Environmental Support to Drilling in Irish Waters – Natura Impact Statement

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DEVELOP

Iolar Exploration Well

Natura Impact Statement

CNOOC Petroleum Europe Limited

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Natura Impact Statement

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ABBREVIATIONS

AA	Appropriate Assessment
API	American Petroleum Institute
BEIS	Department of Business, Energy and Industrial Strategy
BOP	Blow out Preventer
CHARM	Chemical Hazard Assessment and Risk Management
DAHG	Department of Arts, Heritage and the Gaeltacht
dB	Decibel
DCCAE	Department of Communications, Climate Action and Environment
DCENR	Department of Climate, Energy and Natural Resources
DEHLG	Department of Environment, Heritage and Local Government
DP	Dynamic Positioning
EAU	Environmental Advisory Unit
EC	European Community
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ERP	Emergency response plan
FEL	Frontier Exploration Licence
IOGP	International Association of Oil and Gas Producers
IOSEA	Irish Offshore Strategic Environmental Assessment
IPIECA	International Petroleum Industry Environmental Conservation Association
ITOPF	International Tanker Owners Pollution Federation
HP	High Pressure
HT	High Temperature
IMT	Incident Management Team
JNCC	Joint Nature Conservation Committee
JV	Joint Venture
kHz	Kilohertz
km	kilometre
LAT	Lowest astronomical tide
LSE	Likely Significant Effect
m	metre
MARPOL	The International Convention for the Prevention of Pollution from Ships
MSL	Mean Sea Level
NIS	Natura Impact Statement

NMFS	National Marine Fisheries Service (United States)
NCP	National Contingency Plan
NOAA	National Oceanic and Atmospheric Administration (United States)
NPWS	National Parks and Wildlife Services
OSCAR	Oil Spill Contingency and Response model
OBM	Oil Based Mud
OGUK	Oil & Gas UK
OSCAR	Oil Spill Contingency and Response model
OSCP	Oil Spill Contingency Plan
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
OSRL	Oil Spill Response Limited
PAD	Petroleum Affairs Division
PHB	Pre-Hydrated Bentonite
PTS	Permanent Threshold Shift
PUDAC	Permit to Use and Discharge Added Chemicals
rms	Root-Mean Square
SAC	Special Area of Conservation
SEA-PT	Shannon Estuary Anti-Pollution Team
SEL	Sound Exposure Levels
SMRU	Seal Mammals Research Unit
SNCB	Statutory Nature Conservation Bodies
SOPEP	Shipboard Oil Spill Contingency Plan
SPA	Special Protection Area
SPL	Sound Pressure Level
SW	Sea Water
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
TD	Target Depth
TTS	Temporary Threshold Shift
VSP	Vertical Seismic Profiling
WBM	Water Based Mud

1 INTRODUCTION

1.1 Background

CNOOC Petroleum Europe Limited (CNOOC) (previously known as Nexen Petroleum U.K. Limited) plans to drill a single exploration well in the Iolar prospect in Block 52/04 which forms part of Frontier Exploration Licence (FEL) 3/18 in the Porcupine Basin offshore southwest Ireland (termed the 'Project').

The Department of Communication, Energy and Natural Resources (DCENR) (now the Department of Communications, Climate Action and Environment, DCCAE) completed the Irish Offshore Strategic Environmental Assessment (IOSEA) 5 in 2015. The geographical range of the IOSEA5 includes Ireland's Designated Continental Shelf out to the 200-nautical mile (nm) limit and includes all authorisations and activities within the Porcupine Basin. IOSEA5 (DCENR, 2015) supersedes the previous four regional SEAs conducted including that undertaken specifically for the Porcupine Basin, IOSEA2 (DCENR, 2007).

European Community (EC) Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna, commonly known as the Habitats Directive, affords protection to habitats and species of community interest through the designation of an EU-wide network of protected sites known collectively as European sites. These sites are Special Areas of Conservation (SAC) designated under the Habitats Directive and Special Protection Areas (SPA) designated under the Birds Directive (Directive 2009/147/EC). Under Article 6(3) of the Habitats Directive, '*any plan or project which is not directly connected with or necessary to the management of a European site but would be likely to have a significant effect on such a site, either individually or in-combination with other plans and projects, shall be subject to an appropriate assessment of its implications for the European site in view of the site's conservation objectives*.' The requirement for Appropriate Assessment was transposed into Irish law as the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/2011).

On 6th October 2018, CNOOC submitted an Appropriate Assessment Screening Report to the DCCAE in which it identified whether, in view of best scientific knowledge, the Project individually or in combination with another plan or project was likely to have a significant effect on a European site (SAC or SPA including draft, candidate and proposed sites). Following review of this report, on March 27th 2019 the Environmental Advisory Unit (EAU) of DCCAE advertised the notice of the requirement to prepare a Natura Impact Statement (NIS), concluding that *"in the absence of mitigation measures proposed by the applicant, the possibility of a likely significant effect on the site concerned could not be excluded on the basis of objective scientific information, an Appropriate Assessment within the meaning of Article 6(3) of the Directive (92/43/EEC) and Regulation 42 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I.477 of 2011) is required*".

In line with this notice, CNOOC submits this NIS alongside a revised Appropriate Assessment Screening Report (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*) to assist the competent authority, the Minister for Communications, Climate Action and the Environment (the "Minister"), in determining whether the Project, either individually or in combination with other plans or projects, in view of best scientific knowledge, will have an adverse effect on the integrity of any relevant European sites in view of their conservation objectives and specifically on the habitats and species for which the European sites have been designated.

The revised Appropriate Assessment Screening Report (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*), submitted alongside this NIS determined that it it cannot be excluded, on the basis of objective scientific information, that the Project, individually or in combination with other plans or projects, will have a significant effect on a European site. As such there is a need to carry out an Appropriate Assessment for the 63 European sites listed in Table 4.1 and Table 4.2 and displayed in Figure 4.1 of this NIS. This NIS has been prepared to inform the Appropriate Assessment to be carried out by the Minister.

Further information on the specific requirements of the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations 2011 is provided in Section 3.2 of this document.

1.2 Specific Further Information to be Included in the NIS

The Notice of the Requirement to Prepare a NIS provided by the EAU of DCCAE specified that further information must be provided in the NIS on items which are listed in Table 1.1. Table 1.1 also indicates where these items have been addressed in this NIS or the corresponding revised Appropriate Assessment Screening Report. (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*)

Table 1.1 Specific further information to be included in the NIS

EAU information request	CNOOC response and section of this document where it is addressed.
Provision of maximum sound levels from the Vertical Seismic Profiling (VSP).	This has been provided in Section 2.7 of this report.
Confirmation if there are any other projects further inshore or elsewhere off the other coasts of Ireland that may interact to give rise to LSE in combination with the proposed project.	Other projects that may interact to give rise to a significant effect on a European site were considered in the revised Appropriate Assessment Screening Report *(IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3)* and in Section 4.3.66.
Confirm that the entirety of habitat types and species for which a site is protected have been considered.	As outlined in the Section 4.3 of the revised Appropriate Assessment Screening Report (IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3) all habitat types and species for which a site is designated have been considered in the assessment. This NIS only considers those habitat types and species for specific European sites for which, during the revised Appropriate Assessment Screening Report *(IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*) it was not possible to entirely rule out, on the basis of scientific certainty, and without the use of mitigation measures, that there was no likelihood of a significant effect.
Identify the implications of the proposed project for the species present on that site and for which that site has not been listed – as well as the implications for habitat types and species outside the boundaries of that site, insofar as those implications are liable to affect the conservation objectives of the site.	As outlined in the revised Appropriate Assessment Screening Report (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*), habitats and species located outside the boundaries of sites have been considered within Section 4.3.1.2.2.2 and 4.4.1; for example, the presence is considered of harbour porpoise outside the boundaries of the coastal sites for which they are designated. The revised Appropriate Assessment Screening Report (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*) identifies all the European sites and their species and habitats that have been considered in the Appropriate Assessment screening stage and subsequently, where relevant, in the NIS.

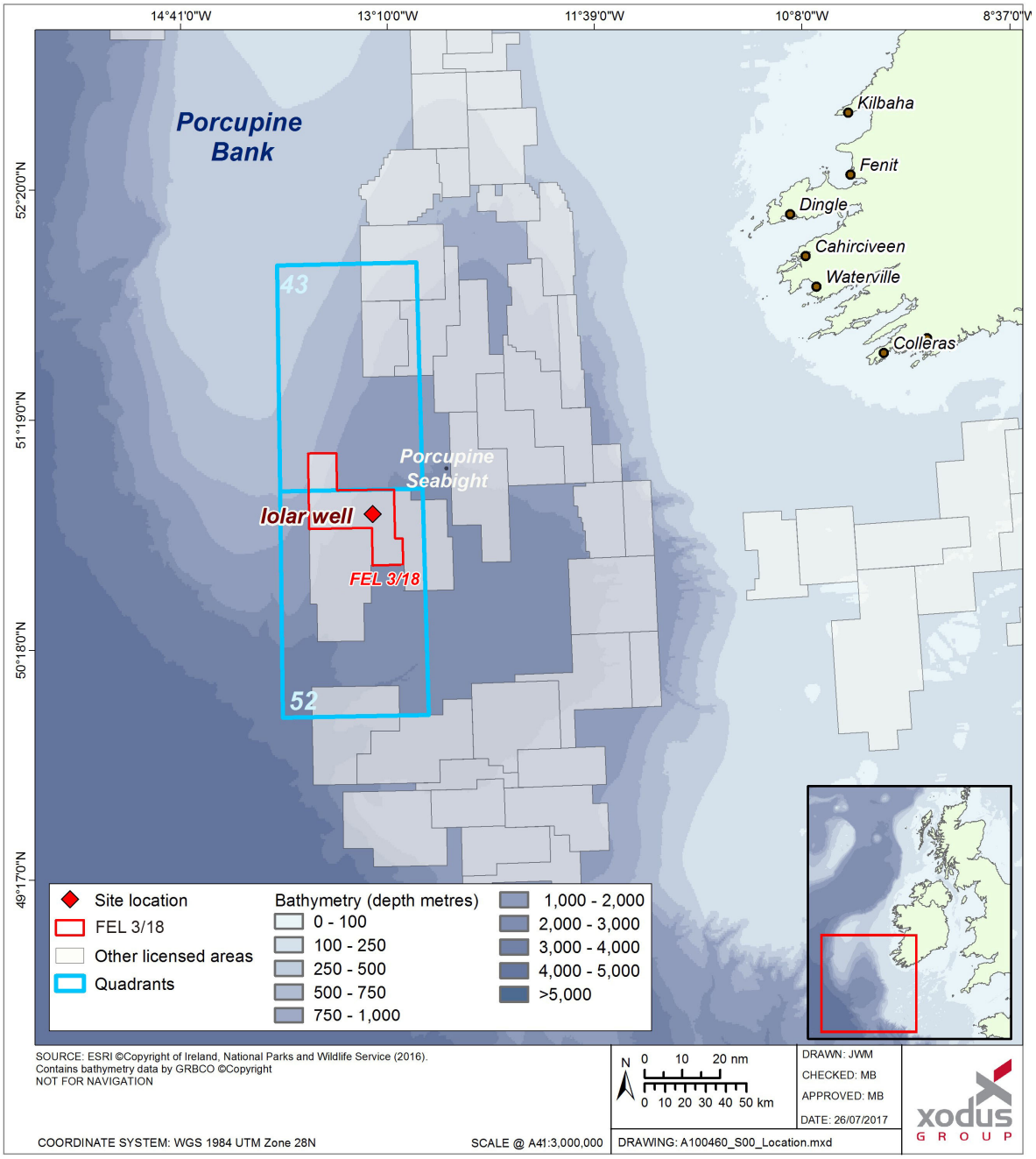
1.3 Project Overview

The Project is located within the Porcupine Basin in FEL 3/18 approximately 232 km southwest of the Irish mainland, in a water depth of approximately 2,200 m (Figure 1.1). The purpose of the proposed well is to gather data on the reservoir characteristics, hydrocarbon presence, pressures and temperatures in order to inform the hydrocarbon potential, in fulfilment of CNOOC's licensing condition. Once exploration drilling

operations are complete, the well will be abandoned, whether or not commercially viable quantities of hydrocarbons are found.

The exploration well will be drilled by a specialist drill ship, the IceMax, with drilling operations now expected to start in May 2019. The total duration of the drilling and abandonment operations (on location) is expected to be around 100 to 150 days. The most favourable weather window for the drilling activities is between 1st April and 30th September.

Figure 1.1 Project Location



1.4 The Applicant

CNOOC is a well-established upstream oil and gas company with a global portfolio. A key focus of CNOOC is exploration and appraisal of interests in the North Sea, offshore West Africa and the north east Atlantic.

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1.5 Structure of this Natura Impact Statement

The NIS is presented in the following sections:

Section 1	*Introduction* – provides a background to the project and the purpose of this NIS.
Section 2	*Project Description* – describes the facilities and activities associated with the Project.
Section 3	*Approach to Meeting the Requirements of the Habitats Directive* – describes the requirements of the Habitats Directive and the relevant Irish transposing legislation with respect to the Project and describes the methodology used to assess the potential for adverse effect.
Section 4	*Information to support an Appropriate Assessment:* – Describes the potential impacts of the Project on the European sites, including in combination with other projects, and concludes on whether the Project, either individually or in combination with other plans or projects, in view of best scientific knowledge, will have an adverse effect on the integrity of any relevant European sites in view of their conservation objectives and specifically on the habitats and species for which the European sites have been designated..
Section 5	*Conclusions*
Section 6	*References*
Appendix A	*European site Information*. Contains tabulated information on the SAC and SPAs requiring Appropriate Assessment and thus considered in the NIS. This includes conservation objectives, the current condition status of the qualifying interests of the sites and site-specific and regional estimates for abundance or habitat areas of specific qualifying interests.
Appendix B	*Source noise data for the underwater noise sound propagation modelling*

2 PROJECT DESCRIPTION

This section describes the proposed programme for drilling a deep-water exploration well at the Iolar Prospect.

2.1 Purpose and Objectives

The purpose of the Project is to gather data on the reservoir characteristics, hydrocarbon presence, pressures and temperatures. Once exploration drilling operations are complete, the well will be abandoned, whether or not potentially commercially viable quantities of hydrocarbons are found. The information gathered from the exploration well, together with data obtained previously such as seismic data, will be used to help inform decisions on any future development at the Iolar prospect, as well as contributing to the broader understanding of the potential reserves in the Porcupine basin. Undertaking exploration drilling is a commitment CNOOC is required to meet following award of FEL 3/18.

The primary objective of the Project is to verify and evaluate the hydrocarbon potential, fluid properties and reservoir quality in the Middle to Upper Jurassic age fault block, in the Iolar prospect, in FEL 3/18. The two secondary objectives are to verify and evaluate the hydrocarbon potential, fluid properties and reservoir quality in the interpreted J3L Top Oxfordian reservoir and to evaluate the hydrocarbon potential, fluid properties and reservoir potential of the Cretaceous succession in the FEL 3/18 area.

2.2 Project Overview and Schedule

The co-ordinates of the proposed Iolar 52/04-A well are provided in Table 2.1. The exploration well will be of high pressure / high temperature (HP/HT)[1] and will be drilled using a dynamically positioned drill ship.

Table 2.1 Iolar well details

Well name	Well Number	Surface coordinates (UTM28N ED50)	Water depth (datum Lowest astronomical tide (LAT)[2]
Iolar	52/04-A	50° 53' 31.16"N 13° 21' 24.38"W	2,162 m

The overall footprint of the Project will be limited to the drill ship itself and the 500 m radius safety exclusion zone which will be in place around the drill ship whilst on location. This safety exclusion zone will be approximately 0.8 km^2.

Drilling of the exploration well is now planned to start in May 2019. The total duration of the drilling and abandonment operations (on location) is expected to be in the range of 100 (in the event of a dry hole) to 150 days (in the event of a success case where hydrocarbons are encountered, which will undergo additional formation evaluation that would not be conducted if the well is dry). The most favourable weather window for the drilling activities is between 1st April and 30th September.

[1] The Energy Institute defines a high pressure / high temperature (HP/HT) as:

"High temperature in this context can be defined as when the undisturbed bottom hole temperature at prospective reservoir depth (or total depth) is greater than 300ºF (149ºC). High pressure can be defined as either when the maximum anticipated pore pressure of any porous formation to be drilled through exceeds a hydrostatic gradient of 0.8psi/ft. (representing an Equivalent Mud Weight (EMW) of 1.85SG or 15.4ppg) or, needing deployment of pressure control equipment with a rated working pressure in excess of 10,000psi (690bar, 69MPa). Note that areas of high pressure (abnormal pressure) need not necessarily be accompanied by high temperatures and vice versa."

The Iolar well can be considered a HP/HT well under this definition because the temperature and the surface wellhead pressure is above the designated 300°F and 10,000psi respectively. The Iolar well has a maximum bottom hole static temperature of 323°F and a base case wellhead pressure of 10,300psi; maximum wellhead pressure of +/-12,000psi.

[2] LAT = Mean sea level (MSL) -1.9 m.

2.3 Drill Ship

The Iolar exploration well will be drilled using the IceMax drill ship (Figure 2.1). Drill ships are purpose-built seagoing vessels. The IceMax has proven capability to drill HP / HT wells and to operate in the deep water and harsh metocean conditions such as those present west of Ireland. It will maintain position over the drilling location for the duration of exploration drilling activity using a dynamic positioning (DP) system.

Drilling equipment is located on the deck, with the derrick normally placed in the middle of the ship. The well is drilled through an opening (called a "moon pool") that extends to the water's surface below the derrick and allows the ship to swing around the well to maintain station in all wind directions. As part of the DP system, computer-controlled thrusters will be operating more-or-less continuously to keep the drill ship precisely over the drilling location as required.

Dynamically-positioned drill ships navigate under their own steam and position themselves at the drilling location. In addition to the drill ship, the operations will require support vessels for supply of materials and for safety standby duties, and helicopter transfer of personnel to and from the drill ship. Helicopters may be used occasionally to supply the drill ship with equipment required at short notice. Otherwise, all transport of drilling equipment, supplies, water, fuel and food will be undertaken by supply vessels, which will also return waste materials and surplus equipment to shore. Table 2.2 shows an overview of the estimated fuel consumption of the drill ship and its associated support vessels and aircraft for the duration of the Project. These durations do not include mobilisation, demobilisation or transit times, and also do not include allowance for weather delays.

The drill ship design exceeds the 100-year return extreme and highest significant wave heights recorded in Fugro (2017a). These wave height records run to 2015 and therefore incorporate any changes in metocean conditions due to climate change up to this date.

Figure 2.1 Stena IceMax - the drill ship proposed to be used for exploration drilling at Iolar

Table 2.2 Vessel requirements and estimated fuel consumption

Activity	Vessel	Fuel type	Consumption rate	Duration	Total fuel consumption (tonnes)
DP drill ship on location	IceMax	Diesel	50 tonnes/day	150 days	7,500
Support shipping	Standby vessel	Diesel	1.7 tonnes/day	150 days	255
Support shipping	Supply vessels (x3)	Diesel	10 tonnes/day	150 days per vessel	4,500
Transport personnel and freight (5 x 1 hour 15-minute return flights from Kerry per week)	S92 Helicopter	Jet fuel	1.56 tonnes/per return trip	85 return trips	132.6

2.4 Well Engineering

The drilling activity proposed is a single deviated well with an option to drill a short side track for coring purposes. The proposed Iolar well will be to a total depth of either 6,310 m total vertical depth subsea (TVDSS) in the success case (i.e., if hydrocarbons are encountered) and 5,923 m in the dry hole case. Figure 2.2 illustrates the well design and main dimensions.

Drilling of the well will be conducted in a number of phases. The first is the drilling or jetting of a 36" diameter "top hole" section into the surface of the seabed, a process known as spudding. This first section is the widest of all the sections that will be drilled; each subsequent section that is drilled will be of successively smaller diameter. Once the top hole is drilled, a 36" conductor pipe will be inserted into the hole and set in place. A 26" section will then be drilled through the conductor and will be lined with a 20" casing, also cemented in place. The conductor and casing will create a seal between the exposed rock of the upper wellbore sections and the inside of the well, and provide an attachment point for the wellhead assembly. The wellhead assembly will be installed and will in turn provide a mechanism to attach the blowout preventer (BOP) and to hang subsequent casing strings inside the well. The BOP is an arrangement of valves installed, in this case on top of the wellhead on the seabed, to prevent an uncontrolled release of gas and/or oil from the formation during drilling Once the BOP is installed on the wellhead, a surface riser will be connected from the BOP back to the drill ship; this will isolate the drill string from the marine environment and provide a conduit to return the mud and cuttings from the deeper sections of the well back to the drill ship.

The deeper 19", 17½", 12¼" and 8½" sections of the well will then be drilled with the drilling fluids circulated back to the drill ship. A 16" liner and 13⅝" x 13⅜' and 9⅝" x 9⅞" casings and will be installed and cemented in place for the third, fourth and fifth sections in the drilling sequence, respectively. The 8½" section will not have a casing or liner installed (Figure 2.2).

If the well is deemed to be a success, the well may be plugged below the 9⅝" casing and a side track drilled through the same formations as the main well bore, from which core samples will be obtained to provide further information on the hydrocarbon-bearing formations.

2.5 Data gathering

Once the required well depth is reached, the exposed rock formations will be evaluated by running wireline logs, which take a series of measurements from inside the wellbore. The measurements are used to characterise rock formation properties and the potential presence of hydrocarbons. Wireline sampling may also be undertaken to collect in-situ fluids downhole at reservoir conditions, from the rock formations. These fluid samples are recovered to surface in sealed containers for future analysis.

If required, wireline logs may include vertical seismic profiling (VSP) to establish the geological structure of the formations through which the well passes, and to calibrate previously acquired surface seismic data to the wellbore, for future analysis. This involves the deployment of an array of geophones at regular intervals, throughout the wellbore. To undertake VSP the sound source is suspended from deck in the water column, and the recorders (geophones), located down hole, provide a high-resolution seismic image of the immediate vicinity of the well; see Section 2.8 below.

In a success case a side track core is planned to collect reservoir rock - coring is a way of cutting a cylindrical sample of rock and recovering the sample to surface for future laboratory testing for rock properties and presence of hydrocarbons. Up to 150 m of core will be cut in maximum 4 coring runs, and in this case the core will be collected from a new secondary wellbore (side track) drilled in parallel to the original well.

2.6 Mud System and Cuttings Disposal

The first two sections of the well (36" and 26") will be drilled before a marine riser is installed. This means that all drilling fluids, rock cuttings and residual cement returns from these sections will be discharged directly onto the seabed in the immediate vicinity of the well. These sections will be jetted/drilled using seawater and pre-hydrated bentonite sweeps (a type of WBM).

The deeper sections (19", 17½", 12¼" and 8½") will be drilled using OBM. The mud will be pumped downhole and then circulated back to the surface via the annulus (the space between the drill stem and the wall of the bore hole) and through the BOP stack and the marine riser back to the drill ship. On board the drill ship, drill cuttings are separated out and the mud recycled back into the well. Drill cuttings and associated residual oil from the sections drilled with OBM will be collected and stored onboard, prior to being shipped to shore for management and eventual disposal.

Table 2.3 provides an estimate of the amounts of cuttings and WBM that will be generated/used and subsequently discharged to sea. The estimate is based on modelling, which was carried out using quantities higher than what is expected from the current well design, and therefore the values presented in Table 2.3 are a conservative, worst case estimate.

Figure 2.2 Iolar exploration well

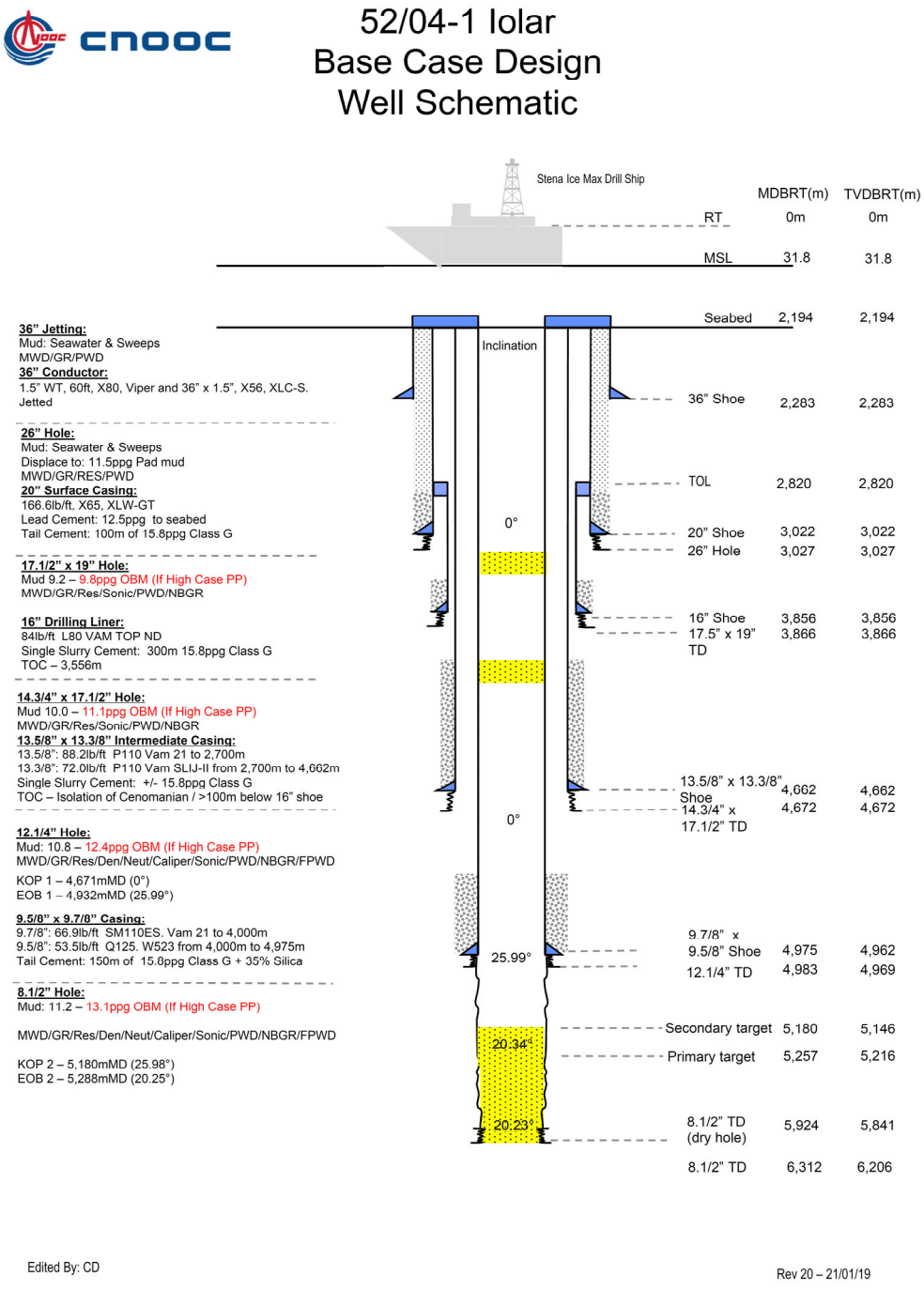


Table 2.3 Use / generation and fate of drilling mud and cuttings

Section	Mud/fluid type	Cuttings generated (tonnes)	Fate	Mud discharged (tonnes)	Cuttings discharged (tonnes)
36"	Seawater with sweeps (WBM)	152	Discharged at seabed	941	152
26"		662		2,168	662
19"	OBM	443	Shipped to shore for processing and disposal	0	0
17½"		325		0	0
12¼"		615		0	0
8½"		872		0	0

2.7 Cement and Other Chemicals

The steel casings run into each of the well sections will be cemented in place by circulating cement through the gap between the casing and surrounding formation. During cementing operations, it is normal practice to use a certain amount of excess cement to ensure the integrity of the cement job. It is therefore likely that a small amount of cement will be deposited on the seabed around the wellhead when cementing in place the 36" conductor and the 20" casing, before the BOP is installed. The amount discharged in this fashion is kept to a minimum by the cementing method used and by visually monitoring the operation from the rig via a remotely operated vehicle (ROV).

During the subsequent cement jobs there will be no cement returns to seabed or surface. When cleaning the cement unit after each of the cementing operations is completed, heavily diluted residual cement slurry will be discharged to sea.

The chemicals and additives to be used during drilling will be determined on the basis of the mud composition, which in turn will be determined by the down-hole conditions encountered whilst drilling. They will be selected on their technical specifications as well as their potential environmental impacts, which will be assessed using the CHARM (Chemical Hazard Assessment and Risk Management) risk assessment model where appropriate. The CHARM risk assessment process is designed to ensure that the selection of chemicals and additives minimises environmental toxicity and maximises biodegradability. The use (and discharge) of chemicals is subject to the prior approval of DCCAE, and subsequent usage and discharge records submitted in accordance with Ireland's obligations under OSPAR. Contingency chemicals will be stored on the drill ship to deal with potential difficulties encountered such as stuck drill pipe or loss of circulation.

2.8 Vertical Seismic Profiling

It is possible that vertical seismic profiling (VSP) will be required for the exploration well to ensure that the best possible data are obtained from the well in order to benefit fully from the exploration drilling. The decision on whether or not VSP is needed will be made during the course of the drilling programme. The NIS has therefore fully considered the potential effects arising from VSP. The technique generates energy waves by compressed air from an airgun array (the source). These are directed into the well bore at the geological strata downhole and generate a much smaller footprint than typical seismic surveys. The activity uses a small airgun array, comprising an air gun volume of 250 cu inch, 2000 psi, and with a maximum shot rate of 10 secs. During VSP operations, four to five receivers (geophones) are positioned in a section of the wellbore and the airgun array is discharged into the water column approximately five times at 20 second intervals. The generated sound pulses are reflected through the seabed and recorded by the receivers to generate a profile of the wellbore. The VSP source is expected to generate a noise level of around 220 dB re 1uPa @ 1 m, with the majority of the noise concentrated at low (<100 Hz) frequencies. The total VSP operation will take 6 to 12 hours to complete.

The worst case maximum peak to peak sound pressure level from the VSP, which was used to inform the noise propagation modelling is 235 dB re 1 µPa. This is discussed further in Section 4.2.1.2 and Appendix B. VSP activities will be undertaken from the drill ship at the end of the drilling operations and no additional VSP survey vessel is anticipated to be used during the Project. Once the survey is complete, the data can be used by reservoir engineers to firm up interpretations of formation structure and topography.

2.9 Well Abandonment

Once exploration drilling operations are complete, the exploration well will be permanently plugged and abandoned. Mechanical and cement plugs will be placed along the well, plugging off all points where hydrocarbons could possible enter the wellbore, thus isolating them from surface. The wellhead will be severed and pulled a minimum of 3 m below the seabed in accordance with DCCAE's requirements.

3 APPROACH TO MEETING THE REQUIREMENTS OF THE HABITATS DIRECTIVE

3.1 Introduction

This section of the NIS summarises the requirements of the Habitats Directive (specifically in terms of Article 6) and the relevant Irish transposing legislation with respect to the Project. It details the approach undertaken to assess whether the Project will have an adverse effect on the integrity of the European sites, in view of the sites' conservation objectives.

3.2 Overview of the Habitats Directive and Transposing Legislation

European Community (EC) Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna, commonly known as the Habitats Directive, was established by the EC to meet its obligations under the 1979 Convention on the Conservation of European Wildlife and Natural Habitats, commonly known as the Bern Convention, and to complement the provisions of the already established EC Directive 79/409/EEC on the conservation of wild birds (now replaced by EC Directive 2009/147/EC). The main aim of the Habitats Directive is to 'contribute towards ensuring biodiversity through the conservation of natural habitats of wild fauna and flora' by way of actions taken to 'maintain or restore, at a favourable conservation status, natural habitats and species of wild fauna and flora of Community interest'. Habitats and species of Community interest are defined in a number of Annexes of both the Habitats and Birds Directives.

As part of the Habitats and Birds Directives, protection must be afforded to appropriate sites to assist in fulfilling the aims of the Directives. Specifically, Special Areas of Conservation (SACs) must be designated under the Habitats Directive for habitats and species listed on Annex I and Annex II of the Habitats Directive, whilst under the Birds Directive, Special Protection Areas (SPAs) must be designated for species listed on Annex I of the Directive. Collectively, these sites are referred to as European sites.

The Habitats Directive was initially transposed into Irish law in 1997 by the European Communities (Natural Habitats) Regulations, 1997, with later amendment regulations in 1998 and 2005. However, these regulations were revoked and replaced, and it is now the European Communities (Birds and Natural Habitats) Regulations 2011 (SI No. 477/2011) that implement both the Habitats and Birds Directives into Irish law. Under these Regulations, the effects of a project on the integrity of a European site are assessed and evaluated; the process by which this assessment takes place is described in Section 3.3.

3.3 Article 6 Obligations

Under Article 6(3) of the Habitats Directive, an Appropriate Assessment of a plan or project is required where the plan or project is not directly connected with or necessary to the management of the site as a European site and if it cannot be excluded, on the basis of objective scientific information, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site. Article 7 of the Habitats Directive makes the provisions of Article 6(3) applicable to European sites designated under the Birds Directive (i.e. SPAs).

The Habitats Directive applies the precautionary principle to European sites. Projects can only be permitted when it is ascertained that there will be no adverse effect on the integrity of the site(s) in question. Where adverse effects are identified, a project may only be permitted in the absence of alternative solutions if there is an Imperative Reason of Overriding Public Interest for the project to go head. Where this is the case, Member States are required to take all compensatory measures necessary to ensure that the overall coherence of the European network is protected.

The approach to meeting Article 6 obligations for the Project is described below. It is in line with Article 6 of the Habitats Directive, European Case Law, the requirements of Irish legislation (The European Communities (Birds and Natural Habitats) Regulations 2011) and best practice guidance, e.g.:

- The Department of Environment, Heritage and Local Government, DEHLG, 2010 guidance on Appropriate Assessment of Plans and Projects in Ireland; and

- The Eurpean Commission guidance document “Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC” (2001).

Since the Project is not directly connected to or necessary for the management of the site as a European site, it is necessary to carry out Appropriate Assessment Screening to assess whether, on the basis of objective scientific information, and in view of the conservation objectives of the site, the Project individually or in combination with other plans or projects will have a significant effect on a European site. This includes consideration of SACs and SPAs including draft, candidate and proposed sites.

It is the responsibility of CNOOC to provide sufficient information to enable the competent authority to carry out the Appropriate Assessment.

Therefore, the Appropriate Assessment Screening process has been repeated, in the absence of mitigation measures, to re-examine whether or not, in view of the best scientific knowledge and in view of the conservation objectives of the site, the Project, individually or in combination with other plans or projects is likely to have a significant effect on a European site. This revised Appropriate Assessment Screening Report (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*) is submitted alongside and informs this NIS.

Following the revised Appropriate Assessment Screening exercise, reported in IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3, Table 4.1 and Table 4.2 and Figure 4.1 below present the European sites, impact pathways or qualifying interests, for which it was not possible to exclude at screening stage that the Project will have significant effects on a European site, either individually or in combination with other plans and projects, taking into account their conservation objectives and in light of the best scientific knowledge in the field.

The main objective of the NIS is to provide information to the competent authority in order for them to assess whether the project, individually or in combination with other projects or plans, will have an adverse effect on the integrity of these European sites having regard to the sites’ conservation objectives. The information necessary to inform an Appropriate Assessment (contained within this NIS) includes:

a) Details on the Conservation Objectives of the site;

b) The current condition status of the qualifying interests of the site (e.g. favourable conservation status);

c) Site-specific and regional estimates for abundance of specific qualifying interests; and

d) Assessment of potential impacts on qualifying interests

Appendix A provides the environmental baseline and site designation data (items A – C) whilst Section 4 presents the assessment of potential impact on the qualifying interests and conservation objectives of the sites (item D).

4 INFORMATION TO SUPPORT AN APPROPRIATE ASSESSMENT

4.1 Introduction

This NIS provides the information to enable an Appropriate Assessment of the impacts of the Project on European sites.

An important factor in the consideration of whether a European site is likely to be affected by the proposed Project is the distance between the Project and the site. NPWS guidelines (2011) state that the Appropriate Assessment process should include:

- Any European site within or adjacent to the plan or project area; and
- Any European site within the likely zone of impact of the plan or project. This must be evaluated on the 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.

For the Project to have a significant effect on any or all of these European sites, there must be a pathway from the Project to the site(s) or its features, and the site(s) or its features must be located within the likely zone of impact for the Project. The revised Appropriate Assessment Screening Report (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 -01 Rev U3*) identified two impact pathways from which it was not possible to exclude at the screening stage that the Project, individually or in combination with other plans or projects, will have a significant effect on a European site. These were

- Underwater noise; and
- Unplanned accidental releases.

The information presented here to support an Appropriate Assessment has been divided into these two impact pathways and conducted on a receptor group basis, in which sites designated for a specific receptor group have been presented together. Table 4.1 and Table 4.2 and Figure 4.1 identify the European sites (36 SACs and 27 SPAs), features and impact mechanisms which, based on the revised *IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*), require an Appropriate Assessment.

Further details on each of the European sites requiring Appropriate Assessment, their conservation objectives, feature status and site-specific and regional estimates for abundance or distribution of the specific qualifying features are provided in Appendix A.

As outlined in Section 1, the IOSEA5 (DCENR, 2015) includes all authorisations and activities within the Porcupine Basin, where it considered the ecological impacts of the 2015 Irish Atlantic Margin Licensing Round, individually or in-combination with other plans and projects, on the identified European sites in view of the sites' conservation objectives. Therefore, reference to the IOSEA5 conducted in 2015 (DCENR, 2015) has also been made where relevant, throughout this assessment.

Table 4.1 SACs, features and impact pathways that require an Appropriate Assessment

SAC name [site code]	Distance from the Project (km)	Relevant features as a reason for site designation[3] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Impacts requiring an Appropriate Assessment	
			Planned underwater noise. Direct Injury – VSP. alone	Unplanned accidental releases – Direct impacts, individually and in-combination
Achill Head [002268]	400	Mudflats and sandflats not covered by seawater at low tide	×	✓
		Reefs	×	✓
		Large shallow inlets and bays	×	✓
Akeragh, Banna and Barrow Harbour [00332]	286	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	×	✓
		Mediterranean salt meadows (*Juncetalia maritimi*)	×	✓
		Salicornia and other annuals colonizing mud and sand	×	✓
		Birds: common teal (*Anas crecca*), mallard (*Anas platyrhynchos*), ruddy turnstone (*Arenaria interpres*), ringed plover (*Charadrius hiaticula*), oystercatcher (*Haematopus ostralegus*), golden plover (*Pluvialis apricaria*), common shelduck (*Tadorna tadorna*), wigeon (*Anas penelope*), brent goose (*Branta bernicla*), sanderling (*Calidris alba*) dunlin (*Calidris alpina*), common curlew (*Numenius arquata*), redshank (*Tringa totanus*), bar-tailed godwit (*Limosa lapponica*), goosander (*Mergus merganser*), grey plover (*Pluvialis squatarola*), common greenshank (*Tringa nebularia*).	×	✓
	238	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	×	✓

[3]The list only includes European sites and features for which a significant effect could not be excluded during the Appropriate Assessment Screening, as reported in the Appropriate Assessment Screening Report (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*).

SAC name [site code]	Distance from the Project (km)	Relevant features as a reason for site designation[3] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Impacts requiring an Appropriate Assessment	
			Planned underwater noise. Direct Injury – VSP. alone	Unplanned accidental releases – Direct impacts, individually and in-combination
Ballinskelligs Bay and Inny Estuary [00335]		Mediterranean salt meadows (*Juncetalia maritimi*)	×	✓
Barley Cove to Ballyrisode Point [001040]	258	Salicornia and other annuals colonizing mud and sand	×	✓
		Mudflats and sandflats not covered by seawater at low tide	×	✓
		Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	×	✓
		Mediterranean salt meadows (*Juncetalia maritimi*)	×	✓
		Birds common teal (*Anas crecca*), Eurasian oystercatcher (*Haematopus ostralegus*), Eurasian curlew (*Numenius arquata*), lesser black-backed gull (*Larus fuscus*), black-headed gull (*Larus ridibundus*), northern lapwing (*Vanellus vanellus*), northern fulmar (*Fulmarus* glacialis)	×	✓
Black Head-Poulsallagh Complex [00020]	359	Reefs	×	✓
		Submerged or partially submerged sea caves	×	✓
Blasket Islands [002172]	224	Harbour porpoise (*Phocoena phocoena*)	✓	✓
		Reefs	×	✓
		Submerged or partially submerged sea caves	×	✓
		Grey seal (*Halichoerus grypus*)	×	✓
	435	Large shallow inlets and bays	×	✓

SAC name [site code]	Distance from the Project (km)	Relevant features as a reason for site designation[3] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Impacts requiring an Appropriate Assessment	
			Planned underwater noise. Direct Injury – VSP. alone	Unplanned accidental releases – Direct impacts, individually and in-combination
Broadhaven Bay [000472]		Mudflats and sandflats not covered by seawater at low tide	×	✓
		Reefs	×	✓
		Submerged or partially submerged sea caves	×	✓
		Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	×	✓
		Birds: Turnstone (*Arenaria interpres*), ringed plover (*Charadrius hiaticula*), Eurasian oystercatcher (*Haematopus ostralegus*), European golden plover (*Pluvialis apricaria*), sandwich tern (*Sterna sandvicensis*), brent goose (*Branta bernicla),* sanderling (*Calidris alba*), dunlin (*Calidris alpina*), red knot (*Calidris canutus*), curlew (*Numenius arquata*), common tern (*Sterna hirundo*), Arctic tern (*Sterna paradisaea*), common redshank (*Tringa tetanus)*, black-headed gull (*Larus ridibundus*), bar-tailed godwit (*Limosa lapponica*), common merganser (*Mergus merganser*), grey plover (*Pluvialis squatarola*), northern lapwing (*Vanellus vanellus*)	×	✓
Carrowmore Dunes [002250]	334	Reefs	×	✓
		Birds: common gull (*Larus canus*), ringed plover (*Charadrius hiaticula*), oystercatcher (*Haematopus ostralegus*), wigeon (*Anas penelope*), dunlin (*Calidris alpina*), common curlew (*Numenius arquata*), black-headed gull (*Chroicocephalus ridibundus*), northern lapwing (*Vanellus vanellus*)	×	✓
Carrowmore Point to Spanish Point and Island [001021]	336	Reefs	×	✓
		Coastal lagoons	×	✓

SAC name [site code]	Distance from the Project (km)	Relevant features as a reason for site designation[3] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Impacts requiring an Appropriate Assessment	
			Planned underwater noise. Direct Injury – VSP. alone	Unplanned accidental releases – Direct impacts, individually and in-combination
		Birds: Whooper swan (*Cygnus Cygnus*), lesser black-backed gull (*Larus fuscus*), European storm petrel (*Hydrobates pelagicus*), grey plover (*Pluvialis squatarola*), northern lapwing (*Vanellus vanellus*), ruddy turnstone (*Arenaria interpres*) barnacle goose (*Branta leucopsis*), ringed plover (*Charadrius hiaticula*), Eurasian oystercatcher (*Haematopus ostralegus*), great cormorant (*Phalacrocorax carbo*), golden plover (*Pluvialis apricaria*), sanderling (*Calidris alba*), dunlin (*Calidris alpine*), purple sandpiper (*Calidris maritima*), Curlew (*Numenius arquata*), common redshank (*Tringa tetanus*).	×	✓
Connemara Bog Complex [002034]	360	Coastal lagoons	×	✓
		Reefs	×	✓
		Atlantic salmon (*Salmo salar*)	×	✓
		Otter (*Lutra lutra*)	×	✓
		Birds: golden plover (*Pluvialis apricaria*), sandwich tern (*Thalasseus sandvicensis*)	×	✓
Erris Head [001501]	434	Birds: Northern fulmar (*Fulmarus glacialis*), lesser black-backed gull (*Larus fuscus*), barnacle goose (*Branta leucopsis*),	×	✓
Glenamoy Bog Complex [00500]	445	Atlantic salmon (*Salmo salar*)	×	✓
		Birds: Atlantic puffin (*Fratercula arctica*), golden plover (*Pluvialis apricaria*), black-legged kittiwake (*Rissa tridactyla*) razorbill (*Alca torda*), storm petrel (*Hydrobates pelagicus*) Manx shearwater (*Puffinus puffinus*), common guillemot (*Uria aalge*), northern fulmar (*Fulmarus glacialis*), barnacle goose (*Branta leucopsis*)	×	✓

SAC name [site code]	Distance from the Project (km)	Relevant features as a reason for site designation[3] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Impacts requiring an Appropriate Assessment	
			Planned underwater noise. Direct Injury – VSP. alone	Unplanned accidental releases – Direct impacts, individually and in-combination
Inishbofin and Inishshark [00278]	366	Coastal lagoons	×	✓
		Grey seal (*Halichoerus grypus*)	×	✓
		Birds: barnacle goose (*Branta leucopsis*), Arctic tern (*Sterna paradisaea*) European storm petrel (*Hydrobates pelagicus*) Manx shearwater (*Puffinus puffinus*), northern fulmar (*Fulmarus glacialis*)	×	✓
Inisheer Island [01275]	355	Reefs	×	✓
		Coastal lagoons	×	✓
		Birds: sandwich tern (*Sterna sandvicensis*), little tern (*Sterna albifrons*), Arctic tern (*Sterna paradisaea*)	×	✓
Inishkea Islands [00507]	415	Grey seal (*Halichoerus grypus*)	×	✓
		Birds: sanderling (*Calidris alba*), dunlin (*Calidris alpina*), purple sandpiper (*Calidris maritima*), ruddy turnstone (*Arenaria interpres*), barnacle goose (*Branta leucopsis*), ringed plover (*Charadrius hiaticula*), common tern (*Sterna hirundo*), Arctic tern (*Sterna paradisaea*), Eurasian oystercatcher (*Haematopus ostralegus*), European herring gull (*Larus argentatus*), great black-backed gull (*Larus marinus*), golden plover (*Pluvialis apricaria*), northern lapwing (*Vanellus vanellus*), lesser black-backed gull (*Larus fuscus*), little tern (*Sterna albifrons*)	×	✓
Inishmaan Island [0000212]	353	Reefs	×	✓
	345	Reefs	×	✓

SAC name [site code]	Distance from the Project (km)	Relevant features as a reason for site designation[3] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Impacts requiring an Appropriate Assessment	
			Planned underwater noise. Direct Injury – VSP. alone	Unplanned accidental releases – Direct impacts, individually and in-combination
Inishmore Island [000213]		Coastal lagoons	×	✓
		Submerged or partially submerged sea caves	×	✓
		Birds: ringed plover (*Charadrius hiaticula*), European shag (*Phalacrocorax aristotelis*), great cormorant (*Phalacrocorax carbo*), black-legged kittiwake (*Rissa tridactyla),* Arctic tern (*Sterna paradisaea*), razorbill (Alca torda), common guillemot (*Uria aalge*), northern lapwing (*Vanellus vanellus*), northern fulmar (*Fulmarus glacialis*), sandwich tern (*Sterna sandvicensis*)	×	✓
Kenmare River [IE02158]	230	Large shallow inlets and bays	×	✓
		Reefs	×	✓
		Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	×	✓
		Mediterranean salt meadows (*Juncetalia maritimi*)	×	✓
		Submerged or partially submerged sea caves	×	✓
		Otter (*Lutra lutra*)	×	✓
		Harbour seal (*Phoca vitulina*)	×	✓
		Birds: Arctic tern (*Sterna paradisaea*), little tern (*Sterna albifrons*)	×	✓
Kerry Head Shoal [02263]	278	Reefs	×	✓
Kilkee Reefs [02264]	317	Reefs	×	✓
		Submerged or partially submerged sea caves	×	✓

SAC name [site code]	Distance from the Project (km)	Relevant features as a reason for site designation[3] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Impacts requiring an Appropriate Assessment	
			Planned underwater noise. Direct Injury – VSP. alone	Unplanned accidental releases – Direct impacts, individually and in-combination
		Large shallow inlets and bays	×	✓
Kilkeran Lake and Castlefreke Dunes [01061]	315	Coastal lagoons	×	✓
Kilkieran Bay and Islands [02111]	354	Mudflats and sandflats not covered by seawater at low tide	×	✓
		Reefs	×	✓
		Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	×	✓
		Mediterranean salt meadows (*Juncetalia maritimi*)	×	✓
		Coastal lagoons	×	✓
		Large shallow inlets and bays	×	✓
		Otter (*Lutra lutra*)	×	✓
		Harbour seal (*Phoca vitulina*)	×	✓
		Birds: common tern (*Sterna hirundo*), Arctic tern (*Sterna paradisaea*), barnacle goose (*Branta leucopsis*), Little tern (*Sterna albifrons*)	×	✓
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment [00365]	243	Otter (*Lutra lutra*)	×	✓
		Sea Lamprey (*Petromyzon marinus*)	×	✓
		Brook lamprey (*Lampetra planeri*)	×	✓
		River lamprey (*Lampetra fluviatilis*)	×	✓
		Atlantic salmon (*Salmo salar*)	×	✓

SAC name [site code]	Distance from the Project (km)	Relevant features as a reason for site designation[3] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Impacts requiring an Appropriate Assessment	
			Planned underwater noise. Direct Injury – VSP. alone	Unplanned accidental releases – Direct impacts, individually and in-combination
Lough Hyne Nature Reserve and Environs [00097]	291	Reefs	×	✓
		Submerged or partially submerged sea caves	×	✓
		Large shallow inlets and bays	×	✓
Lower River Shannon [02165]	290	Large shallow inlets and bays	×	✓
		Salicornia and other annuals colonizing mud and sand	×	✓
		Mudflats and sandflats not covered by seawater at low tide	×	✓
		Sandbanks which are slightly covered by sea water all the time	×	✓
		Reefs	×	✓
		Estuaries	×	✓
		Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	×	✓
		Mediterranean salt meadows (*Juncetalia maritimi*)	×	✓
		Coastal lagoons	×	✓
		Bottlenose dolphin (*Tursiops truncatus*)	×	✓
		Otter (*Lutra lutra*)	×	✓
		Sea Lamprey (*Petromyzon marinus*)	×	✓
		Brook lamprey (*Lampetra planeri*)	×	✓
		River lamprey (*Lampetra fluviatilis*)	×	✓
		Atlantic salmon (*Salmo salar*)	×	✓

SAC name [site code]	Distance from the Project (km)	Relevant features as a reason for site designation[3] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Impacts requiring an Appropriate Assessment	
			Planned underwater noise. Direct Injury – VSP. alone	Unplanned accidental releases – Direct impacts, individually and in-combination
		Freshwater pearl mussel (*Margaritifera margaritifera*)	×	✓
		Birds: razorbill (*Alca torda*), Greater scaup (*Aythya marila*), Scopoli's shearwater (*Calonectris diomedea*), grwat northern diver (*Gavia immer*), Red-throated diver (*Gavia stellata*), black-headed gull (*Larus ridibundus*), bar-tailed godwit (*Limosa lapponica*), bartailed godwit (*Limosa limosa*), common guillemot (*Uria aalge*), northern lapwing (*Vanellus vanellus*), ruddy turnstone (*Arenaria interpres*), ringed plover (*Charadrius hiaticula*) great cormorant (*Phalacrocorax carbo*), European golden plover (*Pluvialis apricaria*), black-legged kittiwake (*Rissa tridactyla*) Sandwich tern (*Thalasseus sandvicensis*), common shelduck (*Tadorna tadorna*) common teal (*Anas crecca*), mallard (*Anas platyrhynchos*), greylag goose (*Anser anser*), wigeon (Anas penelope), brent goose (*Branta bernicla*), dunlin (*Calidris alpina*), red knot (*Calidris canutus*), northern shoveler (*Anas clypeata*), whooper swan (*Cygnus Cygnus*), common greenshank (*Tringa nebularia*), curlew (*Numenius arquata*), Leach's petrel (Oceanodroma leucorhoa), common tern (*Sterna hirundo*), Arctic tern (*Sterna paradisaea*), redshank (*Tringa totanus*)	×	✓
Magharee Islands [002261]	277	Reefs	×	✓
		Birds: common tern (*Sterna hirundo*), Arctic tern (*Sterna paradisaea*)	×	✓
Mount Brandon [00375]	255	Birds: northern fulmar (*Fulmarus glacialis*),	×	✓
Mullet/Blacksod Bay Complex [000470]	419	Large shallow inlets and bays	×	✓
		Salicornia and other annuals colonizing mud and sand	×	✓

SAC name [site code]	Distance from the Project (km)	Relevant features as a reason for site designation[3] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Impacts requiring an Appropriate Assessment	
			Planned underwater noise. Direct Injury – VSP. alone	Unplanned accidental releases – Direct impacts, individually and in-combination
		Mudflats and sandflats not covered by seawater at low tide	×	✓
		Reefs	×	✓
		Otter (*Lutra lutra*)	×	✓
		Birds: Red-necked phalarope (*Phalaropus lobatus*), European golden plover (*Pluvialis apricaria*), ruddy turnstone (*Arenaria interpres*), barnacle goose (*Branta leucopsis*), ringed plover (*Charadrius hiaticula*), common snipe (*Gallinago gallinago*) oystercatcher (*Haematopus ostralegus*) brent goose (*Branta bernicla*), sanderling *(Calidris alba*), dunlin (*Calidris alpina*) red knot (*Calidris canutus*), common curlew (*Numenius arquata*), redshank (*Tringa tetanus*), greater white-fronted goose (*Anser albifrons flavirostris*), great northern diver (*Gavia immer*), red-throated diver (*Gavia stellata*), bar-tailed godwit (*Limosa lapponica*), common scoter (*Melanitta nigra*), goosander (*Mergus merganser*), grey plover (*Pluvialis squatarola*), northern lapwing (*Vanellus vanellus*), whooper swan (*Cygnus cygnus*), little tern (*Sternula albifrons*), common greenshank (*Tringa nebularia*)	×	✓
Omey Island Machair [001309]	365	Birds: grey plover (*Pluvialis squatarola*), ruddy turnstone (*Arenaria interpres*), ringed plover (*Charadrius hiaticula*), golden plover (Pluvialis apricaria), sanderling (*Calidris alba*), dunlin (*Calidris alpina*)	×	✓
Roaringwater Bay and Islands [000101]	268	Harbour porpoise (*Phocoena phocoena*)	✓	✓
		Reefs	×	✓
		Large shallow inlets and bays	×	✓
		Submerged or partially submerged sea caves	×	✓

SAC name [site code]	Distance from the Project (km)	Relevant features as a reason for site designation[3] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Impacts requiring an Appropriate Assessment	
			Planned underwater noise. Direct Injury – VSP. alone	Unplanned accidental releases – Direct impacts, individually and in-combination
		Otter (*Lutra lutra*)	×	✓
		Grey seal (*Halichoerus grypus*)	×	✓
		Birds: northern fulmar (*Fulmarus glacialis*), Razorbill (*Alca torda),* Lesser black-backed gull (*Larus fuscus*), Great cormorant (*Phalacrocorax carbo*), Common guillemot (*Uria aalge*)	×	✓
Slyne Head Islands [00328]	350	Reefs	×	✓
		Grey seal (*Halichoerus grypus*)	×	✓
		Birds: storm petrel (*Hydrobates pelagicus*), Manx shearwater (*Puffinus puffinus),* Arctic tern (*Sterna paradisaea*)	×	✓
Slyne Head Peninsula [002074]	354	Large shallow inlets and bays	×	✓
		Reefs	×	✓
		Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	×	✓
		Mediterranean salt meadows (*Juncetalia maritimi)*	×	✓
		Coastal lagoons	×	✓
		Birds: common tern (*Sterna hirundo*) Sandwich tern (*Thalasseus sandvicensis*)	×	✓
Three Castle Head to Mizen Head [00109]	254	Birds: razorbill (*Alca torda*), great cormorant (*Phalacrocorax carbo*), northern fulmar (*Fulmarus glacialis*), common guillemot (*Uria aalge*), Black-legged kittiwake (*Rissa tridactyla*)	×	✓
	266	Large shallow inlets and bays	×	✓

SAC name [site code]	Distance from the Project (km)	Relevant features as a reason for site designation[3] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Impacts requiring an Appropriate Assessment	
			Planned underwater noise. Direct Injury – VSP. alone	Unplanned accidental releases – Direct impacts, individually and in-combination
Tralee Bay and Magharees Peninsula, West to Cloghane		Salicornia and other annuals colonizing mud and sand	×	✓
		Mudflats and sandflats not covered by seawater at low tide	×	✓
		Reefs	×	✓
		Estuaries	×	✓
		Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*	×	✓
		Mediterranean salt meadows (*Juncetalia maritimi*)	×	✓
		Coastal lagoons	×	✓
		Otter (*Lutra lutra*)	×	✓
		Birds: northern pintail (*Anas acuta*), wigeon (*Anas penelope*), brent goose (*Branta bernicla*), sanderling (*Calidris alba*), dunlin (*Calidris alpina*), red knot (Calidris canutus) purple sandpiper (*Calidris maritima*), common curlew (*Numenius arquata*), redshank (Tringa totanus) common teal (*Anas crecca*), ruddy turnstone (*Arenaria interpres*), ringed plover (*Charadrius hiaticula*), golden plover (*Pluvialis apricaria*), shelduck (*Tadorna tadorna*), northern shoveler (*Anas clypeata*), red-breasted merganser (*Mergus serrator*), greenshank (*Tringa nebularia*), gadwall (*Anas Strepera*), greater scaup (*Aythya marila*), great northern diver (*Gavia immer*), bar-tailed godwit (*Limosa lapponica*), black-tailed godwit (*Limosa limosa*), common scoter (*Melanitta nigra*), grey plover (*Pluvialis squatarola*), northern lapwing (*Vanellus vanellus*)	×	✓
	231	Mudflats and sandflats not covered by seawater at low tide	×	✓

SAC name [site code]	Distance from the Project (km)	Relevant features as a reason for site designation[3] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Impacts requiring an Appropriate Assessment	
			Planned underwater noise. Direct Injury – VSP. alone	Unplanned accidental releases – Direct impacts, individually and in-combination
Valencia Harbour/Portmagee Channel [002262]		Reefs	×	✓
		Large shallow inlets and bays	×	✓
West Connacht Coast [IE02998]	357	Bottlenose dolphin (*Tursiops truncatus*)	×	✓
		Grey seal (*Halichoerus grypus*)	×	✓
		Harbour porpoise (*Phocoena phocoena*)	✓	✓
		Harbour seal (*Phoca vitulina*)	×	✓

Table 4.2 SPA features and impact pathways that require an Appropriate Assessment

SPA name [site code]	Distance from the Project (km)	Special Conservation Interests (as listed on Annex I of the EC Birds Directive 2009/147/EC)[4]	Impacts requiring an Appropriate Assessment	
			Planned underwater noise	Unplanned accidental releases Direct impacts, individually and in-combination
Beara Peninsula [004155]	230	Northern fulmar (*Fulmarus glacialis*), European herring gull (*Larus argentatus*), Common shag (*Phalacrocorax aristotelis*)	×	✓
Bills Rocks [004177]	394	Atlantic puffin (*Fratercula arctica*), Northern fulmar (*Fulmarus glacialis*), storm petrel (*Hydrobates pelagicus*), Common shag (*Phalacrocorax aristotelis*), Black-legged kittiwake (*Rissa tridactyla*)	×	✓
Blasket Islands [004008]	227	Razorbill (*Alca torda*), Atlantic puffin (*Fratercula arctica),* Northern fulmar (*Fulmarus glacialis*), Storm petrel (*Hydrobates pelagicus*), Common gull (*Larus canus*), Lesser black-backed gull (*Larus fuscus*),Leach's petrel (*Oceanodroma leucorhoa*), Manx shearwater (*Puffinus puffinus*), Common shag (*Phalacrocorax aristotelis*), Black-legged kittiwake (*Rissa tridactyla*), Arctic tern (*Sterna paradisaea*), Common guillemot (*Uria aalge*)	×	✓
Cliffs of Moher [004005]	350	Razorbill (*Alca torda*), Atlantic puffin (*Fratercula arctica*), Northern fulmar (*Fulmarus glacialis*), Black-legged kittiwake (*Rissa tridactyla*), Common guillemot (*Uria aalge*)	×	✓
Cruagh Island [004170]	362	Manx shearwater (*Puffinus puffinus*), Barnacle goose (*Branta leucopsis*)	×	✓
Deenish Island and Scariff Island [004175]	234	Northern fulmar (*Fulmarus glacialis*), Storm petrel (*Hydrobates pelagicus*), Herring gull (*Larus argentatus*), Black-backed gull (*Larus fuscus*), Manx shearwater (*Puffinus puffinus*), Arctic tern (*Sterna paradisaea*).	×	✓
Dingle Peninsula [004153]	241	Northern fulmar (*Fulmarus glacialis*),	×	✓

[4]Note 1: The list only includes European sites and features for which a likely significant effect could not be excluded during the Appropriate Assessment Screening, as reported in the Appropriate Assessment Screening Report (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*).

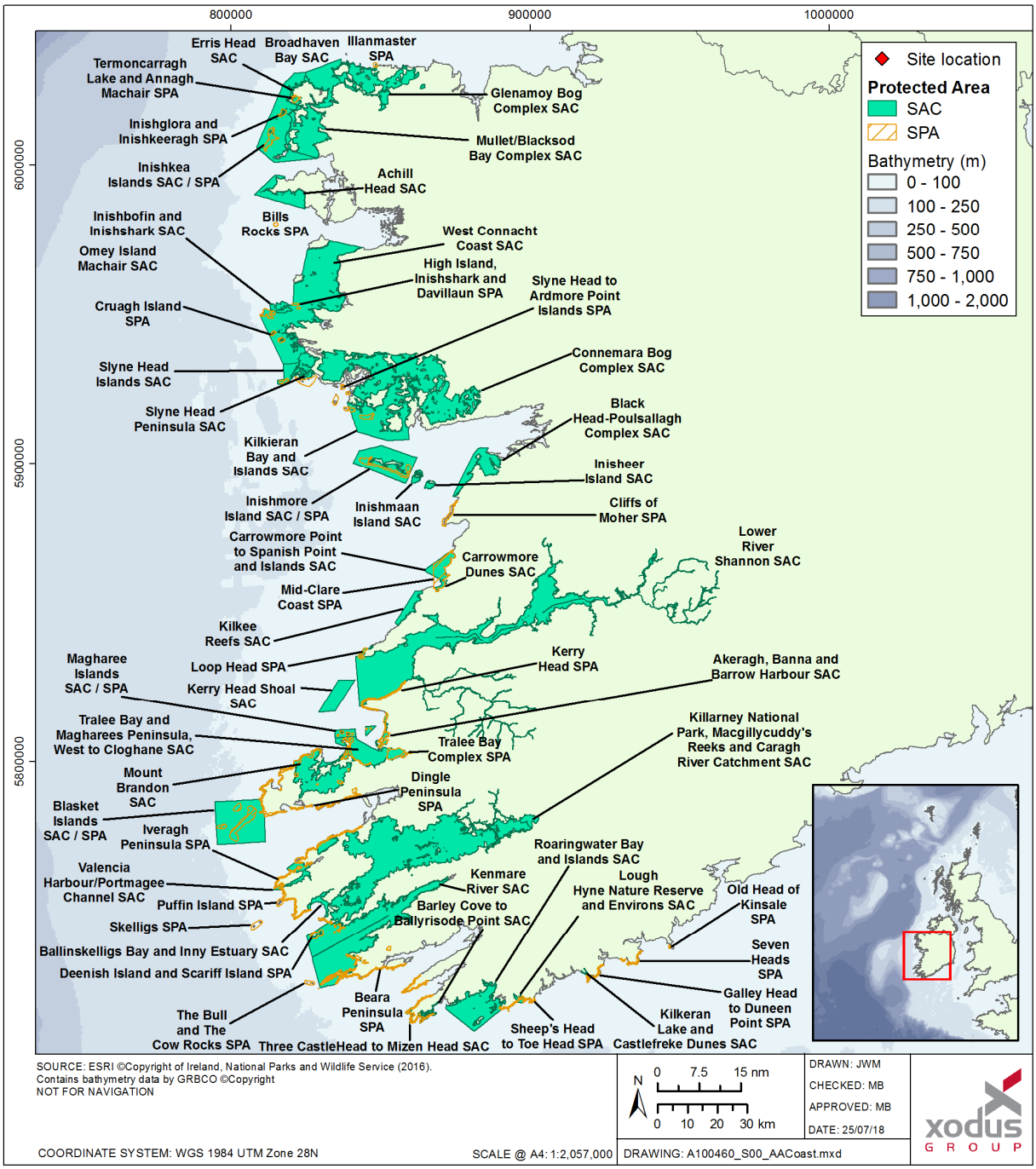
SPA name [site code]	Distance from the Project (km)	Special Conservation Interests (as listed on Annex I of the EC Birds Directive 2009/147/EC)[4]	Impacts requiring an Appropriate Assessment	
			Planned underwater noise	Unplanned accidental releases Direct impacts, individually and in-combination
Galley Head to Duneen Point [004190]	316	Northern fulmar (*Fulmarus glacialis*), Herring gull (*Larus argentatus*),	×	✓
High Island, Inishshark and Davillaun [004144]	362	Barnacle goose (*Branta leucopsis*), Northern fulmar (*Fulmarus glacialis*), Herring gull (*Larus argentatus*), *Common gull (Larus canus),* Common shag (*Phalacrocorax aristotelis*), Manx shearwater (*Puffinus puffinus),* Black-legged kittiwake (*Rissa tridactyla*), Arctic tern (*Sterna paradisaea*)	×	✓
Illanmaster [04074]	457	Barnacle goose (*Branta leucopsis*), Atlantic puffin (*Fratercula arctica*), Storm petrel (*Hydrobates pelagicus*)	×	✓
Inishglora and Inishkeeragh [04084]	427	Barnacle goose (*Branta leucopsis*), Storm petrel (*Hydrobates pelagicus*), Herring gull (*Larus argentatus*), Common gull *(Larus canus),* Lesser black-backed gull (*Larus fuscus*), Common shag (*Phalacrocorax aristotelis*), Great cormorant (*Phalacrocorax carbo*), Arctic tern (*Sterna paradisaea*)	×	✓
Inishkea Islands [04004]	415	Common teal (*Anas crecca*), Ruddy turnstone (*Arenaria interpres*), Barnacle goose (*Branta leucopsis),* Sanderling (*Calidris alba*), Dunlin (*Calidris alpina),* Purple sandpiper (*Calidris maritima*), Ringed plover (*Charadrius hiaticula*), Northern fulmar (*Fulmarus glacialis*), Common snipe (*Gallinago gallinago*), Eurasian oystercatcher (*Haematopus ostralegus*), Storm petrel (*Hydrobates pelagicus*), Common gull *(Larus canus),* Lesser black-backed gull (*Larus fuscus*), Golden plover (*Pluvialis apricaria*), Little tern (*Sternula albifrons*), Common tern (*Sterna hirundo*), Arctic tern (*Sterna paradisaea),* redshank (*Tringa totanus*), Northern lapwing (*Vanellus vanellus*)	×	✓
Inishmore [004152]	347	Razorbill (*Alca torda*), Northern fulmar (*Fulmarus glacialis*), European herring gull (*Larus argentatus*), Common shag (*Phalacrocorax aristotelis*), Black-legged kittiwake (*Rissa tridactyla*), Little tern (*Sternula albifrons*), Arctic tern (*Sterna paradisaea),* Common guillemot (*Uria aalge*),	×	✓

SPA name [site code]	Distance from the Project (km)	Special Conservation Interests (as listed on Annex I of the EC Birds Directive 2009/147/EC)[4]	Impacts requiring an Appropriate Assessment	
			Planned underwater noise	Unplanned accidental releases Direct impacts, individually and in-combination
Iveragh Peninsula [004154]	231	Razorbill (*Alca torda*), Northern fulmar (*Fulmarus glacialis),* European herring gull (*Larus argentatus*), Common shag (*Phalacrocorax aristotelis*), Great cormorant (*Phalacrocorax carbo*), Black-legged kittiwake (*Rissa tridactyla*), Common guillemot (*Uria aalge*)	×	✓
Kerry Head [004189]	290	Northern fulmar (*Fulmarus glacialis*)	×	✓
Loop Head [004119]	300	Razorbill (*Alca torda*), Northern fulmar (*Fulmarus glacialis*), Black-legged kittiwake (*Rissa tridactyla*), Common guillemot (*Uria aalge*)	×	✓
Magharee Islands [004125]	278	Barnacle goose (*Branta leucopsis),* Northern fulmar (*Fulmarus glacialis*), Common gull (*Larus canus*), Lesser black-backed gull (*Larus fuscus*), Great cormorant (*Phalacrocorax carbo*), Little tern (*Sternula albifrons*), Common tern (*Sterna hirundo*), Arctic tern (*Sterna paradisaea*)	×	✓
Mid-Clare Coast [04182]	334	Ruddy turnstone (*Arenaria interpres*), Barnacle goose (*Branta leucopsis),* Sanderling (*Calidris alba*), Dunlin (*Calidris alpina),* Purple sandpiper (*Calidris maritima*), Ringed plover (*Charadrius,hiaticula*), Great northern diver (*Gavia immer*), European herring gull (*Larus argentatus*), Common gull (*Larus canus*), Lesser black-backed gull (*Larus fuscus*), Black-headed gull (*Larus ridibundus*), Common curlew (*Numenius arquata*), Common shag (*Phalacrocorax aristotelis*), Great cormorant (*Phalacrocorax carbo*), Golden plover (*Pluvialis apricaria*), Grey plover (*Pluvialis squatarola*), Redshank (*Tringa totanus*) Northern lapwing (*Vanellus vanellus*),	×	✓
Old Head of Kinsale [04021]	345	Razorbill (*Alca torda*), Northern fulmar (*Fulmarus glacialis*), Herring gull (*Larus argentatus*), Common shag (*Phalacrocorax aristotelis*), Black-legged kittiwake (*Rissa tridactyla*), Common guillemot (*Uria aalge)*	×	✓

SPA name [site code]	Distance from the Project (km)	Special Conservation Interests (as listed on Annex I of the EC Birds Directive 2009/147/EC)[4]	Impacts requiring an Appropriate Assessment	
			Planned underwater noise	Unplanned accidental releases Direct impacts, individually and in-combination
Puffin Island [04003]	229	Razorbill (*Alca torda*), Atlantic puffin (*Fratercula arctica*), Northern fulmar (*Fulmarus glacialis*), Storm petrel (*Hydrobates pelagicus*), Herring gull (*Larus argentatus*), Lesser black-backed gull (*Larus fuscus*), Manx shearwater (*Puffinus puffinus),* kittiwake (*Rissa tridactyla*), Common guillemot (*Uria aalge)*	×	✓
Seven Heads [04191]	328	Herring gull (*Larus argentatus*), Great cormorant (*Phalacrocorax carbo*)	×	✓
Sheep's Head to Toe Head	254	Northern fulmar (*Fulmarus glacialis*), Herring gull (*Larus argentatus*)	×	✓
Skelligs [04007]	218	Razorbill (*Alca torda*), Atlantic puffin (*Fratercula arctica*), Northern fulmar (*Fulmarus glacialis*), Storm petrel (*Hydrobates pelagicus*), Manx shearwater (*Puffinus puffinus),* Kittiwake (*Rissa tridactyla*), Northern gannet (*Sula bassana*), Common guillemot (*Uria aalge*)	×	✓
Slyne Head to Ardmore Point Islands [04159]	351	Barnacle goose (*Branta leucopsis),* Little tern (*Sternula albifrons*), Sandwich tern (*Thalasseus sandvicensis*), Arctic tern (*Sterna paradisaea).*	×	✓
Termoncarragh Lake and Annagh Machair [004093]	433	Common teal (*Anas crecca*), Mallard (*Anas platyrhynchos*), Greater white-fronted goose (*Anser albifrons),* Barnacle goose (*Branta leucopsis),* Dunlin (*Calidris alpina*), Ringed plover (*Charadrius hiaticula*), Whooper swan (*Cygnus Cygnus*), Common snipe (*Gallinago gallinago*), Golden plover (*Pluvialis apricaria*), Northern lapwing (*Vanellus vanellus*)	×	✓
The Bull and The Cow Rocks [04066]	226	Razorbill (*Alca torda*), Atlantic puffin (*Fratercula arctica),* Northern fulmar (*Fulmarus glacialis*), Storm petrel (*Hydrobates pelagicus*), Herring gull (*Larus argentatus*), Great cormorant (*Phalacrocorax carbo*), Kittiwake (*Rissa tridactyla*), northern gannet (*Sula bassana*), Common guillemot (*Uria aalge*).	×	✓

SPA name [site code]	Distance from the Project (km)	Special Conservation Interests (as listed on Annex I of the EC Birds Directive 2009/147/EC)[4]	Impacts requiring an Appropriate Assessment	
			Planned underwater noise	Unplanned accidental releases Direct impacts, individually and in-combination
Tralee Bay Complex [004188]	274	Northern pintail (*Anas acuta*), Common teal (*Anas crecca*), Wigeon (*Anas penelope*), Mallard (*Anas platyrhynchos*), Ruddy turnstone (*Arenaria interpres*), Greater scaup (*Aythya marila*), Brent goose (*Branta bernicla*), Sanderling (*Calidris alba*), Dunlin (*Calidris alpina*), Ringed plover (*Charadrius hiaticula*), Whooper swan (*Cygnus Cygnus*), Eurasian oystercatcher (*Haematopus ostralegus*), Common gull (*Larus canus*), Black-headed gull (*Larus ridibundus*), Bar-tailed godwit (*Limosa lapponica*), Black-tailed godwit (*Limosa limosa*), Common curlew (*Numenius arquata*), Golden plover (*Pluvialis apricaria*), Grey plover (*Pluvialis squatarola*), Common shelduck (*Tadorna tadorna*), Redshank (*Tringa tetanus),* Northern lapwing (*Vanellus vanellus*)	×	✓

Figure 4.1 European sites Requiring an Appropriate Assessment



4.2 An assessment of the potentially significant impacts of the Project – underwater noise

The revised Appropriate Assessment Screening exercise (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*) identified three SACs (Blasket Islands, Roaringwater Bay and Islands West Connacht Coast) each with harbour porpoise as Annex II qualifying features for which, at the screening stage, it was not possible to exclude on the basis of the best scientific information whether the Project, individually or in combination with other projects, would likely have a significant effect in relation to direct physical injury from underwater noise from the VSP activities as a result of the Project.

It is worth noting that the Appropriate Assessment Screening exercise (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*) did, however, determine (Sections 4.4.1.6, 4.4.1.7 and 4.4.1.8) that it can be excluded on the basis of objective scientific information that the Project, individually or in combination with other plans or projects, will have a significant effect on the on the Blasket Islands, Roaringwater Bay and Islands and West Connacht Coast harbour porpoise populations with regard to:

- Direct injury from the continuous noise of the drilling and support vessels,
- Direct behavioural disturbance from the continuous noise of the drilling and support vessels
- Direct behavioural disturbance from the impulsive noise from the VSP; and
- Indirect effects resulting from changes in prey availability.

4.2.1 Potentially significant impacts

4.2.1.1 Noise impact mechanisms

There are three primary ways in which marine mammals may be impacted by sound: behavioural change, acoustic response, and physiological effects (Nowacek *et al.*, 2007). Behavioural changes may include changes to movement, such as altering direction or dive pattern, whilst acoustic responses may take the form of changing vocalisation patterns or communication with conspecifics. Both of these impact mechanisms are considered "disturbance responses" to anthropogenic sounds, and they may have population-level consequences if they preclude the use of important habitat for prolonged periods or impact upon their foraging or breeding success (Lusseau and Bejder, 2007; Williams *et al*., 2006).

Physiological responses are generated when noise emissions fall within the hearing frequency-range of an individual. At the very base level, introduced sounds may impact marine mammals by causing auditory fatigue from the repeated focusing of the hearing apparatus on frequencies occurring at the limits of the individual's 'normal' hearing range. Such fatigue may cause a temporary reduction in hearing ability known as a Temporary Threshold Shift (TTS) (Finneran *et al.*, 2005; Popov *et al.*, 2013). When anthropogenic sounds are sufficiently loud (i.e. at a large enough amplitude to generate intense pressure waves), they have the potential to cause permanent injury to hearing apparatus, and even deafness, through Permanent Threshold Shift (PTS) (Southall *et al.*, 2007; NOAA, 2018). In extreme cases, such as exposure to explosive sound, injuries may be sustained despite the sound occurring beyond the range of audibility for the exposed animal.

4.2.1.2 Underwater noise source from the Project

The potential noise sources associated with the Project include:

- Drill ship (utilising DP and drilling);
- Drilling standby vessel; and
- VSP.

Drilling operations and vessel activities are characterised as continuous noise sources, whereas VSP airgun operations are impulsive (i.e. a series of discrete pulsed sounds). Source sound levels from seismic devices are normally described in Decibel (dB) re 1 µPa at 1 m (as if measured at 1 m from the source). In practice, it is not usually possible to measure at 1 m from an active seismic source that is physically distributed over an

area of several square metres. However, this method allows different source levels to be compared and reported on a standardised scale.

The noise source data used in the continuous noise assessment are summarised in Table 4.3 below. Further information regarding the provenance of this data is presented in Appendix B.

Table 4.3 Continuous noise source data

Activity	Data source	Peak sound pressure level dB re 1 µPa	SEL dB re 1 µPa^{2}s	RMS[5] sound pressure level, dB re 1 µPa
Drill ship (including thrusters)	Kyhn *et al.* (2011)	187	184 (1s)	184
Drilling support and standby vessel	Austin & McGillivray (2005)	191	188 (1s)	188

The impulsive VSP[6] assessment was based on the Sercel G-Gun II 250 data sheet for the seismic energy source, supplemented by measured sound data from Breitzke *et al*. (2008), Tolstoy *et al*. (2009) and Richardson *et al* (1995). The assessment used a zero-peak sound pressure level of 235 dB re 1 µPa and a peak-to-peak sound pressure level 231 dB re 1 µPa. Further information regarding the provenance of these data is presented in Appendix B.

4.2.1.3 Quantification of potential injury zones from underwater noise

Noise propagation modelling was undertaken by Xodus Group Ltd. to support this assessment. The outputs of the noise propagation modelling provide insights into the range within which potential injury and disturbance impacts to marine mammals may occur. These are determined by the sound pressure levels (SPLs) received from impulsive sounds which might induce injury, the cumulative sound exposure levels (SELs) animals are subjected to over time, and the distance in which behavioural change (or disturbance) is likely to occur (taken as the root-mean square (rms) for impulsive sound).

Noise propagation modelling for this assessment was carried out using the Xodus SubsoniX noise model, which implements the sound propagation model developed by Rogers (1981). The Rogers sound propagation model is a semi-empirical, range dependent propagation model which is based on a combination of theoretical considerations and extensive experimental data. Consequently, unlike purely theoretical sound propagation models, the calibration for the Rogers model is built into the model itself and it has subsequently been successfully benchmarked against other sound propagation models (e.g. Etter, 2013; Toso *et al.*, 2014; Schulkin and Mercer, 1985) and has been used previously in underwater noise assessments for tidal and wind energy developments (e.g. Dawoud *et al.*, 2015).

The Xodus SubsoniX noise model marries several acoustic concepts including: the refractive cycle (i.e. skip distance) of the source; geometric divergence; deflection of energy into the bottom at high angles by sea surface scattering; a simplified Rayleigh two-fluid model of the bottom for sand or mud sediments; and absorption of sound energy by molecules in the water.

The model utilised the following information for its required inputs:

- Third-octave band source sound level data, source directivity characteristics, and discreet range (distance from source to receiver; all described in Section 4.2.2);
- Water column depth (2,200 m) and sediment layer depth;
- Sediment type (sand/mud); and

[5] RMS: root mean square

[6] The sounds propagation calculations assumed that the VSP would come from a separate vessel. However, VSP is planned to be undertaken from the drill ship itself resulting in a lower sound propagation than previously assumed and therefore the calculations represent a conservative assessment.

- Sea state (0 on the Beaufort scale which would generate the lowest attenuation values, a worst-case condition).

Calculations of the cumulative SELs use the relevant marine mammal hearing-weightings (M-weightings) and take into account the amount of sound energy to which receptors are exposed over the course of a day. Using relevant knowledge of marine mammal behaviour, the model assumes that a marine mammal will swim away from the noise source at a conservative average speed of 1.5 ms^{-1} (Au and Perryman, 1982). The calculation considers each 1-second period of exposure separately, resulting in a series of discrete SEL values of decreasing magnitude. As the animal swims away, the noise will become progressively quieter. The cumulative SEL is then derived by logarithmically adding the decreasing SELs to estimate the approximate minimum start distance for a marine mammal to be exposed to a sufficient sound energy to result in the onset of potential injury. The resultant SEL values are based on the assumption that the animal will continue to swim away from the source at a constant speed and bearing, whereas studies on marine mammal behaviour indicate that animals are likely to move in a more complex manner (Bartumes, 2007). Measurements of swimming speed in various marine mammal species have shown average swimming speeds to be much higher (including 4.3 ms^{-1} for swimming harbour porpoise; (Otani *et al.*, 2000). The conservative swimming speed of 1.5 ms^{-1} used in this assessment can help account for the potential that the marine mammal might not swim directly away from the source or may not maintain a faster speed over a prolonged period.

Finally, the zone of potential behavioural change used to identify the region in which a disturbance is likely to occur. For impulsive sound, this is the rms SPL, a description of the average amplitude of the variations in pressure over time.

It is important to bear in mind that the modelling outputs are not absolute (i.e. impacts only occur within the output distance ranges) and a variety of physiological and environmental factors can influence the actual noise levels received by an animal and their behavioural response to those noises, thereby influencing the significance of the impact. However, the model is based on the maximum (worst case) expected source level, and impact thresholds (discussed below in Section 4.2.1.4) are based on the best available scientific evidence in which potential impacts can be assessed, using the most conservative thresholds. In addition, the multiple pulse sound criteria assume that the animal does not recover hearing between each pulse or series of pulses and so as far as the SEL calculation is concerned breaks in activity are irrelevant. It is likely that both the intervals between pulses and the breaks in operations for line changes could allow some recovery from temporary hearing threshold shifts for animals exposed to the sound and, therefore, the assessment of sound exposure level is considered to be conservative.

The sections below summarise the auditory thresholds used to determine the SPL and SEL impact ranges in the noise propagation modelling and describe the evidence base used to derive them.

4.2.1.4 Impact thresholds

To determine the consequence of received sound levels on any marine mammal it is useful to relate the levels to known or estimated impact thresholds. This section describes the injury impact thresholds used to inform the assessment.

The injury criteria proposed by Southall *et al*. (2007) have been used for this purpose as they are specified by the NPWS (2014) guidance. However more recent injury criteria proposed by the United States National Oceanic and Atmospheric Administration (NOAA, 2018) has been developed which has built on work by Southall *et al*. (2007) and others (e.g., Lucke *et al.*, 2008; etc.). Therefore, both sets of criteria are presented in this assessment to allow a comparison. This approach ensures the assessment is in line with NPWS guidance as well as using further, current scientific evidence.

The injury criteria proposed by NOAA (2018) are based on a combination of linear (i.e. un-weighted) peak pressure levels and mammal weighted SELs. The hearing weighting function is designed to represent the bandwidth for each group within which acoustic exposures can have auditory effects. Harbour porpoise sit in the High-frequency (HF) cetaceans, with an estimated functional hearing range between 275 Hz and 160 kHz.

The injury criteria proposed in NOAA (2018) are based on two different types of sound:

1. Impulsive sound - a sound comprising one or more discrete acoustic events per 24-hour period, such as impact piling, seismic activities, underwater explosions, etc.; and

2. Non-impulsive sound - non-pulsed sound such as continuous running machinery, vessels, or drilling operations.

The Southall *et al*. (2007) proposed injury criteria are very similar to NOAA (2018) and harbour porpoise also sit HF cetaceans with an estimated functional hearing range between 200 Hz and 180 kHz);

The sound types recognised in Southall *et al*. (2007) are also similar to NOAA (2018) but break down the NOAA (2018) impulsive sound category into two sub-categories. Southall *et al*. (2007) categories are as follows:

1. Pulsed sound, broken down into:
    a. Multiple pulsed sound (i.e. sound comprising two or more discrete acoustic events per 24 hour period, such as impact piling and VSP);
    b. Single pulse sound (i.e. a single acoustic event in any 24 hour period, such as an underwater explosion); and
2. Continuous sound (i.e. non-pulsed sound such as continuous running machinery, vessels or drilling).

The NOAA (2018) and Southall *et al*. (2007) underwater acoustic thresholds for the onset of permanent threshold shifts for high frequency cetaceans from impulsive/pulsed sound are presented in Table 4.4 below. The NOAA (2018) values are slightly more conservative than Southall *et al*. (2007).

Table 4.4 NOAA (2018) and Southall *et al.* (2007) criteria for onset of injury (per 24 hr period) to high frequency cetaceans from impulsive/pulsed sound

***Peak pressure, dB re 1 µPa*[7]**		***Cumulative SEL*[8]*, dB re 1 µPa²s ($L_{E,HW,24hr}$)***	
NOAA (2018)	**Southall *et al.* (2007)**	**NOAA (2018)**	**Southall *et al.* (2007)**
202	230	155	198

4.2.1.5 Quantified zone of influence (impact extent)

The sound propagation calculations determined an SEL radius (zone of influence) for injury to harbour porpoise (high frequency cetaceans) during the VSP activities (assuming that the mammals move with a speed of 1.5 ms^{-1}) to be 7 m and 298 m in radius from the source, for the Southall *et al*., (2007) and NOAA (2018) thresholds, respectively, in the absence of a 'soft start' as recommended in the NPWS guidance (see below).

Therefore, direct physical injury to harbour porpoise could potentially occur to any harbour porpoise within a worst-case zone of influence approximately 298 m from the VSP airguns during the short period of the VSP (maximum of 12 hours). Based on the density estimate provided by Rogan *et al.* (2018) from the ObSERVE Programme (0.049 individuals per km^2), the maximum number of harbour porpoise likely to be within the zone where injury could occur at any one time is less than one.

4.2.2 Mitigation measures

In order to mitigate impacts to marine mammals associated with the VSP activities associated with the Project, CNOOC will adhere to the most recent guidance produced by the NPWS - Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (NPWS, 2014). The mitigation measures to be adopted during the VSP are in line with NPWS (2014) guidance and are presented below:

- A qualified and experienced marine mammal observer (MMO) shall be appointed to monitor for marine mammals and to log all relevant events using standardised data forms;
- Sound-producing activities shall only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring, as determined by the MMO, is not possible, the sound-producing activities shall be postponed until effective visual monitoring is possible;

[7] Peak sound pressure should be unweighted within the generalised hearing range.
[8] The recommended accumulation period is 24-hour based on NOAA hearing weighting for each group.

- Pre-start-up monitoring shall be conducted at least 60 minutes before the activity is due to commence. Sound-producing activity shall not commence until at least 60 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO.
- Pre-Start Monitoring shall subsequently be followed by a Ramp-Up Procedure (where possible) which should include continued monitoring by the MMO. Airguns utilised in VSP generally fire for approximately two minutes and then stop for 5 – 10 minutes before repeating the pattern. To ensure that marine mammals are given the opportunity to move away from the airguns as they commence firing, energy would be slowly increased to the maximum level over a period of 40 minutes, in a process called 'soft-start'.
- If there is a break in sound output for a period of 5-10 minutes (e.g., due to equipment failure, shut-down), MMO monitoring must be undertaken to check that no marine mammals are observed within the Monitored Zone prior to recommencement of the sound source at full power.
- If there is a break in sound output for a period greater than 10 minutes (e.g., due to equipment failure, shut-down or station change) then all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) will be undertaken.

4.2.3 Residual impact assessment

The modelling described in Section 4.2.1.3 was also undertaken incorporating the acoustic effects of a soft start as described in the above mitigation measures. It demonstrates that the firing of the air guns by way of a soft start (ramp up) as per the proposed mitigation measures and NPWS (2014) guidance, would reduce the direct injury range to between approximately 2 m and 152 m (for the Southall *et al*. (2007) and NOAA (2018) thresholds, respectively).

In addition, a Monitored Zone with a 1,000 m radius will be implemented, such that the airguns will not begin firing (by way of soft start) if any harbour porpoises are within 1,000 m of the airgun. The Monitored Zone also applies to any other cetaceans present in the area, which are assessed separately in the Article 12 Assessment. Therefore, this Monitored Zone with a 1,000 m radius eliminates the possibility of harbour porpoises being within 298 or 152 m (zones of influence for direct injury) of the airguns and therefore outside of the modelled injury zone.

Therefore, the implementation of the proposed mitigation measures in line with NPWS guidance will reduce the already small risk of injury to any the harbour porpoises that happen to be close to the Project during the short period (maximum of 12 hours) of VSP, so that injury will not occur to any harbour porpoises from the Blasket Islands, Roaringwater Bay and Islands or West Connacht Coast SACs as a result of VSP activities.

The Conservation Objectives for the sites with regard to harbour porpoise are as follows (as outlined in Appendix A)[9]:

To maintain the favourable conservation condition of Harbour Porpoise in [European site], which is defined by the following list of attributes and targets:

1. *Access to suitable habitat. Species range within the site should not be restricted by artificial barriers to site use.*
2. *Disturbance. Human activities should occur at levels that do not adversely affect the harbour porpoise at the site.*

In relation to the first target and access to suitable habitats, given the distance of the Project from from the Blasket Islands, Roaringwater Bay and Islands and West Connacht Coast SACs, and the expanse of open ocean surrounding the Project, underwater noise emissions from the Project will not create an artificial barrier from which the use of the site by the harbour porpoise population would be restricted.

The second target, in relation to disturbance effects, is relevant for Project noise emissions. However, the revised Appropriate Assessment Screening exercise has excluded, on the basis of objective scientific

[9] Note there are currently no Conservation Objectives set for the West Connacht Coast SAC harbour porpoise population, therefore it is assumed (in their absence) that they would be the same as those set for the Blasket Islands and Roaringwater Bay and Islands SACs (NPWS, 2017)

information, that the Project, individually or in combination with other plans or projects, will have a significant effect on the harbour porpoise populations of the Blasket Islands, Roaringwater Bay and Islands and West Connacht Coast harbour porpoise populations with regard to any behavioural disturbance or indirect effects resulting from drilling, vessel and VSP noise (see Section 4.2 of this NIS). Consequently, there will be no disturbance that would adversely affect the integrity of the harbour porpoise populations at these SACs.

4.2.4 Conclusion – underwater noise

The above assessment has shown that the underwater noise emissions from the Project, in view of the best scientific evidence presented above, will not have an adverse effect on the integrity of the harbour porpoise populations of the Blasket Islands, Roaringwater Bay and Islands or West Connacht Coast SACs, and that the integrity of the sites would not be affected in view of their Conservation Objectives.

4.3 An assessment of the potentially significant impacts of the Project - unplanned accidental releases

The revised Appropriate Assessment Screening exercise (Section 5.2 of *IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*) identified 36 SACs and 27 SPAs, with bird, marine habitats, marine mammal, otter and fish and freshwater pearl mussel features, for which, at the screening stage it was not possible to exclude whether the Project individually or combination with other Projects would likely have a significant effect in relation to an accidental hydrocarbon release from the Project.

4.3.1 Likelihood of release

There is a very low probability of a major accidental release of hydrocarbons occurring from the exploration well and associated planned vessel operations, as noted in IOSEA 5 (DCENR, 2015). The main potential source of an accidental spill would be either from a blowout scenario or a release of marine diesel fuel contained in the storage tanks, released through accidental vessel collision. Other small volume spills may also occur as a result of leaks during bunkering. The risk of a release occurring from a vessel collision is no greater than that occurring from any other ship in the area over the Project period. Marine fuel contains a high percentage of low molecular weight hydrocarbon compounds, known as 'light ends' and hence tends to disperse (usually via evaporation) within approximately eight to ten hours of being spilt. Given the relatively warm temperatures and the generally fast flowing currents, dispersion of marine fuel is likely to be rapid. A small spill may result in a sheen extending over a considerable area. However, this sheen can be broken up and reduced by wave action. Any marine fuel released in the survey area would disperse offshore. A release resulting from a blowout scenario at the exploration well may potentially spread over a wider area.

To put the accidental event scenarios relevant to the Project into context, the section below presents statistics on historical spill events which have occurred on the UK Continental Shelf (UKCS). These statistics are considered useful to support the assessment due to the relatively large number of wells drilled in the UKCS and the similar geographical conditions between Ireland and the UK. Information is also used from the SINTEF Offshore Blowout Database which summarises worldwide blowout and well release incidents.

4.3.1.1 Blowouts and well releases

A well blowout, depending upon the circumstances may occur at the surface or underground. A surface blowout constitutes an uncontrolled flow of formation hydrocarbons from the reservoir to the surface (note the release may occur at the seabed or from the infrastructure at the sea surface) and may lead to release of hydrocarbons to the environment. An underground blowout is when hydrocarbons entering the wellbore cause the wellbore pressure to exceed the fracture pressure at another level in the well, allowing hydrocarbons to flow from the producing formation into the wellbore, and then back into the weaker formation. There may be no release to the environment under these circumstances.

A well release, as opposed to a blowout, is an incident where hydrocarbons flow from a well when flow was not intended. Well releases may also result in release of hydrocarbons to the environment.

Blowouts are extremely rare events in modern drilling (DTI, 2001), although deep water HPHT exploration wells such as the Project are the more challenging wells to drill because the HPHT environment is more challenging to control, and conditions in exploration wells are less predictable than development wells in

previously explored formations. Table 4.5 shows the historical frequency of drilling blowouts and well releases for various types of well drilled to North Sea standards. Deep water HPHT exploration wells have a blowout and well release frequency approximately one order of magnitude greater than normally pressured exploration wells and HPHT development wells, and two orders of magnitude higher than normally pressured development wells. The historical frequency of incidents is still low however, equating to one blowout per 667 wells drilled, and one well release per 83 wells drilled.

Table 4.5 Historical frequency of blowouts and well releases (per well drilled) for various types of well in >200 m water depth (IOGP, 2010)

Well type	Pressure regime	Historical frequency per well drilled (IOGP, 2010)[10]		Number of wells drilled per incident	
		Blowout	Well release	Blowout	Well release
Exploration	Normal	2.5×10^{-4}	2.0×10^{-3}	4000	500
	HP/HT	1.5×10^{-3}	1.2×10^{-2}	667	83
Development	Normal	4.8×10^{-5}	3.9×10^{-4}	20833	2564
	HP/HT	3.0×10^{-4}	2.4×10^{-3}	3333	417

4.3.1.2 Drill ship spills

The Project will drill the Iolar prospect from a drill ship. Potential accidental releases from drill ships (excluding blowouts discussed above) may include fuel, drilling muds, small accidental oil and chemical releases and hydraulic fluids.

The most notable UK blowout from a drill ship was in 1988 when an explosion led to a fire on a semi-submersible rig drilling a high pressure high temperature field in the central North Sea. Historical data for frequency of blowouts from drill ships on the UKCS between 1990 and 2007 is presented in Table 4.6. The data do not show the severity of each event or whether the blowout led to an oil spill. However, the data do provide an indication of overall frequency of blowouts on the UKCS. The frequency of blowouts declined by almost an order of magnitude from the period 1990-1999 to 2000-2007.

Table 4.6 Blowout frequency per unit per year on UKCS (OGUK, 2009)

Type of facility	Period					
	1990 to 1999		2000 to 2007		1990 to 2007 (total)	
	Number	Frequency per year	Number	Frequency per year	Number	Frequency per year
Drill ship	13	0.020	3	0.0066	16	0.014

The information presented in Table 4.7 are based on data submitted to the UK Department of Energy and Climate Change (DECC)[11] for the period 2001 to 2007. During this period, drill ships operating in the UKCS completed a total of 172 operation years. No accidental releases greater than 100 tonnes were recorded in the UKCS between 2001 and 2007 and the majority of accidental releases recorded were less than 1 tonne.

The most common cause of accidental releases from drill ships was drilling operations (42%); of these releases 94% were less than 1 tonne. The second most common cause was maintenance/operational activities (27%); 97% of these releases were also less than 1 tonne.

[10] Based on SINTEF international data for wells in water >200 m (OGP, 2010)

[11] The UK government body that records accidental releases within the UKCS. In July 2016 DECC became part of the Department for Business, Energy & Industrial Strategy (BEIS).

Review of PON1 data recorded between 2007 and 2018 confirms no releases of >100 tonnes have occurred in the intervening years (BEIS, 2018; 2019) and that the majority of drill ship accidental releases remain <1 tonne.

Table 4.7 Number of accidental releases from drill ships, based on UKCS historical data by release size and source during the period 2001 to 2007 (TINA Consultants Ltd pers. comm., 2013)

Accidental release cause	<1 kg	1 to <10 kg	10 to <100 kg	0.1 to <1 tonnes	1 to <10 tonnes	10 to <100 tonnes	All accidental releases[i]
Maintenance/operational activities	10	14	4	5	1	0	**35**
Bunkering	2	9	2	9	0	0	**22**
Subsea releases	1	3	3	1	2	1	**12**
Drilling	12	6	15	15	2	1	**54**
Remote Operated Vehicle (ROV) associated	1	3	1	0	0	0	**5**
Other production	0	0	0	1	0	0	**1**
All accidental releases[ii]	**35**	**42**	**40**	**42**	**8**	**2**	**179**

[i] *Includes accidental releases of unknown size.*

[ii] *Includes accidental releases of unknown cause and accidental releases that could not be categorised.*

The total number of accidental releases from drill ships between 1990 and 2007 in the UKCS, and the frequency of releases per operational year is shown in Table 4.8. The frequency of incidents per operational year decreased by approximately 30% during the period 2000 to 2007 compared to the period 1990 to 1999.

Table 4.8 Number of accidental releases from drill ships on the UKCS from 1990 to 2007 and frequency per operational year (OGUK, 2009)

Type of facility	Period					
	1990 to 1999		2000 to 2007		1990 to 2007 (total)	
	Number	Frequency per year	Number	Frequency per year	Number	Frequency per year
Drill ship	160	0.246	78	0.172	238	0.215

Apart from well blowouts, the drill ship incident scenarios in which the greatest impact might be expected would include vessel grounding, collisions or explosions that lead to a total loss of hydrocarbon inventory (most likely to be marine diesel fuel) although this is unlikely as diesel/hydrocarbon stock is stored in multiple locations in separate tanks and containers. Table 4.9 highlights the number of explosions, collisions and vessel contacts for drill ships in the UKCS and the frequency of incidents per operational year. These data also indicate a general reduction in the frequency of incidents between the period 2000 to 2007 compared to the period 1990 to 1999. Whilst it is not indicated whether accidental releases occurred from each incident recorded, the data suggests that the frequency of incidents which could lead to an accidental release has decreased.

Table 4.9 Number of explosions, collisions and vessel contacts from drill ships in the UKCS from 1990 to 2007 and frequency of incidents per operational year (OGUK, 2009)

Type of incident	Period					
	1990 to 1999		2000 to 2007		1990 to 2007 (total)	
	Number	Frequency per operational year	Number	Frequency per operational year	Number	Frequency per operational year
Vessel contact	108	0.166	25	0.055	133	0.120
Collision	14	0.021	1	0.0022	15	0.014
Explosion	10	0.015	-	-	10	0.009

4.3.2 OSCAR oil spill modelling

CNOOC's risk assessment process identified three categories of accidental event that could potentially cause environmental damage:

- Accidental release of fuel or chemicals from vessel decks or during bunkering;
- Loss of containment of fuel storage tanks (marine diesel) due to vessel collision; and
- Loss of well integrity resulting in a well blowout and release of crude oil.

The Oil Spill Contingency and Response model (OSCAR) was used to model the possible fate of oil from potential hydrocarbon release scenarios at the Iolar well location as shown in Table 4.10 . Each scenario was modelled across three seasons: spring (March to May), summer (June to August) and autumn (September to November), to cover the entire possible drilling window of April to September.

This document focusses on the credible worst-case release scenario of an uncontrolled blowout (Scenario 2).

Table 4.10 Summary of accidental hydrocarbon release model scenarios carried out for the Project

Scenario	Hydrocarbon Type	Spill Volume (m^3)	Modelled Depth of Release	Model Type
1. Instantaneous drill ship diesel inventory spill	Marine diesel	16,565	Surface	Stochastic
2. Well blowout using the predicted unconstrained well flow rate for 146 days	Iolar crude (OSCAR Gulfaks crude used as surrogate)	2,856,856	Seabed	Stochastic
3. Well blowout using the predicted unconstrained well flow rate for 15 days	Iolar crude (OSCAR Gulfaks crude used as surrogate)	737,213	Seabed	Stochastic

OSCAR stochastic modelling uses a minimum of 110 different runs per scenario, predicting the fate of the oil under the varying potential metocean conditions during each run. Mapped outputs can be produced showing the probability of contamination of the sea surface, or the probability of shoreline oiling, for the 110 runs combined (N.B. these probabilities are not representative of a single release).

A minimum threshold of 0.3 µm was applied to the sea surface oiling outputs in line with BEIS guidance (BEIS, 2017). No other thresholds were applied at this stage of the assessment.

An overview of the results of the OSCAR modelling conducted to inform the risk assessment and the development of the detailed Oil Spill Contingency Plan (OSCP) is provided in Table 4.11.

Table 4.11 Summary of accidental hydrocarbon release stochastic modelling results

Scenario	Summary of OSCAR stochastic modelling results
1) Instantaneous drill ship diesel inventory spill	Stochastic modelling indicated a low probability of sea surface contamination across most of the affected area, with sea surface contamination probabilities of >10% restricted to an area of approximately 150 km diameter concentrated to the southeast of the release point. The thickness of diesel floating on the sea surface was predicted to remain <5 µm across most of the affected area, with simulations indicating that small slicks exceeding 10 µm thick could travel up to 200 km from the release point, although the probability of thick oil occurring decreased with distance from the release. There was a low predicted probability of diesel reaching international waters. The highest probability occurred in Autumn, although the season with the fastest simulated arrival time was Spring (3 d 10 h). Diesel was not predicted to enter other national jurisdictions. The highest probability of diesel beaching was predicted in Summer (2.9%), the minimum predicted beaching time (7 d 13 h) also occurred in summer. The (unlikely) possibility of diesel beaching was predicted to be restricted to the southwest coast of Ireland and arrival time was predicted to be similar across all beaching locations.
2) Well blowout using the predicted unconstrained well flow rate for 146 days	Modelling indicated that there is a high probability of sea surface oiling across a large proportion of Irish territorial waters to the West of Ireland, with the location of the highest probability areas varying by season. A surface oil sheen exceeding 5 µm thick could travel hundreds of kilometres from the release point, although it should be noted that the total area of thick oil predicted in the modelling outputs represents over 100 individual spill simulations, and the area of thick oil produced by any single spill would be much smaller. Modelling indicated that oil could reach international waters after approximately six days, and UK waters after approximately 30 days, although the probability of oil reaching UK waters was predicted to be <40%. The area with the highest probability of beaching and the fastest minimum beaching time was predicted to be the southwest coast of Ireland, where there was predicted to be a maximum 98.1% probability of beaching for releases occurring during spring, and a minimum beaching time of approximately 18 days for releases occurring during summer. Probability of oil beaching in all other national jurisdictions was generally <5%, with the exception of the autumn season where there was predicted to be a maximum 7.1% probability of oil beaching in Argyll and Bute, Scotland. Minimum beaching time for the UK coastline was approximately 18 days, for a scenario with a 1% probability of beaching at Anglesey, Wales.
3) Well blowout using the predicted unconstrained well flow rate for 15 days	Modelling indicated that there is a high probability of sea surface oiling across a large area of sea to the west of southern Ireland, with the location of the highest probability areas varying by season. A surface oil sheen exceeding 5 µm thick could travel hundreds of kilometres from the release point, although it should be noted that the area of thick oil predicted in the modelling represents over 100 individual spill simulations, and the area of thick oil produced by any single spill would be much smaller. Modelling indicated that oil could reach international waters after approximately six days, and UK waters after approximately 30 days (in the summer simulations), although the probability of oil reaching UK waters was predicted to be <5%. Beaching was predicted to occur in Ireland only, with the highest probabilities and fastest minimum arrival times occurring on the southwest coast. Probability of beaching only exceeded 25% in the summer simulations, and the maximum probability of beaching was 51.9%. The minimum predicted arrival time was approximately 16 days.

4.3.2.1 Result of the OSCAR modelling in relation to the sites requiring Appropriate Assessment

The modelling results from the worst-case scenario of an uncontrolled blowout were used to inform the NIS. The revised Appropriate Assessment Screening exercise (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*) identified 36 SACs and 27 SPAs (listed on Table 4.12 below) with bird, marine habitats, marine mammal, otter and fish and freshwater pearl mussel features for which, at the screening stage it was not possible to exclude, on the basis of the best scientific information, individually or in combination with other Projects, significant effects in relation to an accidental release from the Project. These sites were identified based on the results of the worst-case credible scenario (Scenario 2 OSCAR model - well blowout using the predicted unconstrained well flow rate for 146 days). This conclusion is drawn on the basis that:

- The probability of oiling at the European sites was greater than 10%; and
    - The oil thickness layer at sea surface at the European sites was predicted to be greater than 10 g/m^2 (equating to an oil layer thickness of approximately 10 µm). This amount of oil on the sea surface would have the appearance of a metallic sheen according to the Bonn Agreement Oil Appearance Code (OSPAR, 2010). The criteria were based on studies for sub-lethal and lethal impacts by French *et al.* (1996) and French-McCay (2009); or
    - The oil concentration on a shoreline was predicted to be greater than of 0.1 litres/m^2 (or (≈100 g/m^2) which corresponds approximately to the lower threshold for "light" shoreline oiling as defined by the International Tanker Owners Pollution Federation (ITOPF, 2014).

4.3.3 Description of the potentially significant impacts

Table 4.12 below presents the maximum probability of oiling occurring based on the Scenario 2 OSCAR model (as a %) and the predicted oil at sea surface or oil on shoreline concentration for each European site identified during the revised Appropriate Assessment Screening exercise (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*) as requiring an Appropriate Assessment.

Based on historical data presented in Section 4.3.1 the likelihood of such a blowout occurring is remote.

Table 4.12 Accidental hydrocarbon release stochastic modelling results in relation to the European sites requiring Appropriate Assessment ('-' less than 10% probability)

Site name [site code]	Oil at sea		Oil on shoreline	
	Probability of oiling (%)	Maximum oil concentration at sea (g/m^2)	Probability of oiling (%)	Maximum oil concentration on shoreline (l/m^2)
SAC				
Achill Head [002268]	12.5	20.7	20.2	294.2
Akeragh, Banna and Barrow Harbour [00332]	-	-	11.5	438.9
Ballinskelligs Bay and Inny Estuary [00335]	27.9	204.0	57.7	445.5
Barley Cove to Ballyrisode Point [001040]	63.5	202.4	62.5	446.7
Black Head-Poulsallagh Complex [00020]	13.5	108.7	18.3	441.8
Blasket Islands [002172]	96.1	320.7	73.1	452.0
Broadhaven Bay [000472]	12.5	20.7	25	379.4
Carrowmore Dunes [002250]	-	-	13.9	366.3
Carrowmore Point to Spanish Point and Island [001021]	21.2	186.7	14.4	437.7
Connemara Bog Complex [002034]	-	-	10.9	32.6
Erris Head [001501]	10.5	34.0	24.0	312.5

Site name [site code]	Oil at sea		Oil on shoreline	
	Probability of oiling (%)	Maximum oil concentration at sea (g/m^2)	Probability of oiling (%)	Maximum oil concentration on shoreline (l/m^2)
Glenamoy Bog Complex [00500]	-	-	25	348.9
Inishbofin and Inishshark [00278]	23.1	97.4	23.1	438.6
Inisheer Island [01275]	15.4	128	26.7	398.4
Inishkea Islands [00507]	10.5	53.1	25	360.6
Inishmaan Island [0000212]	12.9	104.1	17.8	422.5
Inishmore Island [000213]	18.3	133.0	22.1	422.5
Kenmare River [02158]	98.1	957.0	98.1	507.7
Kerry Head Shoal [02263]	67.3	143.3	-	-
Kilkee Reefs [02264]	20.8	159.7	29.7	440.2
Kilkeran Lake and Castlefreke Dunes [01061]	23.1	134.6	31.7	415.8
Kilkieran Bay and Islands [02111]	12.5	107.8	15.4	339.8
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment [00365]	29.8	318.9	41.3	444.3
Lough Hyne Nature Reserve and Environs [00097]	21.8	157.9	20.8	444.1
Lower River Shannon [02165]	33.65	328.8	53.8	466.8
Magharee Islands [002261]	35.6	195.3	22.1	410.0
Mount Brandon [00375]	13.4	99.3	46.2	408.5
Mullet/Blacksod Bay Complex [000470]	-	-	19.2	324.5
Omey Island Machair [001309]	-	-	16.3	319.1
Roaringwater Bay and Islands [000101]	57.7	161.7	62.4	475.0
Slyne Head Islands [00328]	25	111.4	22.1	434.7
Slyne Head Peninsula [002074]	15.4	92.4	22.1	434.7
Three Castle Head to Mizen Head [00109]	76.9	253.0	93.2	447.3
Tralee Bay and Magharees Peninsula, West to Cloghan [002070]	22.8	192.3	29.8	429.1
Valencia Harbour/Portmagee Channel [002262]	59.6	456.4	91.3	538.5
West Connacht Coast [02998]	26.0	111.4	25	389.0
SPA				
Beara Peninsula [004155]	99.0	957.0	98.1	507.7
Bills Rocks [004177]	11.5	17.1	-	-
Blasket Islands [004008]	92.3	218.3	63.5	446.4
Cliffs of Moher [004005]	16.3	114.8	28.8	416.7
Cruagh Island [004170]	14.42	62.74	-	-
Deenish Island and Scariff Island [004175]	71.2	261.6	87.5	480.0

Site name [site code]	Oil at sea		Oil on shoreline	
	Probability of oiling (%)	Maximum oil concentration at sea (g/m^2)	Probability of oiling (%)	Maximum oil concentration on shoreline (l/m^2)
Dingle Peninsula [004153]	51.9	675.7	76.0	465.8
Galley Head to Duneen Point [004190]	32.7	151.7	35.6	421.1
High Island, Inishshark and Davillaun [004144]	23.08	97.41	23.1	438.6
Illanmaster [04074]	12.5	49.7	19.2	284.8
Inishglora and Inishkeeragh [04084]	15.38	19.9	-	-
Inishkea Islands [04004]	10.6	53.2	25	360.6
Inishmore [004152]	13.9	132.9	22.1	422.5
Iveragh Peninsula [004154]	64.4	502.2	91.3	538.5
Kerry Head [004189]	17.3	94.0	43.3	440.5
Loop Head [004119]	33.7	110.8	53.8	466.8
Magharee Islands [004125]	35.6	192.3	29.8	429.1
Mid-Clare Coast [04182]	15.8	153.0	14.4	437.7
Old Head of Kinsale [04021]	26.7	127.3	-	-
Puffin Island [04003]	78.8	335.1	81.7	466.5
Seven Heads [04191]	24.8	87.5	37.6	425.0
Sheep's Head to Toe Head [004156]	76.9	253.0	93.3	513.9
Skelligs [04007]	98.1	212.2	-	-
Slyne Head to Ardmore Point Islands [04159]	22.1	126.3	15.4	339.8
Termoncarragh Lake and Annagh Machair [004093]	-	-	19.2	324.5
The Bull and The Cow Rocks [04066]	100	159.1	-	-
Tralee Bay Complex [004188]	11.5	192.3	29.8	438.4

4.3.3.1 Birds SPAs and SACs[12]

This section considers the following SPAs and SACs (see footnote):

SPAs	SACs
Beara Peninsula,	*Akeragh, Banna and Barrow Harbour,*
Bills Rocks,	*Barley Cove to Ballyrisode Point,*
Blasket Islands,	*Broadhaven Bay,*
Cliffs of Moher, Cruagh Island,	*Carrowmore Point to Spanish Point and Islnd,*
Deenish Island and Scariff Island,	*Connemara Bog Complex,*
Dingle Peninsula,	*Erris Head,*
Galley Head to Duneen Point,	*Glenamoy Bog Complex,*
High Island,	*Inishbofin and Inishshark,*
Inishshark and Davillaun,	*Inisheer Island,*
Illanmaster,	*Inishmore Island,*
Inishglora and Inishkeeragh,	*Kenmare River,*
Inishkea Islands,	*Kilkieran Bay and Islands,*
Inishmore,	*Lower River Shannon,*
Iveragh Peninsula,	*Magharee Islands,*
Kerry Head,	*Mount Brandon,*
Loop Head,	*Omey Island Machair.*
Magharee Islands,	*Roaringwater Bay and Islands,*
Mid-Clare Coast,	*Slyne Head Islands,*
Old Head of Kinsale,	*Slyne Head Peninsula,*
Puffin Island,	*Three Castle Head to Mizen Head,*
Seven Heads,	*Tralee Bay and Magharees Peninsula, West to Cloghan*
Sheep's Head to Toe Head,	
Skelligs,	
Slyne Head to Ardmore Point Islands,	
Termoncarragh Lake and Annagh Machair,	
The Bull and The Cow Rocks and	
Tralee Bay Complex	

Potential effects of a worst-case oil release on birds associated with the European sites listed above are considered below. The site conservation objectives, current condition / status of the qualifying interests of the site and site-specific and regional estimates for abundance of specific qualifying interests are provided in Appendix A.

[12] This includes SACs for which birds (as listed on Annex II of Birds Directive (92/43/EEC)) are listed on their Natura 2000 Standard Data form and the site has been evaluated for them

The impacts of surface oiling on seabirds is seen as one of the greatest environmental risks posed by accidental hydrocarbon release events. This is primarily due to the high affinity between hydrocarbons and seabird's plumage. Once hydrocarbons become incorporated into the feathers, there is a high chance of death due to loss of body heat, starvation, drowning or oil ingestion. Plumage is essential to flight, waterproofing and heat insulation and even small effects on any of these functions can result in mortality. Seabirds do not exhibit avoidance of floating hydrocarbons and are therefore very likely to come into contact with any slick that enters their feeding or resting areas. Other bird species that do not habitually interact with the sea surface may be exposed to beached hydrocarbons, through direct contact whilst foraging on contaminated beaches, or through picking up contaminated food or nesting material. Birds may also be subject to potential indirect / sub-lethal effects where long term toxic effects on key prey species such as the lesser sandeel (*Ammodytes marinus*) can lead to reduced fertility, reduced survival of eggs (Finch *et al.*, 2011) and young birds, and other symptoms including haemolytic anaemia (e.g. Hamer and Turner, 1997). Sub-lethal effects also can include changes in behaviour that may have consequences to the dynamic and structure of the bird colony in the long term (e.g. Walton *et al*., 1997).

Sensitivity varies between species depending on a variety of factors including time spent on the water, total biogeographical population, reliance on the marine environment, and potential rate for population recovery. Species in the auk family spend much of their time on the sea surface and typically dive to avoid danger. Common guillemot *Uria aalge* males and flightless juveniles swim into offshore waters from breeding colonies in the post-breeding season. These types of behaviours render animals particularly sensitive to sea surface hydrocarbons.

The SPAs listed above support a wide range of bird species including many that, based on a variety of factors including productivity, adult survival rate and behaviour (time spent sitting on the water), are considered to particularly sensitive to sea surface oil, such as great northern diver, shearwater species, common guillemot, razorbill, Atlantic puffin and shags (Webb *et al*., 2016).

Any potential impacts on SPA conservation objectives could be seasonal in nature (DCENR, 2015). The drilling period is expected to cover spring and summer, coinciding with the most sensitive period for many species. While the modelled probability of oil exceeding the ecological effects, threshold reaching the majority of listed sites was low (Table 4.12), several sites supporting especially sensitive species had a probability of surface oiling in excess of 90%. These sites included the Beara Peninsula (which supports several species including northern fulmar), the Blasket Islands (razorbill, Atlantic puffin, storm petrel, lesser black-backed gull, leaches petrel, Manx shearwater, kittiwake, Artic tern, common guillemot, northern fulmar), Skelligs (razorbill, Atlantic puffin, northern fulmar, storm petrel, Manx shearwater, kittiwake, gannet and guillemot) and The Bull and The Cow Rocks (razorbill, northern fulmar, storm petrel, herring gull, cormorant, kittiwake, guillemot and northern gannet).

Seabird populations on the sites listed above range from of large colonies of birds (e.g. 52,000 breeding pairs of storm petrel on Blasket Islands, 29,683 breeding pairs of northern gannet on Skelligs and 20,000 breeding individuals of common guillemot on the Cliffs of Moher). However, there are some species which are present in small but nationally important populations e.g. 5 breeding pairs of leach's petrel on the Blasket Islands and 5 breeding pairs of common snipe at the Termoncarragh Lake and Annagh Machair SAC). These smaller populations species may be more vulnerable because smaller losses can have a greater effect on the size of the breeding population. Species which also have low breeding rates (e.g. lay one egg a year), further increasing their vulnerability.

In terms of possible recovery potential in the event of an accidental release event, the ability of a bird population to recover is influenced by a number of factors including:

- The percentage of the breeding population killed (and therefore numbers remaining);
- Number of juveniles lost (affecting recruitment rates in following years);
- Size of the existing pre-breeding pool and rates of recruitment into the colonies;
- Rates of reproduction of individual species;
- Long-term loss of feeding grounds and prey species; and

> Sub-lethal effects which may affect reproductive success.

The rate of recruitment from the pre-breeding population into the breeding colony is influenced by the size of the pre-breeding "pool" of seabirds, which can be a significant proportion of the total population as many seabirds do not breed until they are several years old (e.g. Atlantic puffin 4-5 years) (Dunnet, 1982). As these pre-breeding adults are likely to be away from the colony at the time of an accidental hydrocarbon release (as many seabird species live largely pelagic lives when not at breeding colonies) their numbers may not be directly affected. It is not clearly understood what factors affect recruitment and birds may enter breeding colonies that are not their natal colonies (Dunnet, 1982; Coulson and Coulson, 2007), thereby further increasing potential for recruitment.

Potential recovery rates may range from 1 to 10+ years depending on the species affected and the extent of population loss. Most seabird groups are characterised by a very low breeding rate, for example Atlantic puffins and fulmar characteristically lay a single egg each year and kittiwakes typically lay clutches of two eggs.

Evidence released during the *Braer* spill in the Shetland Islands in 1993 (Ritchie and O'Sullivan, 1994) found that while there were substantial decreases in the number of breeding shags and black guillemot in the area of the spill (Sumburgh Head) the overall effect of the spill was relatively localised and there were no major effects on breeding success in 1993. There were also no signs of sub-lethal toxic effects causing major changes in the behaviour of surviving birds or birds returning to breed in the area. However, the report identified that where there is considerable immature mortality, there is potential for recruitment in the affected species to be low for several years and the colonies may take some time to recover. Furthermore, the effect on species such as shag, which was in decline in the area prior to the spill, may be more severe since the potential for the population to recover is reduced (Ritchie and O'Sullivan, 1994).

Experience from spills elsewhere has also shown that although recovery has been slow for populations greatly reduced immediately following accidental hydrocarbon releases, recovery has been seen (Heubeck, 1997). One exception has been the *Esso Bernicia* accidental hydrocarbon release in Sullom Voe in 1979, where the majority of the wintering population of great northern diver was lost as a result of the accident. This was the largest recorded mortality of this species in European waters (Heubeck, 1997). To date there has been no significant recovery of this population in Sullom Voe, where winter counts during the SOTEAG surveys have remained low, (Heubeck and Mellor, 2016). However, Heubeck (1997) speculates that this lack of recovery of the great northern diver population may lie elsewhere in its annual range.

Therefore, in view of the nature of the impacts, there is a low risk of an unplanned accidental event resulting in an adverse effect on integrity of the following SPAs and SACs with regard to their bird populations:

SPAs	***SACs***
Beara Peninsula,	*Akeragh, Banna and Barrow Harbour,*
Bills Rocks,	*Barley Cove to Ballyrisode Point,*
Blasket Islands,	*Broadhaven Bay,*
Cliffs of Moher,	*Carrowmore Point to Spanish Point and Island,*
Cruagh Island,	*Connemara Bog Complex,*
Deenish Island and Scariff Island,	*Erris Head,*
Dingle Peninsula,	*Glenamoy Bog Complex,*
Galley Head to Duneen Point,	*Inishbofin and Inishshark, Inisheer Island,*
High Island,	*Inishmore Island,*
Inishshark and Davillaun,	*Kenmare River,*
Illanmaster,	*Kilkieran Bay and Islands,*
Inishglora and Inishkeeragh,	*Lower River Shannon,*
Inishkea Islands,	*Magharee Islands,*
Inishmore,	*Mount Brandon,*

Iveragh Peninsula, *Kerry Head,* *Loop Head,* *Magharee Islands,* *Mid-Clare Coast,* *Old Head of Kinsale,* *Puffin Island,* *Seven Heads,* *Sheep's Head to Toe Head,* *Skelligs,* *Slyne Head to Ardmore Point Islands,* *Termoncarragh Lake and Annagh Machair,* *The Bull and The Cow Rocks and* *Tralee Bay Complex*	*Omey Island Machair.* *Roaringwater Bay and Islands,* *Slyne Head Islands,* *Slyne Head Peninsula,* *Three Castle Head to Mizen Head,* *Tralee Bay and Magharees Peninsula, West to Cloghan*

4.3.3.2 Marine mammals SACs

This section considers the following SACs:

SACs	
Blasket Islands, *Inishbofin and Inishshark,* *Inishkea Islands,* *Kenmare River,* *Kilkieran Bay and Islands*	*Lower River Shannon,* *Roaringwater Bay and Islands,* *Slyne Head Islands, and* *West Connacht Coast*

Potential effects of a worst-case oil release on marine mammals associated with the sites listed above are considered below. As outlined in Section 4.1 and Appendix A the above sites are designated for either harbour porpoise, bottlenose dolphin, harbour seal and/ or grey seal. The sites conservation objectives, current condition / status of the qualifying interests of the site and site-specific and/or regional estimates for abundance of qualifying interests are provided in Appendix A.

If marine mammals come into contact with hydrocarbons potential impacts include: loss of insulation, damage to the digestive system, liver or kidneys through ingestion and possible impacts to the respiratory system through aspiration (Gubbay and Earll, 2000; SMRU, 2001). Following the Deepwater Horizon oil release, one major focus has been impacts on reproductive success (DHNRDAT, 2016).

Hydrocarbon exposure and potential impacts will vary between species. Most marine mammals depend on thick layers of subcutaneous fat (blubber) to insulate themselves, and these layers are not compromised by hydrocarbon contamination as birds' feathers are. Consequently, most marine mammals are considered less vulnerable than seabirds to oiling (Geraci and Williams, 1990). A few species however, (including European otter *Lutra lutra* which are not strictly marine mammals but do utilise coastal waters), rely on thick fur for insulation, and these species are highly vulnerable to hypothermia if their fur is oiled (DHNRDAT, 2016).

It has been rare for cetaceans to be affected following a spill, as they may be able to avoid affected areas (DNECR, 2015). Some literature suggests that most cetaceans can probably detect surface hydrocarbons using vision, echolocation and touch (Geraci and Williams, 1990), although detection is not necessarily followed by avoidance. Some populations have a high affinity for specific feeding, breeding or migration locations which appears to override any tendency to avoid the presence of hydrocarbons. DHNRDAT (2016) contains accounts and photographs of dolphins of various species swimming through thick oil slicks produced by the Deepwater Horizon blowout.

Schwacke *et al*. (2014) reported that the resident bottlenose dolphin population in Barataria Bay, Louisiana that was exposed to oil from the Deepwater Horizon release showed common symptoms due to oil exposure including: lung disease, hypoadrenocorticism, and pulmonary consolidation as well as mortality rates higher than previously recorded. Lane *et al*. (2015) reported that the same population suffered a significant decrease in reproductive success as well as high mortality in 2011 and 2012 in the aftermath of the release. Eighty percent of pregnant dolphins failed to produce a viable calf over the monitoring period. Mortality rates over the same period were recorded at 13.2% for the Barataria Bay population, higher than the 3.8-4.9% rate for other populations previously studied in Charleston, South Carolina and Sarasota, Florida.

Venn-Watson *et al*. (2015) reported that increased strandings in northern coastal Louisiana and Mississippi (March-May 2010); Barataria Bay, Louisiana (August 2010-December 2011); Mississippi and Alabama (2011) overlapped in time and space with heavy oiling from the Deepwater Horizon oil release. There was also an unusually high stranding rate in March 2010, the month before the release started. This was identified as being due to a cold winter, which is a natural cause of occasional elevated strandings, but could not have been responsible for the very high numbers of strandings, failed pregnancies and sick dolphins observed over the subsequent four years.

Recovery of cetacean populations following large oil releases is not well understood, although the limited impacts expected on harbour porpoise and bottlenose dolphin and the existing favourable conservation status of these species in Irish waters are expected to allow a rapid recovery.

Pinnipeds are thought to be able to detect hydrocarbons because observations have shown the species avoiding it (St Aubin, 1990). Following the Esso Bernicia hydrocarbon release in Sullom Voe, the harbour seal population temporarily abandoned Yell Sound (Richardson, 1979) and returned a few weeks later. However, contradictory behaviour was seen following the Exxon Valdez release when harbour seals remained in the area and would surface through hydrocarbon slicks (Lowry *et al.*, 1994).

Harbour seals do not groom and due to their pelagic feeding behaviour are able to feed away from any affected shoreline. Therefore, ingestion of hydrocarbons through grooming or consumption of contaminated prey is unlikely. Mucous membranes of the eyes in harbour seals are most sensitive to surface contact of hydrocarbons, with a common symptom being conjunctivitis (St Aubin, 1990; Lowry *et al*., 1994).

Inhalation of hydrocarbons in seals causes symptoms of nonspecific narcosis, which include lethargy, irritation to the eyes and lungs, and in harbour seals damage to the central nervous system (Lowry *et al*., 1994). For most pinnipeds, particularly in northern habitats, it is unlikely that petroleum vapours could become sufficiently concentrated to represent a threat (St Aubin, 1990).

Following the Braer release on the southern coast of the Shetland Islands, there were reports of acute respiratory distress in moulting grey seals hauled out on Lady's Holm a few kilometres to the northwest. While the proportion of individuals exhibiting symptoms at this site was significantly higher than at control sites and was higher than impacts observed at Lady's Holm the following year, the lack of baseline data from before the release occurred meant that it was not possible to attribute the effects to the release (Hall *et al*., 1996). Overall impacts to marine mammals from the Braer release were concluded to be negligible (ESGOSS, 1994), although it is possible that improved monitoring techniques that are now available may detect additional effects should such a scenario recur. Experience from the Exxon Valdez release showed high levels of oiling on the resident harbour seal population. The seals were contaminated with oil both in the water and via oiled haulout sites (Lowry *et al.*, 1994). Concerns that pinniped pups might be reluctant to nurse on oiled mothers (St Aubin, 1990) appear to be unfounded from observations following the Exxon Valdez release that showed oiled harbour seal pups nursing on oiled mothers, and pups of oiled mothers apparently remaining in normal physical condition (Lowry *et al.*, 1994).

There could be sub-lethal impacts leading to reduced pup survival or reproductive rates. Grey seal surveys following the Sea Empress release showed there to be no effects on pup production (Bullimore, 1998). Pathological examination of dead harbour seals following the Exxon Valdez showed only relatively mild damage, which was probably reversible in most cases and could not be unequivocally attributed to oiling. Symptoms of such pathological damage are likely only to be temporary disorientation and lethargy (Spraker *et al*, 1994).

In terms of recovery potential, pinnipeds are long-lived animals with slow reproductive rates. The rate of recovery of a seal population will depend on the segments of the population that are killed and could range from 2-40 years (McLaren, 1990). For example, the loss of a year's offspring may be of little consequence in a population with many overlapping generations (McLaren, 1990). Loss of a large proportion of the mature breeding population may however lead to longer recovery times. Populations close to equilibrium may also respond to recovery at a slower rate than those populations that were already below equilibrium (McLaren, 1990). Harbour seals have only moderate vulnerability to an accidental hydrocarbon release and therefore the numbers of adult seals lost are anticipated to only be a small percentage of the breeding population and therefore associated recovery rates are considered to be good.

The arrival time of the oil, and the degree of weathering it has undergone will likely influence the degree of impact. The minimum arrival time to shore is expected to be 18 days. By this time the oil will have undergone substantial weathering, the more toxic volatile components are likely to have largely evaporated, reducing the toxicity of the remaining material. The season in which a potential release occurred would have an important bearing on the likely impacts. Higher water and air temperatures during the summer and autumn would increase evaporation from the sea surface. Higher wave and wind energy as may be expected during winter and spring would encourage the physical dispersion of the oil and minimise the formation of surface slicks.

Therefore, as the Project is open to the ocean on three sides, with modelling indicating that the majority of released oil will remain in the open ocean, it will undergo dilution and degradation, rather than approaching coastal sites and resident marine mammal populations. The probability of oil beaching the majority of the sites is low (Table 4.12) (ranging from 22.1% to 25%), although the probability of oil beaching on Blasket Islands, Kenmare River, Lower River Shannon and Roaringwater Bay and Islands SACs is higher. 73%, 98.1%, 53.8% and 62.4%, respectively. Consequently, it is these sites which are at a higher risk of hydrocarbon contamination in the unlikely the event of a worst case accidental hydrocarbon release. However, given the modelling there is also a high likelihood that the oil will have undergone substantial weathering at sea before approaching the coast, these sites and their resident marine mammal populations.

Therefore, in view of the nature of the impacts, there is a low risk of an unplanned accidental event resulting in an adverse effect on integrity of the Blasket Islands, Inishbofin and Inishshark, Inishkea Islands, Kenmare River, Kilkieran Bay and Islands, Lower River Shannon, Roaringwater Bay and Islands, Slyne Head Islands and West Connacht Coast SACs with regard to their harbour porpoise, bottlenose dolphin, grey seal and harbour seal populations.

4.3.3.3 Marine habitat SACs

This section considers the following SACs:

SACs	
Achill Head,	*Kerry Head Shoal,*
Akeragh, Banna and Barrow Harbour,	*Kilkee Reefs,*
Ballinskelligs Bay and Inny Estuary,	*Kilkeran Lake and Castlefreke Dunes,*
Barley Cove to Ballyrisode Point,	*Kilkieran Bay and Islands,*
Black Head-Poulsallagh Complex,	*Lough Hyne Nature Reserve and Environs,*
Blasket Islands,	*Lower River Shannon,*
Broadhaven Bay,	*Magharee Islands,*
Carrowmore Dunes,	*Mullet/Blacksod Bay Complex,*
Carrowmore Point to Spanish Point and Island,	*Roaringwater Bay and Islands,*
Connemara Bog Complex,	*Slyne Head Islands,*
Inishbofin and Inishshark,	*Slyne Head Peninsula,*
Inisheer Island, Inishmaan Island,	*Tralee Bay and Magharees Peninsula, West to Cloghan and*
Inishmore Island,	*Valencia Harbour/Portmagee Channel*
Kenmare River,	

Potential effects of a worst-case oil release on marine habitats associated with the sites listed above are considered below. The SACs listed above have been designated to protect a range of subtidal and intertidal marine habitats (Annex I habitats) including reefs, sea caves, large shallow inlets and bays, mudflats, sandflats, plant assemblages, lagoons and estuaries The site conservation objectives, current condition / status of the qualifying interests of the site and site-specific and regional estimates for abundance or areas of specific qualifying interests are provided in Appendix A.

IOSEA 5 noted that the probability of significant quantities of hydrocarbons reaching the Irish and UK coast and posing a threat to the integrity of European sites is small and is further reduced by mitigation measures in place (DCENR, 2015).

All SACs designated for marine Annex I habitats are designated for seabed features. Following an accidental release, hydrocarbons can come into contact with the seabed via several pathways, including sedimentation of dispersed oil, dissolution in the water column and bio-deposition, where pelagic organisms that are contaminated with hydrocarbons die and fall to the seabed as marine snow.

The potential for impacts from hydrocarbon pollution on protected seabed habitats has not been well documented historically; however, the Deepwater Horizon incident at the Macondo well in the Gulf of Mexico has generated extensive research on the subject and found significant impacts to deep-water benthic communities from this large seabed release. The crude oil spilled during the Deepwater Horizon incident had an API gravity of 37.2°, classifying it as a 'light' oil, and of a similar density to that expected for the Iolar crude as described below. Dispersant applied directly to the subsea leak source successfully dispersed large volumes of oil into horizontal deepwater plumes, which were detectable up to 400 km from the release site. These plumes contacted the benthos where seabed topography was raised up into the path of the plumes. Impacts on benthic faunal diversity were detectable above natural variation up to 15 km from the release site. Impacts were identified across soft- and hard-bottom communities including cold-water coral assemblages. Partial recovery of some receptors was recorded four years after the release, with populations of affected

species beginning to increase, and tissue contamination beginning to reduce. Deep-sea red crabs, top benthic predators in the area were found to have Macondo oil compounds in their tissues more than four years after the incident. The timeframe required for full recovery is currently unknown, and for slow-growing coral species, may be measured in decades or longer (DHNRDAT, 2016).

Based on geology and geochemistry information in the area the Iolar crude is expected to have an API gravity of 35° and a specific gravity of 0.85, which means that if released to sea the majority will tend to remain on the sea surface rather than sinking into the water column. In the absence of offshore emergency response, oil will persist on the sea surface for a number of days, although its acute toxicity will be rapidly reduced through rapid evaporation of volatile components. Whilst the light fractions evaporate from the surface, the water-soluble component of the oil mass will dissolve in the seawater. The immiscible components will either emulsify and disperse as small droplets in the water column (in oil-in-water emulsion) or under certain sea conditions, aggregate into tight water-in-oil emulsions (DCENR, 2007).

Ecologically-significant concentrations of dissolved or dispersed oil from surface slicks rarely reach below 10 metres water depth (IPIECA 2015a; IPIECA 2015b). Vulnerability of coastal habitats will therefore be restricted to the intertidal and infralittoral (the shallow subtidal zone). The arrival time of the oil, and the degree of weathering it has undergone will likely influence the degree of impact. The minimum arrival time to shore is expected to be 18 days. By this time the oil will have undergone substantial weathering, the more toxic volatile components are likely to have largely evaporated, reducing the toxicity of the remaining material. The season in which a potential release occurred would have an important bearing on the likely impacts. Higher water and air temperatures during the summer and autumn would increase evaporation from the sea surface. Higher wave and wind energy as may be expected during winter and spring would encourage the physical dispersion of the oil and minimise the formation of surface slicks.

Each habitat type will have a different sensitivity to oiling and a different ability to recover. Generally, highly exposed habitats such as stony reefs, rocky shores and cliffs are less sensitive to oiling. The high energy wave regimes associated with these habitats tend to prevent oil forming stable slicks, and once the supply of oil is stopped, residual oiling is usually rapidly cleaned by wave action. Much of the flora and fauna associated with these environments is adapted to disturbance due to the high natural variation in environmental conditions such as the seasonal changes in the wave regime. As such, recovery is expected to be rapid. Even in a worst-case well blowout scenario, impacts on exposed habitats such as rocky reefs are expected to be limited and not significant.

Impacts are likely to be more severe and longer lasting in sheltered areas where oil can settle into stable slicks resulting in prolonged exposure to the flora and fauna. The lack of natural removal mechanisms such as wave action encourages the formation of persistent tars and the incorporation of oil into sediments where it can persist for many years. Examples of long-term persistence of oil include saltmarsh and muddy shores in Buzzards Bay, Massachusetts, oiled by the 1969 Florida barge spill; saltmarshes in the Magellan Strait, Chile, oiled by the 1974 Metula spill; and sheltered tidal flats and halophyte marsh on the Gulf coast of Saudi Arabia, oiled by the 1991 Gulf War spill. Some oil residues are still present in those areas today, particularly in Saudi Arabia, although the residues represent a small fraction of the initial volumes released and continue to affect only a small fraction of the initial impact zone. The remaining oil residues typically develop a highly weathered crust that is resistant to biodegradation, although this will typically display very limited toxicity as it is largely biologically unavailable.

Many of the sites listed above are designated both for high-energy habitats such as reefs and low-energy habitats such as intertidal mudflats, saltmarsh habitats, sandflats and large shallow inlets and bays. Therefore, in the unlikely event of an accidental release the low-energy features of European sites are considered to be at greater risk than the high energy habitats. In the more sheltered habitats that are most at risk, there is the possibility of heavy oiling and long-term exposure, but effects are likely to be limited by the relatively low probability of oil beaching at the majority of sites, and the high likelihood that the oil will have undergone substantial weathering at sea before approaching the coast.

As outlined above, the minimum arrival time to shore is expected to be 18 days. By this time, the oil will have undergone substantial weathering and the more toxic volatile components are likely to have largely evaporated, reducing the toxicity of the remaining material. The season in which a potential release occurred would have an important bearing on the likely impacts. Higher water and air temperatures during the summer

and autumn would increase evaporation from the sea surface. Higher wave and wind energy as may be expected during winter and spring would encourage the physical dispersion of the oil and minimise the formation of surface slicks.

Therefore, as the Project is open to the ocean on three sides, with modelling indicating that the majority of released oil will remain in the open ocean, it will undergo dilution and degradation, rather than approaching coastal sites and these coastal marine habitats. The probability of oil beaching the majority of the sites is low (Table 4.12) (ranging from 10.9 to 31.7 %), although the probability of oil beaching on Ballinskelligs Bay and Inny Estuary, Barley Cove to Ballyrisode Point, Blasket Islands, Kenmare River, Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment, Lower River Shannon, Roaringwater Bay and Islands and Valencia Harbour/Portmagee Channel SACs are higher (57.7%, 62.%, 73.1%, 98.1%, 41.3%, 53.8%, 62.4% and 91.3 %, respectively). Consequently, it is these sites which are at a higher risk of hydrocarbon contamination in unlikely the event of a worst case accidental hydrocarbon release. However, given the modelling, there is also a high likelihood that if beaching of oil does occur, the oil will have undergone substantial weathering at sea before approaching the coast, these sites and their marine Annex I habitats.

Therefore, in view of the nature of the impacts, there is a low risk of an unplanned accidental event resulting in an adverse effect on integrity of the Achill Head, Akeragh, Banna and Barrow Harbour, Ballinskelligs Bay and Inny Estuary, Barley Cove to Ballyrisode Point, Black Head-Poulsallagh Complex, Blasket Islands, Broadhaven Bay, Carrowmore Dunes, Carrowmore Point to Spanish Point and Island, Connemara Bog Complex, Inishbofin and Inishshark, Inisheer Island, Inishmaan Island, Inishmore Island, Kenmare River, Kerry Head Shoal, Kilkee Reefs, Kilkeran Lake and Castlefreke Dunes, Kilkieran Bay and Islands, Lough Hyne Nature Reserve and Environs, Lower River Shannon, Magharee Islands, Mullet/Blacksod Bay Complex, Roaringwater Bay and Islands, Slyne Head Islands, Slyne Head Peninsula, Tralee Bay and Magharees Peninsula, West to Cloghan and Valencia Harbour/Portmagee Channel SACs, with regard to their Annex I marine habitats.

4.3.3.4 Fish and freshwater pearl mussel SACs

This section considers the following SACs:

SACs	
Connemara Bog Complex, *Glenamoy Bog Complex,*	*Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment and* *Lower River Shannon*

Potential effects of a worst-case oil release on fish and freshwater pearl associated with the sites listed above are considered below. The SACs listed above have been designated to protect sea lamprey, Atlantic salmon and freshwater pearl mussel. The site conservation objectives, current condition / status of the qualifying interests of the site and site-specific and regional estimates for abundance or areas of specific qualifying interests are provided in Appendix A.

Adult fish are not generally affected by hydrocarbon slicks on the sea surface, and most species can tolerate water-soluble oil fraction concentrations of about 10 mg/l. Some species can survive much higher concentrations unless whole oil or dispersed oil droplets coat the gills and cause asphyxiation. Adult fish are generally more resistant than other marine organisms to hydrocarbons, because their surfaces are coated with oil-repellent mucus. Adult fish can be affected through the gills, by ingestion of eating oiled prey. When exposed to oil, adult fish may experience reduced growth, enlarged livers, changes in heart and respiration rates and fin erosion (FWS, 2010). Although various development disorders as well as mortalities may occur to some degree under oil slicks, so far it has proved impossible to detect consequential effects on adult populations. Potential sub-lethal effects of hydrocarbons on fish include impairment of reproductive processes, behaviour changes such as stunned reaction, slow and low movement, loss of stability and balance, melanosis and inconsistent swimming (Barron *et al*, 2005) and increased susceptibility to disease and predators. An accidental hydrocarbon release could potentially result in the tainting of fish, and a concomitant reduction of

its commercial value. Egg and juvenile stages are however the most vulnerable to hydrocarbons (Langangen *et al.,* 2017), which can in turn influence the long-term abundance and recovery of populations, as has been seen in the herring and pink salmon populations 30 years after the Exxon Valdez oil spill in Prince William Sound, Alaska (Incardona *et al.,* 2015). Consequently, it is the spawning and nursery grounds that are most sensitive.

The sites listed above are designated for three species of lamprey (sea, river and brook lamprey) and Atlantic salmon. The sites contain spawning and nursery grounds for all these species putting them at risk to the impacts of oiling noted above. Any effects on Atlantic salmon would also affect the freshwater pearl mussel as the species is hosted on the gills of juvenile salmon during the larval stage of development. Freshwater pearl mussel, which is endangered and declining across its global range with many Irish populations suffering poor recruitment, is likely to also exhibit a direct negative response to oil pollution due to the changes this would be likely to cause in the nutrient and oxygen concentrations in the water.

These four SACs are between 243 and 445 km from the Project (Table 4.1). As outlined above the minimum arrival time to shore from the release site is expected to be 18 days. By this time the oil will have undergone substantial weathering, the more toxic volatile components are likely to have largely evaporated, reducing the toxicity of the remaining material. The season in which a potential release occurred would have an important bearing on the likely impacts. Higher water and air temperatures during the summer and autumn would increase evaporation from the sea surface. Higher wave and wind energy as may be expected during winter and spring would encourage the physical dispersion of the oil and minimise the formation of surface slicks.

Therefore, as the Project is open to the ocean on three sides, with modelling indicating that the majority of released oil will remain in the open ocean, it will undergo dilution and degradation, rather than approaching coastal SACs for fish and freshwater pearl mussel. The probability of oil beaching at the majority of the sites is generally low (Table 4.12) ranging from 10.9% at the Connemara Bog Complex SAC to 25% at the Glenamoy Bog Complex SAC. The Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment and Lower River Shannon SACs have slightly higher probabilities of shoreline oiling of 41.3% and 53.8% but overall, they are lower than seen at some other coastal SACs from the model (see 0). Additionally, given the modelling, if beaching does occur there is a high likelihood that the oil will have undergone substantial weathering at sea before approaching the coast, these sites and their fish populations.

Therefore, in view of the nature of the impacts, there is a low risk of an unplanned accidental event resulting in an adverse effect on integrity of the Connemara Bog Complex, Glenamoy Bog Complex, Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment and Lower River Shannon SACs, with regard their fish and freshwater pearl mussel populations.

4.3.3.5 Otters SACs

This section considers the following SACs:

SACs	
Connemara Bog Complex,	*Lower River Shannon,*
Kenmare River,	*Mullet/Blacksod Bay Complex,*
Kilkieran Bay and Islands,	*Roaringwater Bay and Islands and*
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment,	*Tralee Bay and Magharees Peninsula, West to Cloghane*

Potential effects of a worst-case oil release on European otters associated with the sites listed above are considered below. The site conservation objectives, current condition / status of otters at site and site-specific and regional estimates for abundance for each site are provided in Appendix A.

Observations of the Esso Bernicia oil spill at Sullom Voe in 1979 showed that, initially at least, otters did not recognise oil as being a threat and did not avoid the areas where oil was seen (Baker *et al*., 1981). Failure to

avoid the oil was probably due in part to the necessity for the otters to cross oiled shorelines to access their usual inshore foraging grounds. At least 13 otters died in the aftermath of this incident with post-mortems conducted on five corpses showing death was due to causes associated with ingested oil. Otter activity in the Yell Sound and Sullom Voe area did not appear to decrease at the time of the spill (Richardson, 1979).

Otters may be vulnerable to inhalation of hydrocarbons evaporating from the surface. After the Exxon Valdez spill, inhalation of hydrocarbons was a major contributing factor to the death of sea otters (Geraci and Williams, 1990). In addition, otters rely on their thick coat for insulation, and are highly vulnerable to hypothermia if their fur is oiled (DHNRDAT, 2016). There may also be sub-lethal impacts leading to reduced pup survival or reproductive rates. Chronic effects were recorded in the sea otter population in Prince William Sound following the Exxon Valdez spill in 1989 with low juvenile survival in immediate post spill years. However, by 1993, evidence suggested that chronic damage was subsiding, and population recovery was under way (Ballachey *et al*., 1994). Populations of river otter (*Lontra canadensis*) around Prince William Sound also exhibited chronic effects 2 years after the spill (Duffy *et al*., 1994). While European otters are in a different genus to both sea otters and river otters, their physiological and behavioural similarities are expected to result in similar sensitivity to oil exposure.

These nine SACs are between 230 and 419 km from the Project (Table 4.1). As outlined above the minimum arrival time to shore from the release site is expected to be 18 days. By this time the oil will have undergone substantial weathering, the more toxic volatile components are likely to have largely evaporated, reducing the toxicity of the remaining material. The season in which a potential release occurred would have an important bearing on the likely impacts. Higher water and air temperatures during the summer and autumn would increase evaporation from the sea surface. Higher wave and wind energy as may be expected during winter and spring would encourage the physical dispersion of the oil and minimise the formation of surface slicks.

As outlined above, the Project is open to the ocean on three sides, with modelling indicating that the majority of released oil will remain in the open ocean where it will undergo dilution and degradation, rather than approaching coastal sites and these coastal sites and their resident otter populations. As such, in the event of a worst-case release, oil reaching otter habitat would likely be substantially weathered, and lack the more toxic volatile compounds that would be prone to harm otters through inhalation. The risk of fur oiling and hypothermia would likely remain however. The probability of oil reaching the majority of sites designated for otters was low (Table 4.12) ranging from 10.9% to 41.3%, although Kenmare River and Roaringwater Bay and Islands SACs had predicted 98% and 62.4% probability of shoreline oiling above the ecological effect threshold. As such, in the event of a worst-case release it is likely that at least some of the sites under assessment would incur significant effects.

Therefore, in view of the nature of the impacts, there is a low risk of an unplanned accidental event resulting in an adverse effect on integrity of the Connemara Bog Complex, Kenmare River, Kilkieran Bay and Islands, Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment, Lower River Shannon, Mullet/Blacksod Bay Complex, Roaringwater Bay and Islands and Tralee Bay and Magharees Peninsula, West to Cloghane SACs, with regard to their European otter populations.

4.3.4 Mitigation measures

CNOOC will ensure that the following proposed measures, which are in line with current legislation and industry best practice, are in place to avoid a well blowout or other spill scenarios occurring, and to minimise the environmental impacts of any incident in the unlikely event that one does occur.

4.3.4.1 Prevention measures

CNOOC is aware of the risk of a spill event occurring during the Project and the crew of the drill ship will therefore undergo environmental awareness and safety training. Incident response training will form part of the induction for any crew joining the drill ship or Project vessels. The drill ship has an approved a safety case and will be class certified by a recognised certifying authority.

The worst case credible accidental release scenario arises from loss of primary and secondary well control. The following provides a high-level overview of design and operational measures that reduce the likelihood of a well control incident:

> A full risk assessment will be performed as part of well planning;

- CNOOC Engineering Standards will be implemented;
- The well will be designed to CNOOC well control standard ECN-DR-STD-00067;
- While drilling a two-barrier well control policy will be implemented at all times. The primary well control will be the mud hydrostatic and secondary well control will be the blow-out preventers or BOPs, which will be maintained throughout the drilling of a well. A full risk assessment was performed during well design.
- While drilling, the primary well control barrier in the main conduit will be the hydrostatic pressure imparted by correctly weighted drilling fluid and secondary well control measures will include the BOP and cut-off valves on all machinery, pipelines and hoses;
- Outside the main conduit, previous casings in the next annulus out also have barriers, i.e. seal assemblies in casing hangers, and cement isolation between reservoir and surface - there may be one or more cement seals set in each annulus;
- Well design, materials and drilling procedures will combine to ensure that the surface environment can be isolated from the wellbore by at least two independent barriers during all stages of well construction and abandonment;
- The BOP rated design pressure will comfortably exceed the anticipated reservoir pressures and the BOP will undergo maintenance and inspection prior to use;
- Barriers will be tested prior to use, during installation and post-installation;
- In the event of a blowout during drilling activities, where the primary Blowout Prevention Equipment has failed, a capping device will be deployed. The full description of the containment and recovery process is described in the Iolar Oil Spill Contingency Plan (OSCP), ECI-HS-PRP-00014. This capping and containment system is a one of two-source control strategy, the other being relief well drilling;
- Shallow hazards (from shallow gas or over-pressured shallow formation water) have been assessed by seismic survey prior to drilling, and the results have been incorporated into the well design;
- The plug and abandonment plan will be reviewed and approved by CNOOC, in accordance with Oil and Gas UK, Well Decommissioning Guidelines;
- The crew of the drill ship will undergo environmental awareness and safety training;
- Incident response training will form part of the induction for any crew joining the drill ship or Project vessels; and
- The drill ship will have a safety case and will be class certified by a recognised certifying authority. The safety case documents the design criteria which are based on recent metocean data (see Section 2.3).

Two barriers shall be in place at all times during the entire well life cycle in order to prevent any unintentional flow from the well. However, for top hole operations prior to the BOP installation, only one barrier shall be in place. The highest likelihood of hydrocarbon spillage will occur during diesel bunkering operations from supply vessels to the drill ship. Bunkering operations will only take place during hours of good visibility, in appropriate weather conditions. Bunkering equipment will undergo scheduled maintenance to prevent failures and will be visually inspected immediately prior to each operation. Transfer hoses will have flotation collars and dry-break couplings and will be over-rated for the expected pumping pressure. During operations, radio contact will be maintained between the supply vessel and the drill ship and dedicated lookouts will perform constant visual monitoring of gauges, hoses, fittings and the sea surface. The drill ship and supply vessels will be fitted with automatic cargo level monitoring systems. Spill response kits will be located close to hydrocarbon storage/bunkering areas and appropriately stocked.

4.3.4.2 Response measures

- An Oil Spill Contingency Plan (OSCP) (ECI-HS-PRP-00014) for the Project was approved by the Irish Coast Guard on the 12th February 2019, and was prepared, in accordance with the Sea Pollution (Amendment) Act 1999. The OSCP contains effective response strategies to minimise the impact from

any hydrocarbon spill including in the event that a spill results in hydrocarbons beaching or with the potential to beach on the Irish coastline. The OSCP highlights the following:

- CNOOC are members of the Shannon Estuary Anti-Pollution Team (SEA-PT) and have access to trained shoreline response personnel and shoreline response equipment;
- In the event of major spill incident CNOOC also have the resources of Oil Spill Response Limited (OSRL) for trained shoreline response personnel and shoreline response equipment; and
- The responsibility for responding to any pollution of the coastline rests principally with the local authorities.

    1. Within the framework of the National Contingency Plan (NCP), in the event that an oil spill reaches within 1 nautical mile of the shore the local authority has the obligation to manage clean-up in line with their local shoreline response plan. All Coastal Local Authorities and Port / Harbour Authorities are required under the Sea Pollution Act 1991 (as amended) to have OSCPs in place.
    2. Within the framework of the NCP, in the event that oil reaches the shoreline, the Local Authority has an obligation to manage clean-up, although the responsibility for oil clean up rests with the Operator (i.e. in this instance CNOOC).

- Ireland's National Framework for Major Emergency Management:

    1. Under this framework arrangements are put in place that enable the three principal emergency response agencies; the Local Authorities, the Garda and the Health Service Executive to coordinate their response efforts in the event of a major incident and thus maintain the protection, support and welfare of the public in the event of an emergency. A 'Lead Agency' is identified from the principal response agencies who will coordinate the response for local and regional emergencies. This provides for clear leadership, coordination and collaboration.
    2. Due to the proposed drilling operations being situated offshore, over 200 kilometres from the nearest coastline, the potential for significant interactions with the public are reduced. However, there are some areas where interfaces with the Framework may be required for a coordinated response between the principal emergency response agencies and the project-specific response teams (i.e. CNOOC, Stena, OSRL etc.) such as the Protocol for Land Based Response to Marine Emergencies. This Protocol is part of the overall Framework and provides a mechanism to ensure that decision-making during marine emergencies that may impact on land or on land-based services is coordinated and that the obligations and expectations of all stakeholders to marine emergencies are clearly defined. Aspects of emergency management have been considered during the project as well as response planning, the development of the emergency response plan (ERP), and ensuring the risk management strategy is fully aligned with the Framework. The Figure 4.2 below demonstrates how CNOOC's emergency response structure interfaces with the National Framework for Major Emergency Response Management. CNOOC would support this multi-agency response by mobilising a Representative where required.

- Pollution response strategies: depending on the level of the spill there are three counter pollution response strategies that can be implemented in the event of a hydrocarbon release. The formation of a response strategy would always be done in discussion with the oil spill response contractor (OSRL) and the relevant authorities:

    1. Surveillance and Monitoring: This is the strategy to be implemented for light oils such as condensate and diesel where the prevailing weather conditions are conducive to natural dispersion of oil into the environment. Due to the propensity of diesel for natural dispersion, the preferred response would be to implement a monitoring and surveillance strategy.

    In the event of more persistent oils being present, the following options will be taken into consideration when choosing the response strategy:

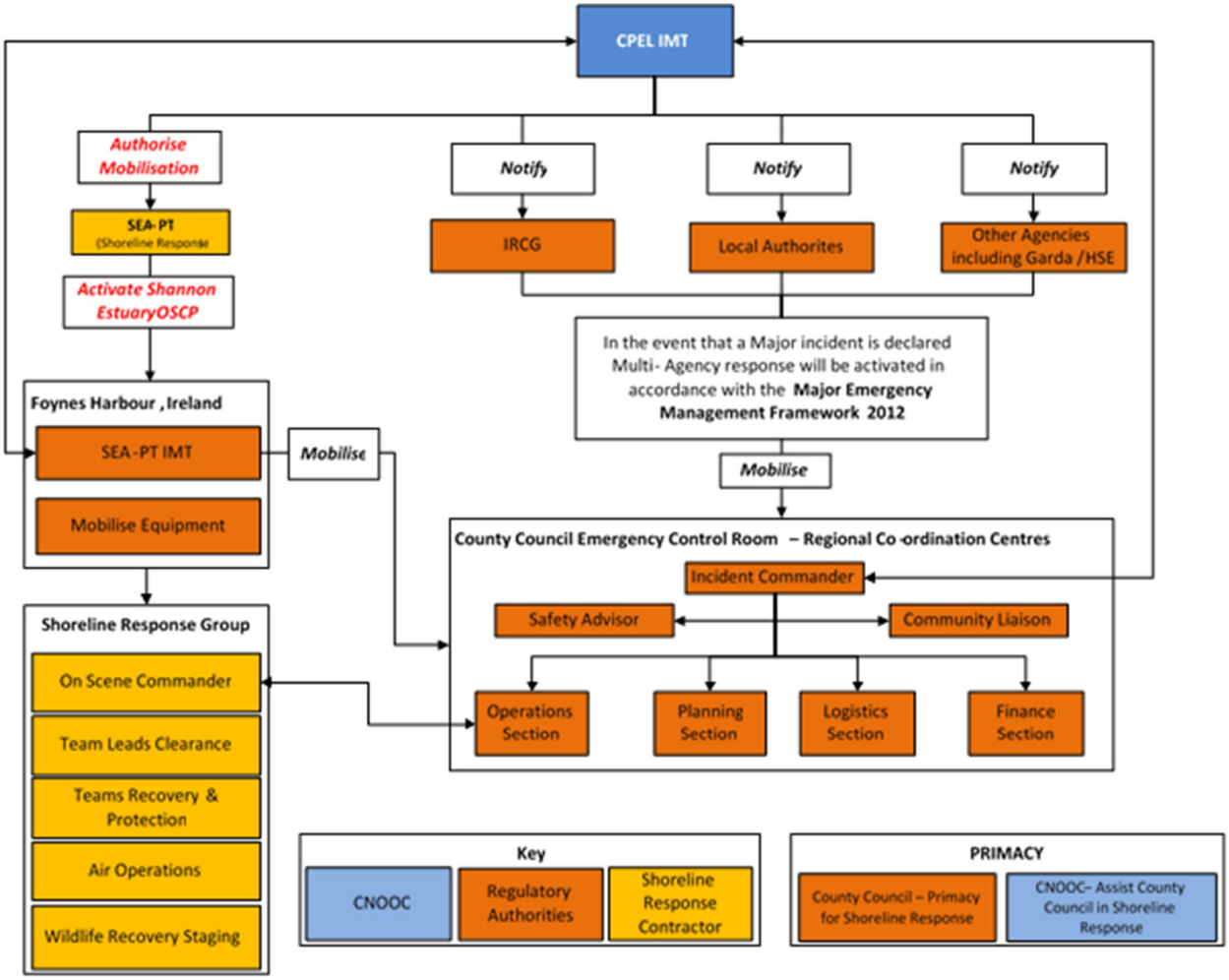
2. Chemical Dispersant Spraying: Oil spill chemical dispersant shall not be used without the authorisation of the Irish Coast Guard unless it is deemed that the immediate situation requires its use to prevent or reduce substantially hazards to human life or limb or to reduce substantially explosion or fire hazards to property.

3. Mechanical Containment and Recovery: Shoreline or 'at sea' containment booms and skimmers may be utilised as another response option. Use of this type of equipment is dependent upon circumstances such as hydrocarbon properties, weather and metocean conditions.

> Shipboard Oil Pollution Emergency Plans (SOPEPs) will be in place for any vessels of greater than 400 gross tonnage used during the proposed operations in line with MARPOL 73/78 Annex I. This will include the IceMax drill ship when it is sailing and not on location. Vessels will also hold International Oil Pollution Prevention Certificates and maintain Oil Record Books.; and

> Small level 1 spills, which disperse quickly, and pose little threat to environmental sensitivities will generally be controlled by onsite resources. Level 2 or 3 spills with the potential to impact the surrounding environment will be managed by an onshore CNOOC Incident Management Team (IMT). Detailed response arrangements for all levels of spill are included in the OSCP.

Figure 4.2 How CNOOC emergency response structure interfaces with the National Framework for Major Emergency Response Management



4.3.5 Residual impact assessment

The following European sites are considered in the residual impact assessment:

SACs	SPAs
Achill Head,	*Beara Peninsula,*
Akeragh, Banna and Barrow Harbour,	*Bills Rocks,*
Ballinskelligs Bay and Inny Estuary,	*Blasket Islands,*
Barley Cove to Ballyrisode Point,	*Cliffs of Moher,*
Black Head-Poulsallagh Complex,	*Cruagh Island,*
Blasket Islands,	*Deenish Island and Scariff Island,*
Broadhaven Bay,	*Dingle Peninsula,*
Carrowmore Dunes,	*Galley Head to Duneen Point,*
Carrowmore Point to Spanish Point and Island,	*High Island,*
Connemara Bog Complex,	*Inishshark and Davillaun,*
Erris Head,	*Illanmaster,*
Glenamoy Bog Complex,	*Inishglora and Inishkeeragh,*
Inishbofin and Inishshark,	*Inishkea Islands,*
Inisheer Island,	*Inishmore,*
Inishkea Islands,	*Iveragh Peninsula,*
Inishmaan Island,	*Kerry Head,*
Inishmore Island,	*Loop Head,*
Kenmare River,	*Magharee Islands,*
Kerry Head Shoal,	*Mid-Clare Coast,*
Kilkee Reefs,	*Old Head of Kinsale,*
Kilkeran Lake and Castlefreke Dunes,	*Puffin Island,*
Kilkieran Bay and Islands,	*Seven Heads,*
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment,	*Sheep's Head to Toe Head Skelligs,*
Lough Hyne Nature Reserve and Environs,	*Slyne Head to Ardmore Point Islands*
Lower River Shannon,	*Termoncarragh Lake and Annagh Machair,*
Magharee Islands,	*The Bull and The Cow Rocks and*
Mount Brandon,	*Tralee Bay Complex*
Mullet/Blacksod Bay Complex,	
Omey Island Machair,	
Roaringwater Bay and Islands,	
Slyne Head Islands,	
Slyne Head Peninsula,	

Three Castle Head to Mizen Head, *Tralee Bay and Magharees Peninsula, West to Cloghane,* *Valencia Harbour/Portmagee Channel,* *West Connacht Coast*	

Based on historical data presented in Section 4.3.1 the likelihood of a blowout is remote. The release prevention measures that CNOOC will have in place (outlined in Section 4.3.4) will further reduce the likelihood of a worst-case release occurring and in the highly unlikely event that one did occur measures are in place through the OSCP to ensure that effective response strategies are in place to minimise the impact from any hydrocarbon spill.

A large unplanned release of hydrocarbons from the Project could affect the bird, marine mammal, marine habitat, fish and freshwater pearl mussel and otter populations of the Achill Head, Akeragh, Banna and Barrow Harbour, Ballinskelligs Bay and Inny Estuary, Barley Cove to Ballyrisode Point, Black Head-Poulsallagh Complex, Blasket Islands, Broadhaven Bay, Carrowmore Dunes, Carrowmore Point to Spanish Point and Island, Connemara Bog Complex, Erris Head, Glenamoy Bog Complex, Inishbofin and Inishshark, Inisheer Island, Inishkea Islands, Inishmaan Island, Inishmore Island, Kenmare River, Kerry Head Shoal, Kilkee Reefs, Kilkeran Lake and Castlefreke Dunes, Kilkieran Bay and Islands, Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment, Lough Hyne Nature Reserve and Environs, Lower River Shannon , Magharee Islands, Mount Brandon, Mullet/Blacksod Bay Complex, Omey Island Machair, Roaringwater Bay and Islands , Slyne Head Islands, Slyne Head Peninsula, Three Castle Head to Mizen Head, Tralee Bay and Magharees Peninsula, West to Cloghane, Valencia Harbour/Portmagee Channel, West Connacht Coast SACs and Beara Peninsula, Bills Rocks, Blasket Islands, Cliffs of Moher, Cruagh Island, Deenish Island and Scariff Island, Dingle Peninsula, Galley Head to Duneen Point, High Island, Inishshark and Davillaun, Illanmaster, Inishglora and Inishkeeragh, Inishkea Islands, Inishmore, Iveragh Peninsula, Kerry Head, Loop Head, Magharee Islands, Mid-Clare Coast, Old Head of Kinsale, Puffin Island, Seven Heads, Sheep's Head to Toe Head Skelligs, Slyne Head to Ardmore Point Islands, Termoncarragh Lake and Annagh Machair, The Bull and The Cow Rocks and Tralee Bay Complex SPAs. However, the prevention and response mitigation measures in place both avoid, as far as possible, the potential of an accidental release occurring and ensure that appropriate strategies are in place to respond to and minimise the potential environmental effects of any release. As such there will be no adverse effect on the integrity of these European sites.

4.3.6 In-combination assessment

With regard to in-combination effects of accidental releases with other offshore projects, the effects are anticipated to be limited to oil and gas activities in the surrounding area. The water depths and remote location of the Project means there are no other industrial activities, such as offshore wind farms, located in the vicinity. There is an absence of cables, pipelines, military activity and recreational activities in the vicinity of the Project. Additionally, the IOSEA5 did not identify any cumulative impacts with fisheries and shipping as a concern (DCENR, 2015).

There are no existing oil and gas projects in the Porcupine Basin nor are there any approved plans for future exploration or seismic activities during 2019 within the region. During 2016, the DCCAE awarded several Licensing Options in the Porcupine Basin in the Phase 1 and 2 Awards from the 2015 Atlantic Margin Licensing Round. There are also a number of active Frontier Exploration Licences (FELs) from the 2011 licensing round which have entered Phase Two, with a commitment to drill an exploration well. There are planned seismic activities during 2019 within FEL 3/04, 2/13, FEL 1/17 and Licensing Option (LO) 16/19.

Current oil and gas applications inshore and offshore the coast of Ireland are listed in Table 4.13. All of the applications are located a minimum of 40 km from the Project and as such potential in-combination effects on European sites through accidental release are not anticipated. IOSEA 5 concluded that the risk of in-combination impacts from accidental events is low, due to the small probability of occurrence and the small degree of cumulative activity predicted to take place under IOSEA 5 (DCENR, 2015)

All oil and gas activities, with the potential for accidental release, have, like the Project, appropriate measures in place to both minimise the potential of an accidental release occurring and to ensure the appropriate strategies are in placed to minimise any potential environmental effect if an event does occur. The probability of an accidental release from a single project is very low and the probability of an accidental release event occurring in combination with an event from another project is further reduced. As such there will be no in-combination adverse effect on the integrity of any of the European sites.

Table 4.13 Current oil and gas exploration and production applications to DCCAE

Location	Company	Activity	Shared pathway of effect
Frontier Exploration Licenses (FELs) 2/13 (40 km from the Project) FEL 1/17 (215 km) Licensing Option (LO) 16/19 (47.5 km)	Europa Oil & Gas	3D seismic surveys	Potential accidental release from survey vessels
Corrib Field (approximately 414 km to the north of the Project)	Vermilion E&P Ireland Limited	Offshore pipeline survey and inspection of the offshore facilities	Potential accidental release from survey vessels
Barryroe, North Celtic Sea, South West Coast, Ireland (approximately 313 km from the Project)	Exola DAC	Seabed and shallow geophysical survey and an environmental baseline and habitat assessment survey	Potential accidental release from survey vessels
Dunquin South, Southern Porcupine Basin, Block 44/29, FEL 3/04 (approximately 61 km from the proposed Iolar well)	Eni Ireland BV	Debris clearance, environmental baseline and habitat assessment site survey	Potential accidental release from survey vessels
Head / Ballycotton gas fields (approximately 383 km north east of the Project)	PSE Kinsale Energy	Decommissioning	Potential accidental release during decommissioning
Seven Heads gas field (approximately 322 km from the Project)	PSE Seven Heads Limited	Decommissioning	Potential accidental release during decommissioning

4.3.7 Conclusion – unplanned accidental release

Based on historical data presented in Section 4.3.1 the likelihood of a blowout is remote. The release prevention measures that CNOOC will have in place (presented in Section 4.3.4.1) will further reduce the likelihood of a worst-case release occurring and in the highly unlikely event that one did occur measures are in place through the approved OSCP to ensure that effective response strategies are in place to minimise the impact from any hydrocarbon spill.

A large unplanned release of hydrocarbons from the Project could affect populations and habitats of a number of European sites on the west coast of Ireland. However, the prevention and response mitigation measures that CNOOC will put in place both to avoid the potential of an accidental release occurring and ensure that appropriate strategies are in place to respond to and minimise the potential environmental effects of any release. As such there will be no adverse effect on the integrity of the European sites.

Therefore, in light of the appropriate mitigation measures avoiding any release as far as possible and, in the unlikely event of an accidental release, responding to and minimising any environment effects, the Project will

have no adverse effects, individually or in-combination with other plans for projects, on the integrity of the following European sites, in view of their conservation objectives:

SACs	SPAs
Achill Head, *Akeragh, Banna and Barrow Harbour,* *Ballinskelligs Bay and Inny Estuary,* *Barley Cove to Ballyrisode Point,* *Black Head-Poulsallagh Complex,* *Blasket Islands,* *Broadhaven Bay,* *Carrowmore Dunes,* *Carrowmore Point to Spanish Point and Island,* *Connemara Bog Complex,* *Erris Head,* *Glenamoy Bog Complex,* *Inishbofin and Inishshark,* *Inisheer Island,* *Inishkea Islands,* *Inishmaan Island,* *Inishmore Island,* *Kenmare River,* *Kerry Head Shoal,* *Kilkee Reefs,* *Kilkeran Lake and Castlefreke Dunes,* *Kilkieran Bay and Islands,* *Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment,* *Lough Hyne Nature Reserve and Environs,* *Lower River Shannon,* *Magharee Islands,* *Mount Brandon,* *Mullet/Blacksod Bay Complex,* *Omey Island Machair,* *Roaringwater Bay and Islands,* *Slyne Head Islands,* *Slyne Head Peninsula,* *Three Castle Head to Mizen Head,* *Tralee Bay and Magharees Peninsula, West to Cloghane,* *Valencia Harbour/Portmagee Channel, and* *West Connacht Coast .*	*Beara Peninsula,* *Bills Rocks,* *Blasket Islands,* *Cliffs of Moher,* *Cruagh Island,* *Deenish Island and Scariff Island,* *Dingle Peninsula,* *Galley Head to Duneen Point,* *High Island, Inishshark and Davillaun,* *Illanmaster, Inishglora and Inishkeeragh,* *Inishkea Islands,* *Inishmore,* *Iveragh Peninsula,* *Kerry Head,* *Loop Head,* *Magharee Islands,* *Mid-Clare Coast,* *Old Head of Kinsale, Puffin Island,* *Seven Heads,* *Sheep's Head to Toe Head Skelligs,* *Slyne Head to Ardmore Point Islands,* *Termoncarragh Lake and Annagh Machair,* *The Bull and The Cow Rocks and* *Tralee Bay Complex*

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5 CONCLUSIONS

Following the Appropriate Assessment Screening Decision communicated by the EAU of the DCCAE on March 27th 2019 of the previously submitted version of the Project Appropriate Assessment Screening Report, this NIS has been prepared alongside a revised Appropriate Assessment Screening Report (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*) to assist the competent authority, the Minister, in determining whether the Project, either individually or in combination with other plans or projects, in view of best scientific knowledge, will have an adverse effect on the integrity of any relevant European sites in the view of their conservation objectives and specifically on the habitats and species for which the European sites have been designated.

The revised Appropriate Assessment Screening Report (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*) submitted alongside this NIS determined that it cannot be excluded, on the basis of objective scientific information, that the Project, individually or in combination with other plans and projects, will have a significant effect on 59 European sites. This NIS has been prepared to inform the Appropriate Assessment to be carried out by the Minister.

The revised Appropriate Assessment Screening Report (*IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3*) identified two impact pathways from which it was not possible to exclude, at the screening stage, in the absence of mitigation measures, whether the Project is likely to have a significant individually or in-combination effect with other projects. These were:

- Underwater noise; and
- Unplanned accidental releases.

The revised Appropriate Assessment Screening Report (IE-EXP-52-04-IOLAR-HS-00016-RP-01 Rev U3) identified three SACs (Blasket Islands, Roaringwater Bay and Islands West Connacht Coast) each with harbour porpoise as Annex II qualifying features, with pathways for connectivity with regard to underwater noise. Based on the best scientific evidence, including the use of sound propagation modelling, it was concluded that likely significant effects on these European sites due to injury to harbour porpoise from the continuous noise sources of the drilling and support vessels or the impulsive noise from VSP airguns can be excluded. In addition, likely significant effects due to behavioural disturbance from the continuous noise sources or the VSP can be excluded.

However, notwithstanding the conclusions of the revised Appropriate Assessment Screening Report, this NIS has been submitted as requested, as at the time of the Appropriate Assessment Screening Decision (see Section 1.1 of this report), insufficient information was available to the Minister to exclude significant effect on the sites concerned without mitigation. As detailed in this NIS, mitigation measures are available during use of VSP to reduce the risk of injury to cetaceans including harbour porpoise. The assessment of potentially significant impacts in this NIS concluded that, based on the presented best scientific evidence, including the use of sound propagation modelling and the implementation of mitigation measures (e.g. soft start and 1,000 m Monitored Zone), the possibility of harbour porpoises being within the expected zone of direct injury is eliminated. As such, noise emissions from the Project will not have an adverse effect on the integrity of the harbour porpoise populations of the Blasket Islands, Roaringwater Bay and Islands or West Connacht Coast SACs, and the integrity of the sites will not be adversely affected in view of their conservation objectives.

Accidental hydrocarbon releases are unplanned events which are not part of the Project. The stochastic modelling of the worst-case accidental release in the form of a prolonged well blowout showed the potential for oil reaching the south and west coast of Ireland. This resulted in the Appropriate Assessment Screening exercise (*IE-EXP-52-04-IOLAR-HS-00016-RP-01* Rev U3) identifying, based on the best scientific knowledge, that it was not possible to exclude, in the absence of appropriate mitigation measures, whether an accidental release from the Project could have a significant effect on 36 SACs and 27 SPAs located on the west coast of Ireland designated for birds, fish, marine mammals, otters, marine habitats and freshwater pearl mussels.

The likelihood of a sufficiently severe accidental event occurring that would cause an effect on these European sites is, however, considered remote based on historical event frequencies. This, alongside the prevention and response mitigation measures that CNOOC will put in place both to avoid the potential of an accidental release occurring and ensure that appropriate strategies are in place to respond to and minimise any potential environmental effects in the unlikely event of any release has led to the conclusion that the Project will not

have an adverse effect on the integrity of these European sites either individually or in-combination with other Projects, in view of their conservation objectives.

This NIS has demonstrated that the Project, individually or in combination with other plans or projects, will not adversely affect the integrity of a European site.

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APPENDIX A EUROPEAN SITE INFORMATION

Appendix A.1 SACs

All SACs and the specific features listed in the table below were considered in Appropriate Assessment.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Achill Head [002268]	Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide, which is defined by the following: Habitat Area. The permanent habitat area is stable or increasing, subject to natural processes. Community distribution: Conserve the following community type in a natural condition: Intertidal fine sand community.	Favourable.	Habitat area was estimated as 16 ha
	Reefs	To maintain the favourable conservation condition of Reefs, which is defined by the following: Habitat Area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution: The distribution of reefs is stable or increasing, subject to natural processes. Community Structure: Conserve the following community types in a natural condition: Intertidal reef community complex; *Laminaria*-dominated community complex; Subtidal reef community.	Favourable.	Habitat area estimated as 3,560 ha Estimated areas for each community: • Intertidal reef community complex – 35 ha • *Laminaria*-dominated community complex – 1,607 ha • -Subtidal reef community – 1,919 ha
	Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays, which is defined by the following: Habitat Area. The permanent habitat area is stable or increasing, subject to natural processes. Community distribution: Conserve the following community type in a natural condition: Conserve the following community types in a natural condition: Intertidal fine sand community; Mobile subtidal sand with *Gastrosaccus spinifer* community; Subtidal sand with *Bathyporeia elegans* and polychaetes community complex; Intertidal reef community complex; *Laminaria* dominated community complex; Subtidal reef community.	Favourable.	Habitat area was estimated as 6,888 ha estimated using OSi data the Transitional Water Body area as defined under the Water Framework Directive. Estimated areas for each community: • Intertidal fine sand community – 16 ha • Mobile subtidal sand with *Gastrosaccus spinifer* community – 626 ha • Subtidal sand with *Bathyporeia elegans* and polychaetes community complex – 2.685 ha • Intertidal reef community complex – 35 ha • *Laminaria*-dominated community complex – 1,607 ha • Subtidal reef community – 1,909 ha

[13]The list only includes European sites and features for which a likely significant effect could not be ruled out during the Appropriate Assessment Screening.

[14] Taken from the conservation objectives for each site from NPWS https://www.npws.ie/protected-sites/sac
[15] Status of features was determined by whether the conservation objectives were to maintain or restore favourable conditions (maintain = favourable; restore = unfavourable). The conditions of features of some select sites were not mentioned by NPWS, marked by 'Not specified'.
[16] [16] Categorised using list of species on red/amber lists as per BirdWatch Ireland - https://www.birdwatchireland.ie/LinkClick.aspx?fileticket=VcYOTGOjNbA%3d&tabid=178
[17] Taken from Natura 2000 data from for each site from NPWS - https://www.npws.ie/protected-sites/sac

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Akeragh, Banna and Barrow Harbour [00332]	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in Akeragh, Banna and Barrow Harbour SAC, which is defined by the following list of attributes and targets: Habitat Area. area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain range of subcommunities with typical species listed in McCorry and Ryle (2009). Vegetation structure: negative indicator species - *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*) with an annual spread of less than 1%.	Unfavourable.	Habitat area estimated as 24 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Mediterranean salt meadows (*Juncetalia maritimi*)	To maintain the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Akeragh, Banna and Barrow Harbour SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain range of subcommunities with typical species listed in McCorry and Ryle (2009). Vegetation structure: negative indicator species - *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*) with an annual spread of less than 1%.	Favourable.	Habitat area estimated as 24 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Salicornia and other annuals colonizing mud and sand	To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in Akeragh, Banna and Barrow Harbour SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain range of subcommunities with typical species listed in McCorry and Ryle (2009). Vegetation structure: negative indicator species - *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*) with an annual spread of less than 1%.	Favourable.	Habitat area estimated as 24 ha.
	Common teal (*Anas crecca*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 721 wintering individuals Maximum 721 wintering individuals
	Mallard (*Anas platyrhynchos)*	No conservation objectives set for this feature for this site	Least concern	Minimum 140 wintering individuals Maximum 140 wintering individuals
	Ruddy turnstone (*Arenaria interpres*)	No conservation objectives set for this feature for this site	Least concern	Minimum 60 wintering individuals Maximum 60 wintering individuals
	Ringed plover (*Charadrius hiaticula*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 130 wintering individuals Maximum 130 wintering individuals
	Oystercatcher (*Haematopus ostralegus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 43 wintering individuals Maximum 43 wintering individuals
	Golden plover (*Pluvialis apricaria*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 1060 wintering individuals Maximum 1060 wintering individuals
	Common shelduck (*Tadorna tadorna*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 70 wintering individuals Maximum 70 wintering individuals

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Wigeon (*Anas penelope*),	No conservation objectives set for this feature for this site	High conservation concern	Minimum 295 wintering individuals Maximum 295 wintering individuals
	Brent goose (*Branta bernicla*)	No conservation objectives set for this feature for this site	Least concern	Minimum 360 wintering individuals Maximum 360 wintering individuals
	Sanderling (*Calidris alba*)	No conservation objectives set for this feature for this site	Least concern	Minimum 280 wintering individuals Maximum 280 wintering individuals
	Dunlin (*Calidris alpina*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 830 wintering individuals Maximum 830 wintering individuals
	Common curlew (*Numenius arquata*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 425 wintering individuals Maximum 425 wintering individuals
	Redshank (*Tringa totanus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 240 wintering individuals Maximum 240 wintering individuals
	Bar-tailed godwit (*Limosa lapponica*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 345 wintering individuals Maximum 345 wintering individuals
	Goosander (*Mergus merganser*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 26 wintering individuals Maximum 26 wintering individuals
	Grey plover (*Pluvialis squatarola*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 62 wintering individuals Maximum 62 wintering individuals
	Northern lapwing (*Vanellus vanellus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 1930 wintering individuals Maximum 1930 wintering individuals
	Common greenshank (*Tringa nebularia*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 11 wintering individuals Maximum 11 wintering individuals

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Ballinskelligs Bay and Inny Estuary [00335]	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	To maintain the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in Ballinskelligs Bay and Inny Estuary SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain range of subcommunities with typical species listed in McCorry and Ryle (2009). Vegetation structure: negative indicator species - *Spartina anglica*. There is no cordgrass (*Spartina anglica*) recorded from this SAC. Prevent establishment of cordgrass.	Favourable.	Habitat area estimated as 11 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Mediterranean salt meadows (*Juncetalia maritimi*)	To maintain the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Ballinskelligs Bay and Inny Estuary SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain range of subcommunities with typical species listed in McCorry and Ryle (2009). Vegetation structure: negative indicator species - *Spartina anglica*. There is no cordgrass (*Spartina anglica*) recorded from this SAC. Prevent establishment of cordgrass.	Favourable.	Habitat area estimated as 10 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Barley Cove to Ballyrisode Point [001040]	Salicornia and other annuals colonizing mud and sand	To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in Barley Cove to Ballyrisode Point SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. There is no cordgrass (*Spartina anglica*) recorded from this SAC. Prevent establishment of cordgrass.	Favourable.	Habitat area estimated as 0.5 ha.
	Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Barley Cove to Ballyrisode Point SAC, which is defined by the following list of attributes and targets: Habitat Area. Area stable or increasing, subject to natural processes including erosion and succession. Community distribution. Conserve the following community types in a natural condition: Sand with *Eurydice pulchra* community complex; Coarse sediment with *Tubificoides benedii* community.	Favourable.	Habitat area estimated as 72 ha. Estimated areas for each community: • Sand with *Eurydice pulchra* community complex - 6 ha; • Coarse sediment with *Tubificoides benedii* community - 66 ha

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in Barley Cove to Ballyrisode Point SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. There is no cordgrass (*Spartina anglica*) recorded from this SAC. Prevent establishment of cordgrass.	Unfavourable.	Habitat area estimated as 6 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Mediterranean salt meadows (*Juncetalia maritimi*)	To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Barley Cove to Ballyrisode Point SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. There is no cordgrass (*Spartina anglica*) recorded from this SAC. Prevent establishment of cordgrass.	Unfavourable.	Habitat area estimated as 6 ha.
	Common teal (*Anas crecca*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 23 wintering individuals Maximum 23 wintering individuals
	Eurasian oystercatcher (*Haematopus ostralegus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 40 wintering individuals Maximum 40 wintering individuals
	Eurasian curlew (*Numenius arquata*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 31 wintering individuals Maximum 31 wintering individuals
	Lesser black-backed gull (*Larus fuscus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 9 reproducing pairs Maximum 9 reproducing pairs
	Black-headed gull (*Larus ridibundus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 82 wintering individuals Maximum 82 wintering individuals
	Northern lapwing (*Vanellus vanellus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 40 wintering individuals Maximum 40 wintering individuals

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Northern fulmar (*Fulmarus glacialis*)	No conservation objectives set for this feature for this site	Least concern	Minimum 41 reproducing pairs Maximum 41 reproducing pairs
Black Head-Poulsallagh Complex [00020]	Reefs	To maintain the favourable conservation condition of Reefs in Black Head-Poulsallagh Complex SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs is stable or increasing, subject to natural processes. Community structure. Conserve the following community types in a natural condition: Intertidal reef community complex; *Laminaria*-dominated community complex.	Favourable	Habitat area estimated as 540 ha. Estimated areas for each community: • Intertidal reef community complex - 87 ha; • *Laminaria*-dominated community complex - 454 ha.
	Submerged or partially submerged sea caves	To maintain the favourable conservation condition of Submerged or partially submerged sea caves in Black Head-Poulsallagh Complex SAC, which is defined by the following list of attributes and targets: Distribution. The distribution of sea caves is stable, subject to natural processes Community structure. Human activities should occur at levels that do not adversely affect the ecology of sea caves in this SAC.	Favourable	Habitat area estimated as 78 ha.
Blasket Islands [002172]	Harbour porpoise (*Phocoena phocoena*)	To maintain the favourable conservation condition of Harbour Porpoise in Blasket Islands SAC, which is defined by the following list of attributes and targets: Access to suitable habitat. Species range within the site should not be restricted by artificial barriers to site use. Disturbance. Human activities should occur at levels that do not adversely affect the harbour porpoise at the site.	Favourable.	Minimum 267 permanent individuals at site. Maximum 477 permanent individuals at site.
	Reefs	To maintain the favourable conservation condition of Reefs in Blasket Islands SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs remains stable, subject to natural processes. Community structure. Conserve the following community types in a natural condition: subtidal reef with faunal turf and echinoderms community complex; *Laminaria*-dominated community complex.	Favourable.	Habitat area estimated as 4859 ha. Estimated areas for each community: • Subtidal reef with faunal turf and echinoderms community complex - 4817 ha; • *Laminaria*-dominated community complex - 43 ha.
	Submerged or partially submerged sea caves	To maintain the favourable conservation condition of Submerged or partially submerged sea caves in Blasket Islands SAC, which is defined by the following list of attributes and targets: Distribution. The distribution of sea caves occurring in the site should remain stable, subject to natural processes Community structure. Human activities should occur at levels that do not adversely affect the ecology of sea caves in this SAC.	Favourable.	Habitat area estimated as 227 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Broadhaven Bay [000472]	Grey seal (*Halichoerus grypus*)	To maintain the favourable conservation condition of Grey Seal in Blasket Islands SAC, which is defined by the following list of attributes and targets: Access to suitable habitat. Species range within the site should not be restricted by artificial barriers to site use. Breeding behaviour. Conserve the breeding sites in a natural condition. Moulting behaviour. Conserve the moult haul-out sites in a natural condition. Resting behaviour. Maintain the resting haul-out sites in a natural condtion. Disturbance. Human activities should occur at levels that do not adversely affect the grey seal at the site.	Favourable.	Minimum 648 permanent individuals at site. Maximum 833 permanent individuals at site.
	Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in Broadhaven Bay SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community extent. Maintain the extent of the *Zostera*-dominated community, subject to natural processes. Community structure: *Zostera* density. Conserve the high quality of *Zostera*-dominated community, subject to natural processes. Community distribution. Conserve the following community types in a natural condition: Coarse sediment to sandy mud with *Pygospio elegans* community complex; Sand with *Angulus tenuis* community complex; Sand to coarse sediment with crustaceans and *Polyophthalmus pictus* community complex; Subtidal sand with *polychaetes* community complex; *Fucoid*-dominated reef community complex; Subtidal reef community complex.	Favourable.	Habitat area estimated as 8674 ha. Estimated areas for each community: • Coarse sediment to sandy mud with *Pygospio elegans* community complex - 415 ha; • Sand with *Angulus tenuis* community complex - 399 ha; • Sand to coarse sediment with crustaceans and *Polyophthalmus pictus* community complex - 549 ha; • Subtidal sand with *polychaetes* community complex – 6196 ha; • *Fucoid*-dominated reef community complex - 170 ha; • Subtidal reef community complex - 876 ha; • Shingle – 14 ha.
	Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Broadhaven Bay SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community distribution. Conserve the following community types in a natural condition: Coarse sediment to sandy mud with *Pygospio elegans* community complex; Sand with *Angulus tenuis* community complex	Favourable.	Habitat area estimated as 495 ha. Estimated areas for each community: • Coarse sediment to sandy mud with *Pygospio elegans* community complex - 335 ha; • Sand with *Angulus tenuis* community complex – 160 ha.
	Reefs	To maintain the favourable conservation condition of Reefs in Broadhaven Bay SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs remains stable, subject to natural processes. Community structure. Conserve the following community types in a natural condition: *Fucoid*-dominated reef community complex; Subtidal reef community complex.	Favourable.	Habitat area estimated as 1103 ha. Estimated areas for each community: • *Fucoid*-dominated reef community complex - 184 ha; • Subtidal reef community complex - 919 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Submerged or partially submerged sea caves	To maintain the favourable conservation condition of Submerged or partially submerged sea caves in Broadhaven Bay SAC, which is defined by the following list of attributes and targets: Distribution. The distribution of sea caves remains stable, subject to natural processes. Community structure. Human activities should occur at levels that do not adversely affect the ecology of sea caves in this SAC.	Favourable.	Habitat area estimated as 91 ha.
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	To maintain the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in Broadhaven Bay SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. There is no cordgrass (*Spartina anglica*) recorded from this SAC. Prevent establishment of cordgrass.	Favourable.	Habitat area estimated as 7 ha.
	Turnstone (*Arenaria interpres*)	No conservation objectives set for this feature for this site	Least concern	Minimum 50 wintering individuals Maximum 50 wintering individuals
	Ringed plover (*Charadrius hiaticula*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 484 wintering individuals Maximum 484 wintering individuals
	Eurasian oystercatcher (*Haematopus ostralegus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 300 wintering individuals Maximum 300 wintering individuals
	European golden plover (*Pluvialis apricaria*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 7,001 wintering individuals Maximum 7,001 wintering individuals

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Sandwich tern (*Sterna sandvicensis*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 81 reproducing pairs Maximum 81 reproducing pairs
	Brent goose (*Branta bernicla)*	No conservation objectives set for this feature for this site	Least concern	Minimum 1 wintering individual Maximum 200 wintering individuals
	Sanderling (*Calidris alba*)	No conservation objectives set for this feature for this site	Least concern	Minimum 74 wintering individuals Maximum 74 wintering individuals
	Dunlin (*Calidris alpina*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 2,108 wintering individuals Maximum 2,108 wintering individuals
	Red knot (*Calidris canutus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 217 wintering individuals Maximum 217 wintering individuals
	Curlew (*Numenius arquata*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 500 wintering individuals Maximum 500 wintering individuals
	Common tern (*Sterna hirundo*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 22 reproducing pairs Maximum 22 reproducing pairs
	Arctic tern (*Sterna paradisaea*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 20 reproducing pairs Maximum 20 reproducing pairs
	Common redshank *(Tringa tetanus)*	No conservation objectives set for this feature for this site	High conservation concern	Minimum 150 wintering individuals Maximum 150 wintering individuals
	Black-headed gull (*Larus ridibundus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 100 reproducing pairs Maximum 100 reproducing pairs
	Bar-tailed godwit (*Limosa lapponica*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 481 wintering individuals Maximum 481 wintering individuals
	Common merganser (*Mergus merganser*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 38 wintering individuals Maximum 38 wintering individuals
	Grey plover (*Pluvialis squatarola*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 52 wintering individuals Maximum 52 wintering individuals
	Northern lapwing (*Vanellus vanellus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 52 wintering individuals Maximum 52 wintering individuals

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Carrowmore Dunes [002250]	Reefs	To maintain the favourable conservation condition of Reefs in Carrowmore Dunes SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs remains stable, subject to natural processes. Community structure. Conserve the following community types in a natural condition: Intertidal reef community complex; *Laminaria*-dominated reef community complex.	Favourable.	Habitat area estimated as 211 ha. Estimated areas for each community: • Intertidal reef community complex - 65 ha; • *Laminaria*-dominated community complex - 146 ha.
	Common gull (*Larus canus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 40 wintering individuals Maximum 40 wintering individuals
	Ringed plover (*Charadrius hiaticula*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 70 wintering individuals Maximum 70 wintering individuals Reproducing data deficient
	Oystercatcher (*Haematopus ostralegus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 140 wintering individuals Maximum 140 wintering individuals
	Wigeon (*Anas penelope)*	No conservation objectives set for this feature for this site	High conservation concern	Minimum 70 wintering individuals Maximum 70 wintering individuals
	Dunlin (*Calidris alpina*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 80 wintering individuals Maximum 80 wintering individuals
	Common curlew (*Numenius arquata*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 200 wintering individuals Maximum 200 wintering individuals
	Black-headed gull (*Chroicocephalus ridibundus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 300 wintering individuals Maximum 300 wintering individuals
	Northern lapwing (*Vanellus vanellus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 180 wintering individuals Maximum 180 wintering individuals
Carrowmore Point to Spanish Point and Island [001021]	Reefs	To maintain the favourable conservation condition of Reefs in Carrowmore Point to Spanish Point SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs remains stable, subject to natural processes. Community structure. Conserve the following community types in a natural condition: Intertidal reef community complex; *Laminaria*-dominated reef community complex.	Favourable.	Habitat area estimated as 2829 ha. Estimated areas for each community: • Intertidal reef community complex - 243 ha; • *Laminaria*-dominated community complex - 2587 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Coastal lagoons	To restore the favourable conservation condition of Coastal lagoons in Carrowmore Point to Spanish Point and Islands SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable, or increasing, subject to natural processes. Habitat distribution. No decline, subject to natural processes. Salinity regime. Median annual salinity and temporal variation within natural ranges. Hydrological regime. Annual water level fluctuations and minima within natural ranges. Barrier connectivity between lagoon and sea. Appropriate hydrological connections between lagoon and sea, including where necessary, appropriate management. Water quality: Chlorophyll *a*. Annual median chlorophyll a within natural range and less than 5µg/l. Water quality: Molybdate Reactive Phosphorus (MRP). Annual median MRP within natural range and less than 0.1mg/l. Water quality: Dissolved Inorganic Nitrogen (DIN). Annual median DIN within natural range and less than 0.15mg/l. Depth of macrophyte colonisation. Macrophyte colonisation to maximum depth of lagoon. Typical plant species. Maintain number and extent of listed lagoonal specialists, subject to natural variation. Typical animal species. Maintain listed lagoon specialists, subject to natural variation. Negative indicator species. Negative indicator species absent or under control.	Unfavourable	Habitat area estimated as 12 ha.
	Whooper swan (*Cygnus cygnus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 10 wintering individuals Maximum 30 wintering individuals
	Lesser black-backed gull (*Larus fuscus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 24 reproducing pairs Maximum 24 reproducing pairs
	European storm petrel (*Hydrobates pelagicus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 1 reproducing pairs Maximum 10 reproducing pairs
	Grey plover (*Pluvialis squatarola*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 14 wintering individuals Maximum 14 wintering individuals
	Northern lapwing (*Vanellus vanellus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 352 wintering individuals Maximum 352 wintering individuals

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Ruddy turnstone (*Arenaria interpres*)	No conservation objectives set for this feature for this site	Least concern	Minimum 476 wintering individuals Maximum 476 wintering individuals
	Barnacle goose (*Branta leucopsis*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 350 wintering individuals Maximum 350 wintering individuals
	Ringed plover (*Charadrius hiaticula*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 170 wintering individuals Maximum 170 wintering individuals
	Eurasian oystercatcher (*Haematopus ostralegus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 128 wintering individuals Maximum 128 wintering individuals
	Great cormorant (*Phalacrocorax carbo*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 60 reproducing pairs Maximum 60 reproducing pairs
	Golden plover (*Pluvialis apricaria*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 883 wintering individuals Maximum 883 wintering individuals
	Sanderling (*Calidris alba*)	No conservation objectives set for this feature for this site	Least concern	Minimum 189 wintering individuals Maximum 189 wintering individuals
	Dunlin (*Calidris alpina*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 1,540 wintering individuals Maximum 1,540 wintering individuals
	Purple sandpiper (*Calidris maritima*)	No conservation objectives set for this feature for this site	Least concern	Minimum 239 wintering individuals Maximum 239 wintering individuals
	Curlew (*Numenius arquata*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 179 wintering individuals Maximum 179 wintering individuals
	Common redshank (*Tringa totanus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 43 wintering individuals Maximum 43 wintering individuals

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Connemara Bog Complex [002034]	Coastal lagoons	To maintain the favourable conservation condition of Coastal lagoons in Connemara Bog Complex SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable, or increasing, subject to natural processes. Habitat distribution. No decline, subject to natural processes. Salinity regime. Median annual salinity and temporal variation within natural ranges. Hydrological regime. Annual water level fluctuations and minima within natural ranges. Barrier connectivity between lagoon and sea. Appropriate hydrological connections between lagoon and sea, including where necessary, appropriate management. Water quality: Chlorophyll *a*. Annual median chlorophyll a within natural range and less than 5µg/l. Water quality: Molybdate Reactive Phosphorus (MRP). Annual median MRP within natural range and less than 0.1mg/l. Water quality: Dissolved Inorganic Nitrogen (DIN). Annual median DIN within natural range and less than 0.15mg/l. Depth of macrophyte colonisation. Macrophyte colonisation to at least 4m depth. Typical plant species. Maintain number and extent of listed lagoonal specialists, subject to natural variation. Typical animal species. Maintain listed lagoon specialists, subject to natural variation. Negative indicator species. Negative indicator species absent or under control.	Favourable.	Habitat area estimated as 151 ha.
	Reefs	To maintain the favourable conservation condition of Reefs in Connemara Bog Complex SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs is stable or increasing, subject to natural processes. Community extent. Maintain the extent of the *Serpula vermicularis*-dominated community complex, subject to natural processes. Community structure. Conserve the high quality of the *Serpula vermicularis*-dominated community complex, subject to natural processes Community structure. Conserve the following community type in a natural condition: Intertidal reef community complex.	Favourable.	Habitat area estimated as 6 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Erris Head [001501]	Atlantic salmon (*Salmo salar*)	To restore the favourable conservation condition of Atlantic Salmon in Connemara Bog Complex SAC, which is defined by the following list of attributes and targets: Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary. Adult spawning fish. Conservation Limit (CL) for each system consistently exceeded. Salmon fry abundance. Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling Out-migrating smolt abundance. No significant decline. Number and distribution of redds. No decline in number and distribution of spawning redds due to anthropogenic causes. Water quality. At least Q4 at all sites sampled by EPA.	Unfavourable.	N/A
	Otter (*Lutra lutra*)	To maintain the favourable conservation condition of Otter in Connemara Bog Complex SAC, which is defined by the following list of attributes and targets: Distribution. No significant decline. Extent of terrestrial habitat. No significant decline. Extent of marine habitat. No significant decline. Extent of freshwater (river) habitat. No significant decline. Extent of freshwater (lake/lagoon) habitat. No significant decline. Couching sites and holts. No significant decline. Fish biomass available. No significant decline.	Favourable.	Extent of terrestrial habitat area - 2194 ha; Extent of marine habitat - 139 ha; Extent of freshwater (river) habitat - 564 km; Extent of freshwater (lake/lagoon) habitat – 3,908 ha.
	Northern fulmar (*Fulmarus glacialis*)	No conservation objectives set for this feature for this site	Least concern	Minimum 50 reproducing pairs Maximum 100 reproducing pairs
	Lesser black-backed gull (*Larus fuscus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 4 reproducing pairs Maximum 4 reproducing pairs
	Barnacle goose (*Branta leucopsis*),	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 1 wintering individuals Maximum 20 wintering individuals

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Glenamoy Bog Complex [00500]	Atlantic salmon (*Salmo salar*)	To restore the favourable conservation condition of Atlantic Salmon in Glenamoy Bog Complex SAC, which is defined by the following list of attributes and targets: Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary. Adult spawning fish. Conservation Limit (CL) for each system consistently exceeded. Salmon fry abundance. Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling Out-migrating smolt abundance. No significant decline. Number and distribution of redds. No decline in number and distribution of spawning redds due to anthropogenic causes. Water quality. At least Q4 at all sites sampled by EPA.	Unfavourable.	N/A
	Atlantic puffin (*Fratercula arctica*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 2250 reproducing pairs Maximum 2250 reproducing pairs
	Golden plover (*Pluvialis apricaria*)	No conservation objectives set for this feature for this site	High conservation concern	Reproducing: data deficient
	Black-legged kittiwake (*Rissa tridactyla*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 1 reproducing pairs Maximum 500 reproducing pairs
	Razorbill (*Alca torda*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 1 reproducing pairs Maximum 100 reproducing pairs
	Storm petrel (*Hydrobates pelagicus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 7,500 reproducing pairs Maximum 10,000 reproducing pairs
	Manx shearwater (*Puffinus puffinus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 100 reproducing pairs Maximum 100 reproducing pairs
	Common guillemot (*Uria aalge*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 1 reproducing pairs Maximum 100 reproducing pairs
	Northern fulmar (*Fulmarus glacialis*)	No conservation objectives set for this feature for this site	Least concern	Minimum 2000 reproducing pairs Maximum 2000 reproducing pairs
	Barnacle goose (*Branta leucopsis*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 1 overwintering individuals Maximum 50 overwintering individuals

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Inishbofin and Inishshark [00278]	Coastal lagoons	To restore the favourable conservation condition of Coastal lagoons in Inishbofin and Inishshark SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable, subject to slight natural variation. Habitat distribution. No decline, subject to natural processes. Salinity regime. Median annual salinity and temporal variation within natural ranges. Hydrological regime. Annual water level fluctuations and minima within natural ranges. Barrier connectivity between lagoon and sea. Appropriate hydrological connections between lagoon and sea, including where necessary, appropriate management. Water quality: Chlorophyll *a*. Annual median chlorophyll a within natural range and less than 5µg/l. Water quality: Molybdate Reactive Phosphorus (MRP). Annual median MRP within natural range and less than 0.1mg/l. Water quality: Dissolved Inorganic Nitrogen (DIN). Annual median DIN within natural range and less than 0.15mg/l. Depth of macrophyte colonisation. Macrophyte colonisation to maximum depth of lagoon. Typical plant species. Maintain number and extent of listed lagoonal specialists, subject to natural variation. Typical animal species. Maintain listed lagoon specialists, subject to natural variation. Negative indicator species. Negative indicator species absent or under control.	Unfavourable.	Habitat area estimated as 8 ha.
	Grey seal (*Halichoerus grypus*)	To maintain the favourable conservation condition of Grey Seal in Inishbofin and Inishshark SAC, which is defined by the following list of attributes and targets: Access to suitable habitat. Species range within the site should not be restricted by artificial barriers to site use. Breeding behaviour. Conserve the breeding sites in a natural condition. Moulting behaviour. Conserve the moult haul-out sites in a natural condition. Resting behaviour. Maintain the resting haul-out sites in a natural condtion. Disturbance. Human activities should occur at levels that do not adversely affect the grey seal at the site.	Favourable.	Minimum 749 permanent individuals at site. Maximum 963 permanent individuals at site.
	Barnacle goose (*Branta leucopsis*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 300 overwintering individuals Maximum 300 overwintering individuals
	Arctic tern (*Sterna paradisaea*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 27 reproducing pairs Maximum 27 reproducing pairs

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	European storm petrel (*Hydrobates pelagicus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 1 reproducing pairs Maximum 100 reproducing pairs
	Manx shearwater (*Puffinus puffinus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 1 reproducing pairs Maximum 200 reproducing pairs
	Northern fulmar (*Fulmarus glacialis*)	No conservation objectives set for this feature for this site	Least concern	Minimum 400 reproducing pairs Maximum 400 reproducing pairs
Inisheer Island [01275]	Reefs	To maintain the favourable conservation condition of Reefs in Inisheer Island SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs remains stable, subject to natural processes. Community structure. Conserve the following community type in a natural condition: Exposed intertidal reef community complex	Favourable.	Habitat area estimated as 70 ha. Estimated areas for each community: • Exposed intertidal reef community complex – 70 ha
	Coastal lagoons	To maintain the favourable conservation condition of Coastal lagoons in Inisheer Island SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable, subject to slight natural variation. Habitat distribution. No decline, subject to natural processes. Salinity regime. Median annual salinity and temporal variation within natural ranges. Hydrological regime. Annual water level fluctuations and minima within natural ranges. Barrier connectivity between lagoon and sea. Appropriate hydrological connections between lagoon and sea, including where necessary, appropriate management. Water quality: Chlorophyll *a*. Annual median chlorophyll a within natural range and less than 5µg/l. Water quality: Molybdate Reactive Phosphorus (MRP). Annual median MRP within natural range and less than 0.1mg/l. Water quality: Dissolved Inorganic Nitrogen (DIN). Annual median DIN within natural range and less than 0.15mg/l. Depth of macrophyte colonisation. Macrophyte colonisation to at least 2m depth. Typical plant species. Maintain number and extent of listed lagoonal specialists, subject to natural variation. Typical animal species. Maintain listed lagoon specialists, subject to natural variation. Negative indicator species. Negative indicator species absent or under control.	Favourable.	Habitat area estimated as 6 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Sandwich tern (*Sterna sandvicensis*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 2 reproducing pairs Maximum 2 reproducing pairs
	Little tern (*Sterna albifrons)*	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 2 reproducing pairs Maximum 2 reproducing pairs
	Arctic tern (*Sterna paradisaea*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 2 reproducing pairs Maximum 2 reproducing pairs
Inishkea Islands [00507]	Grey seal (*Halichoerus grypus*)	To maintain the favourable conservation condition of Grey Seal in Inishkea Islands SAC, which is defined by the following list of attributes and targets: Access to suitable habitat. Species range within the site should not be restricted by artificial barriers to site use. Breeding behaviour. Conserve the breeding sites in a natural condition. Moulting behaviour. Conserve the moult haul-out sites in a natural condition. Resting behaviour. Maintain the resting haul-out sites in a natural condtion. Disturbance. Human activities should occur at levels that do not adversely affect the grey seal at the site.	Favourable.	280 permanent individuals at site.
	Sanderling (*Calidris alba*)	No conservation objectives set for this feature for this site	Least concern	Minimum 200 overwintering individuals Maximum 200 overwintering individuals
	Dunlin (*Calidris alpina*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 5 reproducing pairs Maximum 5 reproducing pairs
	Purple sandpiper (*Calidris maritima*)	No conservation objectives set for this feature for this site	Least concern	Minimum 175 overwintering individuals Maximum 175 overwintering individuals
	Ruddy turnstone (*Arenaria interpres*)	No conservation objectives set for this feature for this site	Least concern	Minimum 400 overwintering individuals Maximum 400 overwintering individuals
	Barnacle goose (*Branta leucopsis*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 2,300 overwintering individuals Maximum 2,700 overwintering individuals
	Ringed plover (*Charadrius hiaticula*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 31 reproducing pairs Maximum 31 reproducing pairs
	Common tern (*Sterna hirundo*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 1 reproducing pairs Maximum 20 reproducing pairs
	Arctic tern (*Sterna paradisaea*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 73 reproducing pairs Maximum 220 reproducing pairs

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Eurasian oystercatcher (*Haematopus ostralegus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 136 reproducing pairs Maximum 136 reproducing pairs
	European herring gull (*Larus argentatus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 100 reproducing pairs Maximum 100 reproducing pairs
	Great black-backed gull (*Larus marinus*),	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 150 reproducing pairs Maximum 150 reproducing pairs
	Golden plover (*Pluvialis apricaria*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 5000 overwintering individuals Maximum 5000 overwintering individuals
	Northern lapwing (*Vanellus vanellus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 14 reproducing pairs Maximum 14 reproducing pairs
	Lesser black-backed gull (*Larus fuscus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 10 reproducing pairs Maximum 10 reproducing pairs
	Little tern (*Sterna albifrons*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 4 reproducing pairs Maximum 41 reproducing pairs
Inishmaan Island [0000212]	Reefs	To maintain the favourable conservation condition of Reefs in Inishmaan Island SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs remains stable, subject to natural processes. Community structure. Conserve the following community type in a natural condition: intertidal reef community complex	Favourable.	Habitat area estimated as 70 ha. Estimated areas for each community: • Intertidal reef community complex - 70 ha.
Inishmore Island [000213]	Reefs	To maintain the favourable conservation condition of Reefs in Inishmore Island SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs remains stable, subject to natural processes. Community structure. Conserve the following community type in a natural condition: intertidal reef community complex; *Laminaria*-dominated community complex; subtidal reef community complex.	Favourable.	Habitat area estimated as 6330 ha. Estimated areas for each community: • Intertidal reef community complex - 281 ha; • *Laminaria*-dominated community complex - 4167 ha; • Subtidal reef community complex - 1883 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Coastal lagoons	To restore the favourable conservation condition of Coastal lagoons in Inishmore Island SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable, subject to slight natural variation. Habitat distribution. No decline, subject to natural processes. Salinity regime. Median annual salinity and temporal variation within natural ranges. Hydrological regime. Annual water level fluctuations and minima within natural ranges. Barrier connectivity between lagoon and sea. Appropriate hydrological connections between lagoon and sea, including where necessary, appropriate management. Water quality: Chlorophyll *a*. Annual median chlorophyll a within natural range and less than 5µg/l. Water quality: Molybdate Reactive Phosphorus (MRP). Annual median MRP within natural range and less than 0.1mg/l. Water quality: Dissolved Inorganic Nitrogen (DIN). Annual median DIN within natural range and less than 0.15mg/l. Depth of macrophyte colonisation. Macrophyte colonisation to maximum depth of lagoon. Typical plant species. Maintain number and extent of listed lagoonal specialists, subject to natural variation. Typical animal species. Maintain listed lagoon specialists, subject to natural variation. Negative indicator species. Negative indicator species absent or under control.	Unfavourable.	Habitat area estimated as 8 ha.
	Submerged or partially submerged sea caves	To maintain the favourable conservation condition of Submerged or partially submerged sea caves in Inishmore Island SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent area of sea caves is stable or increasing, subject to natural processes. Distribution. The distribution of sea caves occurring in the site should remain stable, subject to natural processes. Community structure. Conserve the following community type in a natural condition: Sea cave community complex. Community structure. Human activities should occur at levels that do not adversely affect the ecology of sea caves in this SAC.	Favourable.	Habitat area estimated as 147 ha. Estimated areas for each community: • Sea cave community complex - 1 ha
	Ringed plover (*Charadrius hiaticula*),	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 24 reproducing pairs Maximum 24 reproducing pairs
	Northern fulmar (*Fulmarus glacialis*)	No conservation objectives set for this feature for this site	Least concern	Minimum 180 reproducing pairs Maximum 180 reproducing pairs

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	European shag (*Phalacrocorax aristotelis*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 38 reproducing pairs Maximum 38 reproducing pairs
	Great cormorant (*Phalacrocorax carbo)*	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 7 reproducing pairs Maximum 7 reproducing pairs
	Black-legged kittiwake (*Rissa tridactyla)*	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 404 reproducing pairs Maximum 404 reproducing pairs
	Arctic tern (*Sterna paradisaea*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 338 reproducing pairs Maximum 338 reproducing pairs
	Sandwich tern (*Sterna sandvicensis*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 2 reproducing pairs Maximum 2 reproducing pairs
	Razorbill (*Alca torda*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 66 reproducing pairs Maximum 66 reproducing pairs
	Common guillemot (*Uria aalge)*	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 2245 reproducing pairs Maximum 2245 reproducing pairs
	Northern lapwing (*Vanellus vanellus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 12 reproducing pairs Maximum 12 reproducing pairs

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Kenmare River [IE02158]	Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in Kenmare River SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community extent. Maintain the extent of the *Zostera*- and Maerl-dominated communities and the *Pachycerianthus multiplicatus* community, subject to natural processes. Community structure: *Zostera* density. Conserve the high quality of *Zostera*-dominated community, subject to natural processes. Community structure. Conserve the high quality of the *Pachycerianthus multiplicatus* community, subject to natural processes. Community structure. Conserve the high quality of the Maerl-dominated community, subject to natural processes Community distribution. Conserve the following community types in a natural condition: Intertidal mobile sand community complex; Muddy fine sands dominated by *polychaetes* and *Amphiura filiformis* community complex; Fine to medium sand with crustaceans and *polychaetes* community complex; Coarse sediment dominated by *polychaetes* community complex; Shingle; Intertidal reef community complex; Subtidal reef with echinoderms and faunal turf community complex and *Laminaria*-dominated community complex.	Favourable.	Habitat area estimated as 39322 ha. Estimated areas for each community: • Zostera-dominated community - 20ha; • Maërl-dominated community – 47ha; • *Pachycerianthus multiplicatus* community – 6ha; • Intertidal mobile sand community complex - 63 ha; • Muddy fine sands dominated by polychaetes and *Amphiura filiformis* community complex – 20150 ha; • Fine to medium sand with crustaceans and *polychaetes* community complex – 1989 ha • Coarse sediment dominated by *polychaetes* community complex – 8314 ha; • Shingle – 1 ha; • Intertidal reef community complex - 526 ha; • Subtidal reef with echinoderms and faunal turf community complex – 4808 ha; • *Laminaria*-dominated community complex - 3358 ha
	Reefs	To maintain the favourable conservation condition of Reefs in Kenmare River SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs remains stable, subject to natural processes. Community structure. Conserve the following community type in a natural condition: intertidal reef community complex; subtidal reef with echinoderms and faunal turf community complex; *Laminaria*-dominated community complex;	Favourable.	Habitat area estimated as 9196 ha. Estimated areas for each community: • Intertidal reef community complex - 681 ha • -Subtidal reef with echinoderms and faunal turf community complex – 4838 ha • *Laminaria*-dominated community complex - 3678 ha

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	To maintain the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in Kenmare River SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. There is no cordgrass (*Spartina anglica*) recorded from this SAC. Prevent establishment of cordgrass.	Favourable.	Habitat area estimated as 3 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Mediterranean salt meadows (*Juncetalia maritimi*)	To maintain the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Kenmare River SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of saltmarsh habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. There is no cordgrass (*Spartina anglica*) recorded from this SAC. Prevent establishment of cordgrass.	Favourable.	Habitat area estimated as 18 ha.
	Submerged or partially submerged sea caves	To maintain the favourable conservation condition of Submerged or partially submerged sea caves in Kenmare River SAC, which is defined by the following list of attributes and targets: Distribution. The distribution of sea caves occurring in the site should remain stable, subject to natural processes. Community structure. Human activities should occur at levels that do not adversely affect the ecology of sea caves in this SAC.	Favourable.	Habitat area estimated as 433 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Otter (*Lutra lutra*)	To restore the favourable conservation condition of Otter in Kenmare River SAC, which is defined by the following list of attributes and targets: Distribution. No significant decline. Extent of terrestrial habitat. No significant decline. Extent of marine habitat. No significant decline. Extent of freshwater (river) habitat. No significant decline. Extent of freshwater (lake/lagoon) habitat. No significant decline. Couching sites and holts. No significant decline. Fish biomass available. No significant decline. Barriers to connectivity. No significant increase.	Unfavourable.	Population in the site: data deficient Extent of terrestrial habitat area - 268 ha above high water mark, 40 ha along river banks / around ponds; Extent of marine habitat - 2748 ha; Extent of freshwater (river) habitat - 18.9 km; Extent of freshwater (lake/lagoon) habitat - 25.1 ha.
	Harbour seal (*Phoca vitulina*)	To maintain the favourable conservation condition of Harbour Seal in Kenmare River SAC, which is defined by the following list of attributes and targets: Access to suitable habitat. Species range is not restricted by artificial barriers to site use. Breeding behaviour. Conserve the breeding sites in a natural condition. Moulting behaviour. Conserve the moult haul-out sites in a natural condition. Resting behaviour. Conserve the resting haul-out sites in a natural condition. Disturbance. Human activities should occur at levels that do not adversely affect the harbour seal population at the site.	Favourable.	391 permanent individuals at site.
	Arctic tern (*Sterna paradisaea*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 20 reproducing pairs Maximum 20 reproducing pairs
	Little tern (*Sterna albifrons*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 2 reproducing pairs Maximum 2 reproducing pairs
Kerry Head Shoal [02263]	Reefs	To maintain the favourable conservation condition of Reefs in Kerry Head Shoal SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs remains stable, subject to natural processes. Community structure. Conserve the following community type in a natural condition: exposed subtidal reef community complex.	Favourable.	Habitat area estimated as 5797 ha. Estimated areas for each community: • Exposed subtidal reef community complex - 5797 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Kilkee Reefs [02264]	Reefs	To maintain the favourable conservation condition of Reefs in Kilkee Reefs SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs is stable or increasing, subject to natural processes. Community structure. Conserve the following community type in a natural condition: exposed intertidal reef community complex; exposed subtidal reef community complex.	Favourable.	Habitat area estimated as 2391 ha. Estimated areas for each community: • Exposed intertidal reef community complex - 82 ha • Exposed subtidal reef community complex - 2310 ha.
	Submerged or partially submerged sea caves	To maintain the favourable conservation condition of Submerged or partially submerged sea caves in Kilkee Reefs SAC, which is defined by the following list of attributes and targets: Distribution. The distribution of sea caves occurring in the site should remain stable, subject to natural processes. Community structure. Human activities should occur at levels that do not adversely affect the ecology of sea caves in this SAC.	Favourable.	Habitat area estimated as 29 ha.
	Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in Kilkee Reefs SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community distribution. Conserve the following types in a natural condition: Sediment community complex; exposed intertidal reef community complex; exposed subtidal reef community complex.	Favourable.	Habitat area estimated as 1350 ha. Estimated areas for each community: • Sediment community complex - 103 ha; • Exposed intertidal reef community complex - 69 ha; • Exposed subtidal reef community complex; 1170 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Kilkeran Lake and Castlefreke Dunes [01061]	Coastal lagoons	To restore the favourable conservation condition of Coastal lagoons in Kilkeran Lake and Castlefreke Dunes SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable, subject to slight natural variation. Habitat distribution. No decline, subject to natural processes. Salinity regime. Median annual salinity and temporal variation within natural ranges. Hydrological regime. Annual water level fluctuations and minima within natural ranges. Barrier connectivity between lagoon and sea. Appropriate hydrological connections between lagoon and sea, including where necessary, appropriate management. Water quality: Chlorophyll *a*. Annual median chlorophyll a within natural range and less than 5µg/l. Water quality: Molybdate Reactive Phosphorus (MRP). Annual median MRP within natural range and less than 0.1mg/l. Water quality: Dissolved Inorganic Nitrogen (DIN). Annual median DIN within natural range and less than 0.15mg/l. Depth of macrophyte colonisation. Macrophyte colonisation to maximum depth of lagoon. Typical plant species. Maintain number and extent of listed lagoonal specialists, subject to natural variation. Typical animal species. Maintain listed lagoon specialists, subject to natural variation. Negative indicator species. Negative indicator species absent or under control.	Unfavourable.	Habitat area estimated as 18 ha.
Kilkieran Bay and Islands [02111]	Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Kilkieran Bay and Islands SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community distribution. Conserve the following community type in a natural condition: Intertidal sand with *polychaetes* community complex.	Favourable.	Habitat area estimated as 180 ha. Estimated areas for each community: • Intertidal sand with *polychaetes* complex - 180 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Reefs	To maintain the favourable conservation condition of Reefs in Kilkieran Bay and Islands SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs is stable or increasing, subject to natural processes. Community structure. Conserve the following community type in a natural condition: Intertidal reef community complex; Subtidal sponge and ascidian community complex; Exposed to moderately exposed subtidal reef community complex; Deep water faunal crust and sponge community complex; *Laminaria*-dominated community complex.	Favourable.	Habitat area estimated as 9084 ha. Estimated areas for each community: • Intertidal reef community complex – 2,412 ha; • Subtidal sponge and ascidian community complex - 122 ha; • Exposed to moderately exposed subtidal reef community complex – 1,336 ha; • Deep water faunal crust and sponge community complex - 882 ha; • Laminaria-dominated community complex – 4,333 ha.
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in Kilkieran Bay and Islands SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. There is no cordgrass (*Spartina anglica*) recorded from this SAC. Prevent establishment of cordgrass.	Unfavourable.	Habitat area estimated as 38 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Mediterranean salt meadows (*Juncetalia maritimi*)	To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Kilkieran Bay and Islands SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of saltmarsh habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. There is no cordgrass (*Spartina anglica*) recorded from this SAC. Prevent establishment of cordgrass.	Unfavourable.	Habitat area estimated as 80 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Coastal lagoons	To maintain the favourable conservation condition of Coastal lagoons in Kilkieran Bay and Islands SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable, subject to slight natural variation. Habitat distribution. No decline, subject to natural processes. Salinity regime. Median annual salinity and temporal variation within natural ranges. Hydrological regime. Annual water level fluctuations and minima within natural ranges. Barrier connectivity between lagoon and sea. Appropriate hydrological connections between lagoon and sea, including where necessary, appropriate management. Water quality: Chlorophyll *a*. Annual median chlorophyll a within natural range and less than 5µg/l. Water quality: Molybdate Reactive Phosphorus (MRP). Annual median MRP within natural range and less than 0.1mg/l. Water quality: Dissolved Inorganic Nitrogen (DIN). Annual median DIN within natural range and less than 0.15mg/l. Depth of macrophyte colonisation. Macrophyte colonisation to maximum depth of lagoon. Typical plant species. Maintain number and extent of listed lagoonal specialists, subject to natural variation. Typical animal species. Maintain listed lagoon specialists, subject to natural variation. Negative indicator species. Negative indicator species absent or under control.	Favourable.	Habitat area estimated as 123 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in Kilkieran Bay and Islands SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community extent. Maintain the extent of the *Zostera*- and Maerl-dominated communities and the *Pachycerianthus multiplicatus* community, subject to natural processes. Community structure: *Zostera* density. Conserve the high quality of *Zostera*-dominated community, subject to natural processes. Community structure. Conserve the high quality of the *Pachycerianthus multiplicatus* community, subject to natural processes. Community structure. Conserve the high quality of the Maerl-dominated community, subject to natural processes Community distribution. Conserve the following community types in a natural condition: Intertidal sand with *polychaetes* community complex; Mixed sediment dominated by *polychaetes* community complex; Sand with nemerteans and crustaceans community complex; Deep water sand dominated by bivalves and *polychaetes* community complex; Reef communities.	Favourable.	Habitat area estimated as 18760 ha. Estimated areas for each community: • *Zostera*-dominated community complex - 333 ha; • Maërl-dominated community complex – 1,321 ha; • Pachycerianthus multiplicatus-dominated community – 10 ha; • Intertidal sand with polychaetes community complex - 166 ha; • Mixed sediment dominated by polychaetes community complex - 6734 ha; • Sand with nemerteans and crustaceans community complex - 233 ha; • Deep water sand dominated by bivalves and polychaetes community complex - 808 ha; • Intertidal reef community complex – 2157 ha; • Subtidal sponge and ascidian community complex – 119 ha; • Deep water faunal crust and sponge community complex – 882 ha • Exposed to moderately exposed subtidal reef community complex – 1324 ha • Laminaria-dominated community complex – 4,215 ha.
	Otter (*Lutra lutra*)	To restore the favourable conservation condition of Otter in Kilkieran Bay and Islands SAC, which is defined by the following list of attributes and targets: Distribution. No significant decline. Extent of terrestrial habitat. No significant decline. Extent of marine habitat. No significant decline. Extent of freshwater (river) habitat. No significant decline. Extent of freshwater (lake/lagoon) habitat. No significant decline. Couching sites and holts. No significant decline. Fish biomass available. No significant decline. Barriers to connectivity. No significant increase.	Unfavourable.	Population in the site: data deficient Extent of terrestrial habitat area - 316 ha above high water mark, 14 ha along river banks / around ponds; Extent of marine habitat - 2996 ha; Extent of freshwater (river) habitat - 4.4 km; Extent of freshwater (lake/lagoon) habitat - 24 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Harbour seal (*Phoca vitulina*)	To maintain the favourable conservation condition of Harbour Seal in Kilkieran Bay and Islands SAC, which is defined by the following list of attributes and targets: Access to suitable habitat. Species range is not restricted by artificial barriers to site use. Breeding behaviour. Conserve the breeding sites in a natural condition. Moulting behaviour. Conserve the moult haul-out sites in a natural condition. Resting behaviour. Conserve the resting haul-out sites in a natural condition. Disturbance. Human activities should occur at levels that do not adversely affect the harbour seal population at the site.	Favourable.	116 permanent individuals at site.
	Common tern (*Sterna hirundo*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 47 reproducing pairs Maximum 47 reproducing pairs
	Arctic tern (*Sterna paradisaea*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 99 reproducing pairs Maximum 99 reproducing pairs
	Barnacle goose (*Branta leucopsis*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 370 overwintering individuals Maximum 370 overwintering individuals
	Little tern (*Sterna albifrons*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 7 reproducing pairs Maximum 9 reproducing pairs
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment [00365]	Otter (*Lutra lutra*)	To maintain the favourable conservation condition of Otter in Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC, which is defined by the following list of attributes and targets: Distribution. No significant decline. Extent of terrestrial habitat. No significant decline. Extent of freshwater (river) habitat. No significant decline. Extent of freshwater (lake/lagoon) habitat. No significant decline. Couching sites and holts. No significant decline. Fish biomass available. No significant decline. Barriers to connectivity. No significant increase.	Favourable.	Population in the site: data deficient Extent of terrestrial habitat area - 1937 ha along river banks / lake shoreline / around ponds; Extent of freshwater (river) habitat - 1246 km; Extent of freshwater (lake/lagoon) habitat - 2710 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Sea Lamprey (*Petromyzon marinus*)	To maintain the favourable conservation condition of Sea Lamprey in Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC, which is defined by the following list of attributes and targets: Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary. Population structure of juveniles. At least three age/size groups present. Juvenile density in fine sediment. Juvenile density at least 1/m². Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds. Availability of juvenile habitat. More than 10% of sample sites positive.	Favourable.	Population in the site: data deficient
	Brook lamprey (*Lampetra planeri*)	To maintain the favourable conservation condition of Brook Lamprey in Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC, which is defined by the following list of attributes and targets: Distribution. Access to all water courses down to first order streams. Population structure of juveniles. At least three age/size groups present. Juvenile density in fine sediment. Mean catchment juvenile density of brook/river lamprey at least 5/m². Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds. Availability of juvenile habitat. More than 50% of sample sites positive.	Favourable.	Population in the site: data deficient
	River lamprey (*Lampetra fluviatilis*)	To maintain the favourable conservation condition of River Lamprey in Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC, which is defined by the following list of attributes and targets: Distribution. Access to all water courses down to first order streams. Population structure of juveniles. At least three age/size groups present. Juvenile density in fine sediment. Mean catchment juvenile density of brook/river lamprey at least 5/m². Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds. Availability of juvenile habitat. More than 50% of sample sites positive.	Favourable.	Population in the site: data deficient

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Lough Hyne Nature Reserve and Environs [00097]	Atlantic salmon (*Salmo salar*)	To maintain the favourable conservation condition of Atlantic Salmon in Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC, which is defined by the following list of attributes and targets: Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary. Adult spawning fish. Conservation Limit (CL) for each system consistently exceeded. Salmon fry abundance. Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling Out-migrating smolt abundance. No significant decline. Number and distribution of redds. No decline in number and distribution of spawning redds due to anthropogenic causes. Water quality. At least Q4 at all sites sampled by EPA.	Favourable.	Population in the site: data deficient
	Reefs	To maintain the favourable conservation condition of Reefs in Lough Hyne Nature Reserve and Environs SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs is stable or increasing, subject to natural processes. Community structure. Conserve the following community type in a natural condition: Intertidal reef community complex; Subtidal reef community complex; *Laminaria*-dominated community complex.	Favourable.	Habitat area estimated as 86 ha. Estimated areas for each community: • Intertidal reef community complex - 1 ha; • Subtidal reef community complex - 12 ha; • *Laminaria*-dominated community complex - 73 ha.
	Submerged or partially submerged sea caves	To maintain the favourable conservation condition of Submerged or partially submerged sea caves in Lough Hyne Nature Reserve and Environs SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of sea caves occurring in the site should remain stable, subject to natural processes. Community structure. Conserve the following community type in a natural condition: Sea cave community complex. Community structure. Human activities should occur at levels that do not adversely affect the ecology of sea caves in this SAC.	Favourable.	Habitat area estimated as 5 ha. Estimated areas for each community: • Intertidal sand with polychaetes complex - 0.05 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in Lough Hyne Nature Reserve and Environs SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community extent. Maintain the extent of the *Zostera*-dominated community, subject to natural processes. Community structure: *Zostera* density. Conserve the high quality of *Zostera*-dominated community, subject to natural processes. Community distribution. Conserve the following community types in a natural condition: Muds to mixed sediment with polychaetes, bivalves and oligochaetes community complex; Intertidal reef community complex; Subtidal reef community complex; *Laminaria*-dominated community complex; Sea cave community complex.	Favourable.	Habitat area estimated as 265 ha. Estimated areas for each community: • *Zostera*-dominated community - 3 ha; • Muds to mixed sediment with polychaetes, bivalves and oligochaetes community complex - 177 ha; • Intertidal reef community complex - 1 ha; • Subtidal reef community complex - 12 ha; • *Laminaria*-dominated community complex - 73 ha.
Lower River Shannon [02165]	Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community distribution. Conserve the following community types in a natural condition: Intertidal sand with *Scolelepis squamata* and *Pontocrates* spp. community; Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex; Subtidal sand to mixed sediment with *Nucula nucleus* community complex; Subtidal sand to mixed sediment with *Nephtys* spp. community complex; *Fucoid*-dominated intertidal reef community complex; Mixed subtidal reef community complex; Faunal turf-dominated subtidal reef community; Anemone- dominated subtidal reef community; and *Laminaria*- dominated community complex.	Favourable.	Habitat area estimated as 35288 ha. Estimated areas for each community: • Intertidal sand with *Scolelepis squamata* and *Pontocrates* spp. community - 211 ha; • Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex – 466 ha; • Subtidal sand to mixed sediment with *Nucula nucleus* community complex – 6095 ha • Subtidal sand to mixed sediment with *Nephtys* spp. community complex – 9431 ha; • *Fucoid*-dominated intertidal reef community complex – 616 ha; • Mixed subtidal reef community complex – 7464 ha; • Faunal turf-dominated subtidal reef – 8710 ha; • Anemone-dominated subtidal reef community – 34 ha; • *Laminaria*-dominated community complex - 2221 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Salicornia and other annuals colonizing mud and sand	To maintain the favourable conservation condition of Salicornia and other annuals colonizing mud and sand in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	Favourable.	Habitat area estimated as 0.22 ha.
	Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community distribution. Conserve the following community types in a natural condition: Intertidal sand with *Scolelepis squamata* and *Pontocrates* spp. community; and Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex.	Favourable.	Habitat area estimated as 8808 ha. Estimated areas for each community: • Intertidal sand with *Scolelepis squamata* and *Pontocrates* spp. community - 213 ha; • Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex – 8596 ha.
	Sandbanks which are slightly covered by sea water all the time	To maintain the favourable conservation condition of Sandbanks which are slightly covered by sea water all the time in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Habitat distribution. The distribution of sandbanks is stable, subject to natural processes. Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community distribution. Conserve the following community type in a natural condition: Subtidal sand to mixed sediment with *Nephtys* spp. community complex.	Favourable.	Habitat area estimated as 1353 ha. Estimated areas for each community: • Subtidal sand to mixed sediment with *Nephtys* spp. community complex – 1353 ha;

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Reefs	To maintain the favourable conservation condition of Reefs in Lough Hyne Nature Reserve and Environs SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs is stable or increasing, subject to natural processes. Community structure. Conserve the following community type in a natural condition: *Fucoid*-dominated intertidal reef community complex; Mixed subtidal reef community complex; Faunal turf-dominated subtidal reef community; Anemone- dominated subtidal reef community; and *Laminaria*-dominated community complex.	Favourable.	Habitat area estimated as 21421 ha. Estimated areas for each community: • *Fucoid*-dominated intertidal reef community complex - 1294 ha; • Mixed subtidal reef community complex - 7464 ha; • Faunal turf-dominated subtidal reef community - 9692 ha; • Anemone-dominated subtidal reef community - 747 ha; • *Laminaria*-dominated community complex - 2224 ha.
	Estuaries	To maintain the favourable conservation condition of Estuaries in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community distribution, Conserve the following community types in a natural condition: Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex; Estuarine subtidal muddy sand to mixed sediment with gammarids community complex; Subtidal sand to mixed sediment with *Nucula nucleus* community complex; Subtidal sand to mixed sediment with *Nephtys* spp. community complex; *Fucoid*-dominated intertidal reef community complex; Faunal turf-dominated subtidal reef community; and Anemone-dominated subtidal reef community.	Favourable.	Habitat area estimated as 24273 ha. Estimated areas for each community: • Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex – 8130 ha; • Estuarine subtidal muddy sand to mixed sediment with gammarids community complex - 268 ha; • Subtidal sand to mixed sediment with *Nucula nucleus* community complex – 4196 ha • Subtidal sand to mixed sediment with *Nephtys* spp. community complex – 8404 ha; • *Fucoid*-dominated intertidal reef community complex – 678 ha; • Faunal turf-dominated subtidal reef – 981 ha; • Anemone-dominated subtidal reef community – 713 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%.	Unfavourable.	Habitat area estimated as 495 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Mediterranean salt meadows (*Juncetalia maritimi*)	To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of saltmarsh habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%.	Unfavourable.	Habitat area estimated as 25 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Coastal lagoons	To restore the favourable conservation condition of Coastal lagoons in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable, subject to slight natural variation. Habitat distribution. No decline, subject to natural processes. Salinity regime. Median annual salinity and temporal variation within natural ranges. Hydrological regime. Annual water level fluctuations and minima within natural ranges. Barrier connectivity between lagoon and sea. Appropriate hydrological connections between lagoon and sea, including where necessary, appropriate management. Water quality: Chlorophyll *a*. Annual median chlorophyll a within natural range and less than 5µg/l. Water quality: Molybdate Reactive Phosphorus (MRP). Annual median MRP within natural range and less than 0.1mg/l. Water quality: Dissolved Inorganic Nitrogen (DIN). Annual median DIN within natural range and less than 0.15mg/l. Depth of macrophyte colonisation. Macrophyte colonisation to maximum depth of lagoon. Typical plant species. Maintain number and extent of listed lagoonal specialists, subject to natural variation. Typical animal species. Maintain listed lagoon specialists, subject to natural variation. Negative indicator species. Negative indicator species absent or under control.	Unfavourable.	Habitat area estimated as 33 ha.
	Bottlenose dolphin (*Tursiops truncatus*)	To maintain the favourable conservation condition of Bottlenose Dolphin in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Access to suitable habitat. Species range within the site should not be restricted by artificial barriers to site use. Habitat use: critical areas. Critical areas, representing habitat used preferentially by bottlenose dolphin, should be maintained in a natural condition. Disturbance. Human activities should occur at levels that do not adversely affect the bottlenose dolphin population at the site	Favourable.	Minimum 128 permanent individuals at site. Maximum 152 permanent individuals at site.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Otter (*Lutra lutra*)	To restore the favourable conservation condition of Otter in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Distribution. No significant decline. Extent of terrestrial habitat. No significant decline. Extent of marine habitat. No significant decline. Extent of freshwater (river) habitat. No significant decline. Extent of freshwater (lake/lagoon) habitat. No significant decline. Couching sites and holts. No significant decline. Fish biomass available. No significant decline. Barriers to connectivity. No significant increase.	Unfavourable.	Population in site: data deficient Extent of terrestrial habitat area - 597 ha above high water mark, 959 ha along river banks / around ponds; Extent of marine habitat - 4461 ha; Extent of freshwater (river) habitat - 500 km; Extent of freshwater (lake/lagoon) habitat - 126 ha.
	Sea Lamprey (*Petromyzon marinus*)	To restore the favourable conservation condition of Sea Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary. Population structure of juveniles. At least three age/size groups present. Juvenile density in fine sediment. Juvenile density at least 1/m². Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds. Availability of juvenile habitat. More than 10% of sample sites positive.	Unfavourable.	Population in site: data deficient
	Brook lamprey (*Lampetra planeri*)	To maintain the favourable conservation condition of Brook Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Distribution. Access to all water courses down to first order streams. Population structure of juveniles. At least three age/size groups present. Juvenile density in fine sediment. Mean catchment juvenile density of brook/river lamprey at least 2/m². Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds. Availability of juvenile habitat. More than 50% of sample sites positive.	Favourable.	Population in site: data deficient
	River lamprey (*Lampetra fluviatilis*)	To maintain the favourable conservation condition of River Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Distribution. Access to all water courses down to first order streams. Population structure of juveniles. At least three age/size groups present. Juvenile density in fine sediment. Mean catchment juvenile density of brook/river lamprey at least 2/m². Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds. Availability of juvenile habitat. More than 50% of sample sites positive.	Favourable.	Population in site: data deficient

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Atlantic salmon (*Salmo salar*)	To restore the favourable conservation condition of Salmon in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary. Adult spawning fish. Conservation Limit (CL) for each system consistently exceeded. Salmon fry abundance. Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling Out-migrating smolt abundance. No significant decline. Number and distribution of redds. No decline in number and distribution of spawning redds due to anthropogenic causes. Water quality. At least Q4 at all sites sampled by EPA.	Unfavourable.	Population in site: data deficient
	Freshwater pearl mussel (*Margaritifera margaritifera*)	To restore the favourable conservation condition of Freshwater Pearl Mussel in the Lower River Shannon SAC, which is defined by the following list of attributes and targets: Distribution. Maintain at 7km. Population size. Restore to 10,000 adult mussels. Population structure: recruitment. Restore to at least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length. Population structure: adult mortality. No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution. Habitat extent. Restore suitable habitat in more than 3.3km and any additional stretches necessary for salmonid spawning. Water quality: macroinvertebrate and phytobenthos (diatoms). Restore water quality- macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93. Substratum quality: filamentous algae (macroalgae), macrophytes (rooted higher plants). Restore substratum quality- filamentous algae: absent or trace (<5%). Substratum quality: sediment. Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment. Substratum quality: oxygen availability. Restore to no more than 20% decline from water column to 5cm depth in substrate. Hydrological regime: flow variability. Restore appropriate hydrological regimes. Host fish. Maintain sufficient juvenile salmonids to host glochidial larvae.	Unfavourable	Population in site: data deficient
	Razorbill (*Alca torda*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 105 reproducing pairs Maximum 105 reproducing pairs

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Greater scaup (*Aycalfthya marila*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 121 overwintering individuals Maximum 121 overwintering individuals
	Scopoli's shearwater (*Calonectris diomedea*)	No conservation objectives set for this feature for this site	Medium conservation concern	Data deficient
	Great northern diver (*Gavia immer)*	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 3 overwintering individuals Maximum 3 overwintering individuals
	Red-throated diver (*Gavia stellata*)	No conservation objectives set for this feature for this site	Medium conservation concern	Data deficient
	Black-headed gull (*Larus ridibundus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 2216 overwintering individuals Maximum 2216 overwintering individuals
	Bar-tailed godwit (*Limosa lapponica*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 476 overwintering individuals Maximum 476 overwintering individuals
	Common guillemot (*Uria aalge*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 4010 reproducing pairs Maximum 4010 reproducing pairs
	Northern lapwing (*Vanellus vanellus)*	No conservation objectives set for this feature for this site	High conservation concern	Data deficient
	Ruddy turnstone (*Arenaria interpres*)	No conservation objectives set for this feature for this site	Least concern	Minimum 107 overwintering individuals Maximum 107 overwintering individuals
	Ringed plover (*Charadrius hiaticula)*	No conservation objectives set for this feature for this site	Medium conservation concern	Data deficient
	Great cormorant (*Phalacrocorax carbo*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 13 reproducing pairs Maximum 13 reproducing pairs
	European golden plover (*Pluvialis apricaria*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 4708 reproducing pairs Maximum 4708 reproducing pairs
	Black-legged kittiwake (*Rissa tridactyla*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 690 reproducing pairs Maximum 690 reproducing pairs
	Sandwich tern (*Sterna sandvicensis*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 34 reproducing pairs Maximum 34 reproducing pairs
	Common shelduck (*Tadorna tadorna)*	No conservation objectives set for this feature for this site	Medium conservation concern	Data deficient

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Common teal (*Anas crecca*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 2319 overwintering individuals Maximum 2319 overwintering individuals
	Mallard (*Anas platyrhynchos*)	No conservation objectives set for this feature for this site	Least concern	Data deficient
	Greylag goose (*Anser anser*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 216 overwintering individuals Maximum 216 overwintering individuals
	Wigeon (*Anas penelope*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 5,976 overwintering individuals Maximum 5,976 overwintering individuals
	Brent goose (*Branta bernicla*)	No conservation objectives set for this feature for this site	Least concern	Minimum 246 overwintering individuals Maximum 246 overwintering individuals
	Dunlin (*Calidris alpina*)	No conservation objectives set for this feature for this site	High conservation concern	Data deficient
	Red knot (*Calidris canutus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 800 overwintering individuals Maximum 800 overwintering individuals
	Northern shoveler (*Anas clypeata*)	No conservation objectives set for this feature for this site	Least concern	Minimum 84 overwintering individuals Maximum 84 overwintering individuals
	Whooper swan (*Cygnus cygnus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 201 overwintering individuals Maximum 201 overwintering individuals
	Common greenshank (*Tringa nebularia*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 36 overwintering individuals Maximum 36 overwintering individuals
	Curlew (*Numenius arquata*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 1504 overwintering individuals Maximum 1504 overwintering individuals
	Leach's petrel (*Oceanodroma leucorhoa*),	No conservation objectives set for this feature for this site	High conservation concern	Data deficient
	Common tern (*Sterna hirundo*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 15 reproducing pairs Maximum 15 reproducing pairs
	Arctic tern (*Sterna paradisaea*)	No conservation objectives set for this feature for this site	Medium conservation concern	Data deficient
	redshank (*Tringa totanus*)	No conservation objectives set for this feature for this site	High conservation concern	Data deficient

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Magharee Islands [002261]	Reefs	To maintain the favourable conservation condition of Reefs in Magharee Islands SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs is stable or increasing, subject to natural processes. Community structure. Conserve the following community type in a natural condition: Intertidal reef community complex; *Laminaria*-dominated community complex; subtidal reef community complex.	Favourable.	Habitat area estimated as 2236 ha. Estimated area of each community: • Intertidal reef community complex - 15 ha; • *Laminaria*-dominated community complex - 68 ha; • Subtidal reef community complex - 2154 ha.
	Common tern (*Sterna hirundo*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 46 reproducing pairs Maximum 46 reproducing pairs
	Arctic tern (*Sterna paradisaea*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 68 reproducing pairs Maximum 68 reproducing pairs
Mount Brandon [00375]	Northern fulmar (*Fulmarus glacialis)*	No conservation objectives set for this feature for this site	Least concern	Minimum 25 reproducing pairs Maximum 50 reproducing pairs
Mullet/Blacksod Bay Complex [000470]	Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in Mullet/Blacksod Bay Complex SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community extent. Maintain the extent of the *Zostera*- and Maerl-dominated communities and the *Serpula vermicularis*-dominated community, subject to natural processes. Community structure: *Zostera* density. Conserve the high quality of *Zostera*-dominated community, subject to natural processes. Community structure. Conserve the high quality of the *Serpula vermicularis*-dominated community, subject to natural processes. Community structure. Conserve the high quality of the Maerl-dominated community, subject to natural processes Community distribution. Conserve the following community types in a natural condition: Sand with *Angulus tenuis* and *Pygospio elegans* community complex; Sand with *Gastrosaccus spinifer* community complex; Fine sand with *Angulus fabula* community complex; Intertidal reef community complex; Sheltered subtidal reef community complex and *Laminaria*-dominated community complex.	Favourable.	Habitat area estimated as 11169 ha. Estimated area of each community: • *Zostera*-dominated community - 9170 ha; • Maërl-dominated community – 14 ha; • *Serpula vermicularis*-dominated community complex - 855 ha; • Sand with *Angulus tenuis* and *Pygospio elegans* community complex – 1182 ha; • Sand with *Gastrosaccus spinifer* community complex – 1994 ha; • Fine sand with *Angulus fabula* community complex - 6289 ha; • Intertidal reef community complex - 254 ha; • Sheltered subtidal reef community complex – 81 ha; • Laminaria-dominated community complex – 251 ha; • Shingle - 38 ha.
	Red-necked phalarope (*Phalaropus lobatus*)	No conservation objectives set for this feature for this site	Least concern	Minimum 1 reproducing pairs Maximum 1 reproducing pairs
	European golden plover (*Pluvialis apricaria*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 60 overwintering individuals Maximum 60 overwintering individuals

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Ruddy turnstone (*Arenaria interpres*)	No conservation objectives set for this feature for this site	Least concern	Minimum 51 overwintering individuals Maximum 51 overwintering individuals
	Barnacle goose (*Branta leucopsis*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 400 overwintering individuals Maximum 400 overwintering individuals
	Ringed plover (*Charadrius hiaticula*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 524 overwintering individuals Maximum 524 overwintering individuals
	Common snipe (*Gallinago gallinago*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 154 overwintering individuals Maximum 154 overwintering individuals
	Oystercatcher (*Haematopus ostralegus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 317 overwintering individuals Maximum 317 overwintering individuals
	Brent goose (*Branta bernicla*)	No conservation objectives set for this feature for this site	Least concern	Minimum 400 overwintering individuals Maximum 400 overwintering individuals
	Sanderling *(Calidris alba*)	No conservation objectives set for this feature for this site	Least concern	Minimum 58 overwintering individuals Maximum 58 overwintering individuals
	Dunlin (*Calidris alpina*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 2601 overwintering individuals Maximum 2601 overwintering individuals Minimum 26 reproducing pairs Maximum 26 reproducing pairs
	Red knot (*Calidris canutus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 342 overwintering individuals Maximum 342 overwintering individuals
	Common curlew (*Numenius arquata*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 493 overwintering individuals Maximum 493 overwintering individuals
	Redshank (*Tringa totanus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 12 reproducing pairs Maximum 12 reproducing pairs
	Greater white-fronted goose (*Anser albifrons flavirostris*),	No conservation objectives set for this feature for this site	Least concern	Minimum 56 overwintering individuals Maximum 56 overwintering individuals
	Great northern diver (*Gavia immer*	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 64 overwintering individuals Maximum 64 overwintering individuals
	Red-throated diver (*Gavia stellata*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 45 overwintering individuals Maximum 45 overwintering individuals

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Bar-tailed godwit (*Limosa lapponica*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 552 overwintering individuals Maximum 552 overwintering individuals
	Common scoter (*Melanitta nigra*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 642 overwintering individuals Maximum 642 overwintering individuals
	Goosander (*Mergus merganser*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 50 overwintering individuals Maximum 50 overwintering individuals
	Grey plover (*Pluvialis squatarola*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 60 overwintering individuals Maximum 60 overwintering individuals
	Northern lapwing (*Vanellus vanellus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 210 overwintering individuals Maximum 210 overwintering individuals Minimum 43 reproducing pairs Maximum 43 reproducing pairs
	Whooper swan (*Cygnus cygnus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 95 overwintering individuals Maximum 95 overwintering individuals
	Little tern (*Sternula albifrons*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 7 reproducing pairs Maximum 7 reproducing pairs
	Common greenshank (*Tringa nebularia*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 12 reproducing pairs Maximum 12 reproducing pairs

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Salicornia and other annuals colonizing mud and sand	To maintain the favourable conservation condition of Salicornia and other annuals colonising mud and sand in Mullet/Blacksod Bay Complex SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities with typical species including common glasswort (*Salicornia europaea*), common saltmarsh grass (*Puccinellia maritima*), sea aster (*Aster tripolium*) and annual sea-blite (*Suaeda maritima*). Vegetation structure: negative indicator species - *Spartina anglica*. There is no record of common cordgrass (*Spartina anglica*) in the SAC and its establishment should be prevented.	Favourable.	Habitat area estimated as 0.02 ha.
	Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Mullet/Blacksod Bay Complex SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community distribution. Conserve the following community types in a natural condition: Mobile sand with *Bathyporeia guilliamsoniana* community; Sand with *Angulus tenuis* and *Pygospio elegans* community complex.	Favourable.	Habitat area estimated as 1428 ha. Estimated area of each community: • Mobile sand with *Bathyporeia guilliamsoniana* community – 197 ha; • Sand with *Angulus tenuis* and *Pygospio elegans* community complex – 1231 ha;

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Omey Island Machair [001309]	Reefs	To maintain the favourable conservation condition of Reefs in Mullet/Blacksod Bay Complex SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Distribution. The distribution of reefs is stable or increasing, subject to natural processes. Community extent. Maintain the extent of the *Serpula vermicularis*-dominated community complex, subject to natural processes. Community structure. Conserve the high quality of the *Serpula vermicularis*-dominated community complex, subject to natural processes. Community structure. Conserve the following community types in a natural condition: Intertidal reef community complex; Sheltered subtidal reef community; *Laminaria*-dominated community complex.	Favourable.	Habitat area estimated as 1531 ha. Estimated area of each community: • *Serpula vermincularis*-dominated community complex - 855 ha; • Intertidal reef community complex - 338 ha; • Sheltered subtidal reef community complex - 81 ha; • *Laminaria*-dominated community complex – 256 ha.
	Otter (*Lutra lutra*)	To maintain the favourable conservation condition of Otter in Mullet/Blacksod Bay Complex SAC, which is defined by the following list of attributes and targets: Distribution. No significant decline. Extent of terrestrial habitat. No significant decline. Extent of marine habitat. No significant decline. Extent of freshwater (river) habitat. No significant decline. Extent of freshwater (lake/lagoon) habitat. No significant decline. Couching sites and holts. No significant decline. Fish biomass available. No significant decline. Barriers to connectivity. No significant increase.	Favourable.	Extent of terrestrial habitat area - 169 ha; Extent of marine habitat - 930 ha; Extent of freshwater (river) habitat - 31 km; Extent of freshwater (lake/lagoon) habitat - 88 ha.
	Barnacle goose (*Branta bernicla*)	No conservation objectives set for this feature for this site	Least concern	Minimum 5 overwintering individuals Maximum 30 overwintering individuals
	Grey plover (*Pluvialis squatarola*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 1overwintering individuals Maximum 15 overwintering individuals
	Ruddy turnstone (*Arenaria interpres*)	No conservation objectives set for this feature for this site	Least concern	Minimum 1 overwintering individuals Maximum 20 overwintering individuals
	Ringed plover (*Charadrius hiaticula*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 7 reproducing pairs Maximum 7 reproducing pairs
	Golden plover (*Pluvialis apricaria*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 200 overwintering individuals Maximum 400 overwintering individuals
	Sanderling (*Calidris alba*)	No conservation objectives set for this feature for this site	Least concern	Minimum 30 overwintering individuals Maximum 50 overwintering individuals

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	Dunlin (*Calidris alpina*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 1 overwintering individuals Maximum 100 overwintering individuals
Roaringwater Bay and Islands [000101]	Harbour porpoise (*Phocoena phocoena*)	To maintain the favourable conservation condition of Harbour Porpoise in Roaringwater Bay and Islands SAC, which is defined by the following list of attributes and targets: Access to suitable habitat. Species range within the site should not be restricted by artificial barriers to site use. Disturbance. Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site	Favourable.	Minimum 117 permanent individuals at site. Maximum 201 permanent individuals at site.
	Reefs	To maintain the favourable conservation condition of Reefs in Roaringwater Bay and Islands SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Habitat distribution. The distribution of reefs is stable or increasing, subject to natural processes. Community extent. Maintain the extent of the *Laminaria*-dominated community complex, subject to natural processes. Community structure. The following reef community complexes should be maintained in a natural condition: Exposed to moderately exposed intertidal reef; Exposed to moderately exposed subtidal reef below 20m; Sheltered reef. Community structure. The biology of *Laminaria*-dominated communities should be conserved, subject to natural processes	Favourable.	Habitat area estimated as 3497 ha. Estimated area of each community: • Exposed to moderately exposed intertidal reef - 327 ha; • Exposed to moderately exposed subtidal reef below 20m - 1286 ha; • Sheltered reef- 39 ha. • *Laminaria*-dominated community - 1846 ha.
	Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in Roaringwater Bay and Islands SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community extent. Maintain the extent of the *Zostera*- and Maerl-dominated communities, subject to natural processes. Shoot density. The quality of *Zostera*-dominated communities should be conserved, subject to natural processes. Community structure. Conserve the high quality of the Maerl-dominated community, subject to natural processes. Community distribution. Conserve the following community types in a natural condition: Muddy sand with bivalves and polychaetes community complex; Mixed sediment community complex; Shallow sand/mud community complex.	Favourable.	Habitat area estimated as 12808 ha. Estimated area of each community: • *Zostera* dominated community- 119 ha; • Maërl-dominated community - 96 ha; • Muddy sand with bivalves and polychaetes community complex- 2407 ha; • Mixed sediment community complex - 3205 ha; • Mixed sediment community complex; Shallow sand/mud community complex - 3335 ha.

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	Submerged or partially submerged sea caves	To maintain the favourable conservation condition of Submerged or partly submerged sea caves in Roaringwater Bay and Islands SAC, which is defined by the following list of attributes and targets: Distribution. The distribution of sea caves occurring in the site should remain stable, subject to natural processes. Community structure. Human activities should occur at levels that do not adversely affect the ecology of sea caves at the site.	Favourable.	Habitat area estimated as 143 ha.
	Otter (*Lutra lutra*)	To restore the favourable conservation condition of Otter in Roaringwater Bay and Islands SAC, which is defined by the following list of attributes and targets: Distribution. No significant decline. Extent of terrestrial habitat. No significant decline. Extent of marine habitat. No significant decline. Extent of freshwater (river) habitat. No significant decline. Couching sites and holts. No significant decline. Fish biomass available. No significant decline. Barriers to connectivity. No significant increase.	Unfavourable.	Population in site: data deficient Extent of terrestrial habitat area - 171 ha above high water mark, 3 ha along river banks / around ponds; Extent of marine habitat - 1562 ha; Extent of freshwater (river) habitat - 0.74 km;
	Grey seal (*Halichoerus grypus*)	To maintain the favourable conservation condition of Grey Seal in Roaringwater Bay and Islands SAC, which is defined by the following list of attributes and targets: Access to suitable habitat. Species range within the site should not be restricted by artificial barriers to site use. Breeding behaviour. Conserve the breeding sites in a natural condition. Moulting behaviour. Conserve the moult haul-out sites in a natural condition. Resting behaviour. Maintain the resting haul-out sites in a natural condition. Population composition. The grey seal population occurring within this site should contain adult, juvenile and pup cohorts annually. Disturbance. Human activities should occur at levels that do not adversely affect the grey seal at the site.	Favourable.	254 individuals at site.
	Northern fulmar (*Fulmarus glacialis*)	No conservation objectives set for this feature for this site	Least concern	Minimum 744 reproducing pairs Maximum 744 reproducing pairs
	Razorbill (*Alca torda*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 31 reproducing pairs Maximum 31 reproducing pairs
	Lesser black-backed gull (*Larus fuscus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 262 reproducing pairs Maximum 262 reproducing pairs
	Great cormorant (*Phalacrocorax carbo*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 98 reproducing pairs Maximum 98 reproducing pairs

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Common guillemot (*Uria aalge*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 42 reproducing pairs Maximum 42 reproducing pairs
Slyne Head Islands [00328]	Reefs	To maintain the favourable conservation condition of Reefs in Slyne Head Islands SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Habitat distribution. The distribution of reefs is stable or increasing, subject to natural processes. Community structure. Conserve the following community types in a natural condition: Exposed intertidal reef community complex; *Laminaria*-dominated community; and Exposed subtidal reef with echinoderms and encrusting algae community.	Favourable.	Habitat area estimated as 1418 ha. Estimated area of each community: • Exposed intertidal reef community complex – 121 ha; • *Laminaria*-dominated community – 765 ha; • Exposed subtidal reef with echinoderms and encrusting algae community - 531 ha.
	Grey seal (*Halichoerus grypus*)	To maintain the favourable conservation condition of Grey Seal in Slyne Head Islands SAC, which is defined by the following list of attributes and targets: Access to suitable habitat. Species range within the site should not be restricted by artificial barriers to site use. Breeding behaviour. Conserve the breeding sites in a natural condition. Moulting behaviour. Conserve the moult haul-out sites in a natural condition. Resting behaviour. Maintain the resting haul-out sites in a natural condition. Disturbance. Human activities should occur at levels that do not adversely affect the grey seal at the site.	Favourable.	Minimum 32 permanent individuals at site. Maximum 41 permanent individuals at site.
	Storm petrel (*Hydrobates pelagicus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 50 reproducing pairs Maximum 50 reproducing pairs
	Manx shearwater (*Puffinus puffinus)*	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 70 permanent pairs Maximum 90 permanent pairs
	Arctic tern (*Sterna paradisaea*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 329 reproducing pairs Maximum 329 reproducing pairs

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Slyne Head Peninsula [002074]	Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in Slyne Head Peninsula SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community extent. Maintain the extent of the *Zostera*- and Maerl-dominated communities, subject to natural processes. Community structure: *Zostera* density. Conserve the high quality of the *Zostera*-dominated community complex, subject to natural processes Community structure. Conserve the high quality of the Maerl-dominated community, subject to natural processes. Community distribution. Conserve the following community types in a natural condition: Intertidal sand with Enchytraeidae community complex; Mobile intertidal sand with polychaetes community complex; Subtidal sand with polychaetes and bivalves community complex; Subtidal sand with *Kurtiella bidentata* community complex; Intertidal reef community complex; *Laminaria*-dominated community complex.	Favourable.	Habitat area estimated as 1539 ha. Estimated area of each community: • *Zoztera*-dominated community complex - 33 ha; • Maërl-dominated community complex - 261 ha; • Intertidal sand with Enchytraeidae community complex - 14 ha; • Mobile intertidal sand with polychaetes community complex - 11 ha; • Subtidal sand with polychaetes and bivalves community complex – 288 ha; • Subtidal sand with *Kurtiella bidentata* community complex - 574 ha; • Intertidal reef community complex - 159 ha; • *Laminaria*-dominated community complex - 14 ha.
	Reefs	To maintain the favourable conservation condition of Reefs in Slyne Head Peninsula SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Habitat distribution. The distribution of reefs is stable or increasing, subject to natural processes. Community structure. Conserve the following community types in a natural condition: Intertidal reef community complex; *Laminaria*-dominated community.	Favourable.	Habitat area estimated as 571 ha. Estimated area of each community: • Intertidal reef community complex – 350 ha; • *Laminaria*-dominated community – 220 ha.
	Common tern (*Sterna hirundo*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 5 reproducing pairs Maximum 5 reproducing pairs
	Sandwich tern (T*halasseus sandvicensis*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 31 reproducing pairs Maximum 31 reproducing pairs

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in Slyne Head Peninsula SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. Common cordgrass (*Spartina anglica*) has not been recorded in this SAC and its establishment should be prevented.	Unfavourable.	Habitat area estimated as 4 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Mediterranean salt meadows (*Juncetalia maritimi)*	To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Slyne Head Peninsula SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of saltmarsh habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. Common cordgrass (*Spartina anglica*) has not been recorded in this SAC and its establishment should be prevented.	Unfavourable.	Habitat area estimated as 7 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Coastal lagoons	To restore the favourable conservation condition of Coastal lagoons in Slyne Head Peninsula SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable, subject to slight natural variation. Habitat distribution. No decline, subject to natural processes. Salinity regime. Median annual salinity and temporal variation within natural ranges. Hydrological regime. Annual water level fluctuations and minima within natural ranges. Barrier connectivity between lagoon and sea. Appropriate hydrological connections between lagoon and sea, including where necessary, appropriate management. Water quality: Chlorophyll *a*. Annual median chlorophyll a within natural range and less than 5µg/l. Water quality: Molybdate Reactive Phosphorus (MRP). Annual median MRP within natural range and less than 0.1mg/l. Water quality: Dissolved Inorganic Nitrogen (DIN). Annual median DIN within natural range and less than 0.15mg/l. Depth of macrophyte colonisation. Macrophyte colonisation to maximum depth of lagoon. Typical plant species. Maintain number and extent of listed lagoonal specialists, subject to natural variation. Typical animal species. Maintain listed lagoon specialists, subject to natural variation. Negative indicator species. Negative indicator species absent or under control.	Unfavourable.	Habitat area estimated as 23 ha.
Three Castle Head to Mizen Head [00109]	Razorbill (*Alca torda*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 23 reproducing pairs Maximum 23 reproducing pairs
	Great cormorant (*Phalacrocorax carbo*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 7 reproducing pairs Maximum 7 reproducing pairs
	Northern fulmar (*Fulmarus glacialis*)	No conservation objectives set for this feature for this site	Least concern	Minimum 133 reproducing pairs Maximum 133 reproducing pairs
	Common guillemot (*Uria aalge)*	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 133 reproducing pairs Maximum 133 reproducing pairs
	Black-legged kittiwake (*Rissa tridactyla*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 153 reproducing pairs Maximum 153 reproducing pairs

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
Tralee Bay and Magharees Peninsula, West to Cloghane	Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in Tralee Bay and Magharees Peninsula, West to Cloghane SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community extent. Maintain the extent of the *Mytilus*-dominated community and the *Zostera*-dominated and *Sabellaria*-dominated community complexes, subject to natural processes. Community structure: *Zostera* density. Conserve the high quality of the *Zostera*-dominated community complex, subject to natural processes Community structure: *Mytilus edulis* density. Conserve the high quality of the *Mytilus*-dominated community, subject to natural processes. Community structure: *Sabellaria* density. Conserve the high quality of the *Sabellaria*-dominated community complex, subject to natural processes. Community distribution. Conserve the following community types in a natural condition: Sand to sandy mud with polychaetes and bivalves community complex; Sand with *Nephtys cirrosa* community complex; Mixed sediment with crustaceans, bivalves and polychaetes community complex; *Ostrea edulis*-dominated community; Intertidal reef community complex; Subtidal reef community complex; *Laminaria*-dominated reef community complex.	Favourable.	Habitat area estimated as 10131 ha. Estimated area of each community: • *Zostera*-dominated community complex – 350 ha; • *Mytilus*-dominated community – 11 ha; • *Sabellaria*-dominated community complex - 7 ha; • Sand to sandy mud with polychaetes and bivalves community complex – 767 ha; • Mixed sediment with crustaceans, bivalves and polychaetes community complex - 2992 ha; • *Ostrea edulis*-dominated community - 650 ha; • Intertidal reef community complex - 199 ha; • Subtidal reef community complex - 2499 ha; • *Laminaria*-dominated community complex - 117 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Salicornia and other annuals colonizing mud and sand	To maintain the favourable conservation condition of Salicornia and other annuals colonizing mud and sand in Tralee Bay and Magharees Peninsula, West to Cloghane SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*). No new sites for this species and an annual spread of less than 1% where it is already known to occur.	Favourable.	Habitat area estimated as 116 ha.
	Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Tralee Bay and Magharees Peninsula, West to Cloghane SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community extent. Maintain the extent of *Mytilus*-dominated community and the *Zostera*-dominated and *Sabellaria*-dominated community complexes, subject to natural processes. Community structure: *Zostera* density. Conserve the high quality of the *Zostera*-dominated community complex, subject to natural processes Community structure: *Mytilus edulis* density. Conserve the high quality of the *Mytilus*-dominated community, subject to natural processes. Community structure: *Sabellaria* density. Conserve the high quality of the *Sabellaria*-dominated community complex, subject to natural processes. Community distribution. Conserve the following community types in a natural condition: Sand to sandy mud with polychaetes and bivalves community complex; Sand with *Nephtys cirrosa* community complex; *Ostrea edulis*-dominated community.	Favourable.	Habitat area estimated as 1685 ha. Estimated area of each community: • *Zostera*-dominated community complex – 241 ha; • *Mytilus*-dominated community – 12 ha; • *Sabellaria*-dominated community complex - 7 ha; • Sand to sandy mud with polychaetes and bivalves community complex – 915 ha; • Sand with *Nephtys cirrosa* community complex – 506 ha; • *Ostrea edulis*-dominated community - 4 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Reefs	To maintain the favourable conservation condition of Reefs in Tralee Bay and Magharees Peninsula, West to Cloghane SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Habitat distribution. The distribution of reefs is stable or increasing, subject to natural processes. Community extent. Maintain the extent of the *Mytilus*-dominated community and the *Sabellaria*-dominated community complex, subject to natural processes. Community structure: *Mytilus edulis* density. Conserve the high quality of the *Mytilus*-dominated community, subject to natural processes Community structure: *Sabellaria* density. Conserve the high quality of the *Sabellaria*-dominated community complex, subject to natural processes. Community structure. The following reef community complexes should be maintained in a natural condition: Exposed to moderately exposed intertidal reef; Exposed to moderately exposed subtidal reef below 20m; Sheltered reef.	Favourable.	Habitat area estimated as 2856 ha. Estimated area of each community: • *Mytilus*-dominated community – 12 ha; • *Sabellaria*-dominated community complex - 7 ha; • Intertidal reef community complex - 221 ha; • Subtidal reef community complex - 2499 ha; • *Laminaria*-dominated community complex - 117 ha.
	Estuaries	To maintain the favourable conservation condition of Estuaries in Tralee Bay and Magharees Peninsula, West to Cloghane SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community extent. Maintain the extent of the *Zostera*-dominated community complex and the *Mytilus*-dominated community, subject to natural processes. Community structure: *Zostera* density. Conserve the high quality of the *Zostera*-dominated community complex, subject to natural processes Community structure: *Mytilus edulis* density. Conserve the high quality of the *Mytilus*-dominated community, subject to natural processes. Community distribution. Conserve the following community types in a natural condition: Sand to sandy mud with polychaetes and bivalves community complex; Mixed sediment with crustaceans, bivalves and polychaetes community complex; Intertidal reef community complex.	Favourable.	Habitat area estimated as 306 ha. Estimated area of each community: • *Zostera*-dominated community complex – 65 ha; • *Mytilus*-dominated community – 1 ha; • Sand to sandy mud with polychaetes and bivalves community complex – 172 ha; • Mixed sediment with crustaceans, bivalves and polychaetes community complex – 28 ha; • Intertidal reef community complex - 22 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*	To maintain the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in Tralee Bay and Magharees Peninsula, West to Cloghane SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1% where it is known to occur	Favourable.	Habitat area estimated as 98 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Mediterranean salt meadows (*Juncetalia maritimi*)	To maintain the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Tralee Bay and Magharees Peninsula, West to Cloghane SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable or increasing, subject to natural processes including erosion and succession. Habitat distribution. No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply. Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions. Physical structure: creeks and pans. Maintain/restore creek and pan structure. Subject to natural processes, including erosion and succession. Physical structure: flooding regime. Maintain natural tidal regime. Vegetation structure: zonation. Maintain the range of saltmarsh habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height. Maintain structural variation within sward. Vegetation structure: vegetation cover. Maintain more than 90% of the area outside of creeks vegetated. Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009). Vegetation structure: negative indicator species - *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1% where it is already known to occur	Favourable.	Habitat area estimated as 36 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Coastal lagoons	To restore the favourable conservation condition of Coastal lagoons in Tralee Bay and Magharees Peninsula, West to Cloghane SAC, which is defined by the following list of attributes and targets: Habitat area. Area stable, subject to slight natural variation. Habitat distribution. No decline, subject to natural processes. Salinity regime. Median annual salinity and temporal variation within natural ranges. Hydrological regime. Annual water level fluctuations and minima within natural ranges. Barrier connectivity between lagoon and sea. Appropriate hydrological connections between lagoon and sea, including where necessary, appropriate management. Water quality: Chlorophyll *a*. Annual median chlorophyll a within natural range and less than 5µg/l. Water quality: Molybdate Reactive Phosphorus (MRP). Annual median MRP within natural range and less than 0.1mg/l. Water quality: Dissolved Inorganic Nitrogen (DIN). Annual median DIN within natural range and less than 0.15mg/l. Depth of macrophyte colonisation. Macrophyte colonisation to maximum depth of lagoon. Typical plant species. Maintain number and extent of listed lagoonal specialists, subject to natural variation. Typical animal species. Maintain listed lagoon specialists, subject to natural variation. Negative indicator species. Negative indicator species absent or under control.	Unfavourable.	Habitat area estimated as 129 ha.
	Otter (*Lutra lutra*)	To restore the favourable conservation condition of Otter in Tralee Bay and Magharees Peninsula, West to Cloghane SAC, which is defined by the following list of attributes and targets: Distribution. No significant decline. Extent of terrestrial habitat. No significant decline. Extent of marine habitat. No significant decline. Extent of freshwater (river) habitat. No significant decline. Extent of freshwater (lake/lagoon) habitat. No significant decline. Couching sites and holts. No significant decline. Fish biomass available. No significant decline. Barriers to connectivity. No significant increase.	Unfavourable.	Population in the site: data deficient Extent of terrestrial habitat area - 82 ha above high water mark, 50 ha along river banks / around ponds; Extent of marine habitat - 702 ha; Extent of freshwater (river) habitat - 20 km; Extent of freshwater (lake/lagoon) habitat - 54 ha.
	Northern pintail (*Anas acuta*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 48 overwintering individuals Maximum 48 overwintering individuals

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Brent goose (*Branta bernicla*)	No conservation objectives set for this feature for this site	Least concern	Minimum 398 overwintering individuals Maximum 398 overwintering individuals
	Sanderling (*Calidris alba*)	No conservation objectives set for this feature for this site	Least concern	Minimum 327 overwintering individuals Maximum 327 overwintering individuals
	Dunlin (*Calidris alpina*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 2949 overwintering individuals Maximum 2949 overwintering individuals
	Red knot (*Calidris canutus*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 320 overwintering individuals Maximum 320 overwintering individuals
	Purple sandpiper (*Calidris maritima*)	No conservation objectives set for this feature for this site	Least concern	Minimum 103 overwintering individuals Maximum 103 overwintering individuals
	Common curlew (*Numenius arquata*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 897 overwintering individuals Maximum 897 overwintering individuals
	Redshank (*Tringa totanus*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 421 overwintering individuals Maximum 421 overwintering individuals
	Common teal (*Anas crecca*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 699 overwintering individuals Maximum 699 overwintering individuals
	Ruddy turnstone (*Arenaria interpres*)	No conservation objectives set for this feature for this site	Least concern	Minimum 477 overwintering individuals Maximum 477 overwintering individuals
	Ringed plover (*Charadrius hiaticula*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 298 overwintering individuals Maximum 298 overwintering individuals
	Golden plover (*Pluvialis apricaria*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 2278 overwintering individuals Maximum 2278 overwintering individuals
	Shelduck (*Tadorna tadorna*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 259 overwintering individuals Maximum 259 overwintering individuals
	Northern shoveler (*Anas clypeata*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 144 overwintering individuals Maximum 144 overwintering individuals
	Red-breasted merganser (*Mergus serrator*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 57 overwintering individuals Maximum 57 overwintering individuals
	Greenshank (*Tringa nebularia*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 24 overwintering individuals Maximum 24 overwintering individuals

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Gadwall (*Anas Strepera*)	No conservation objectives set for this feature for this site	Least concern	Minimum 20 overwintering individuals Maximum 20 overwintering individuals
	Greater scaup (*Aythya marila*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 1712 overwintering individuals Maximum 1712 overwintering individuals
	Great northern diver (*Gavia immer*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 39 overwintering individuals Maximum 39 overwintering individuals
	Bar-tailed godwit (*Limosa lapponica*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 710 overwintering individuals Maximum 710 overwintering individuals
	Black-tailed godwit (*Limosa limosa*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 256 overwintering individuals Maximum 256 overwintering individuals
	Common scoter (*Melanitta nigra*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 327 overwintering individuals Maximum 327 overwintering individuals
	Grey plover (*Pluvialis squatarola*)	No conservation objectives set for this feature for this site	Medium conservation concern	Minimum 303 overwintering individuals Maximum 303 overwintering individuals
	Wigeon (*Anas penelope*)	No conservation objectives set for this feature for this site	High conservation concern	Minimum 427 overwintering individuals Maximum 427 overwintering individuals
	northern lapwing (*Vanellus vanellus*)	No conservation objectives set for this feature for this site	High conservation concern	Data deficient
Valencia Harbour/Portmagee Channel [002262]	Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Valencia Harbour/Portmagee Channel SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community distribution. Conserve the following community types in a natural condition: Intertidal sand with nematodes and polychaetes community complex; and Medium to fine sand with *Nephtys cirrosa* and *Spiophanes bombyx* community complex.	Favourable.	Habitat area estimated as 122 ha. Estimated area of each community: • *Zostera*-dominated community complex – 65 ha; • *Mytilus*-dominated community – 1 ha; • Sand to sandy mud with polychaetes and bivalves community complex – 172 ha; • Mixed sediment with crustaceans, bivalves and polychaetes community complex – 28 ha; Intertidal reef community complex - 22 ha.

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
West Connacht Coast [IE02998]	Reefs	To maintain the favourable conservation condition of Reefs in Valencia Harbour/Portmagee Channel SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Habitat distribution. The distribution of reefs is stable or increasing, subject to natural processes. Community structure. Conserve the following community types in a natural condition: *Fucus*-dominated intertidal reef community complex; *Laminaria*-dominated community; and Echinoderm-dominated reef community complex.	Favourable	Habitat area estimated as 953 ha. Estimated area of each community: • *Zostera*-dominated community complex – 65 ha; • *Mytilus*-dominated community – 1 ha; • Sand to sandy mud with polychaetes and bivalves community complex – 172 ha; • Mixed sediment with crustaceans, bivalves and polychaetes community complex – 28 ha; Intertidal reef community complex - 22 ha.
	Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in Valencia Harbour/Portmagee Channel SAC, which is defined by the following list of attributes and targets: Habitat area. The permanent habitat area is stable or increasing, subject to natural processes. Community extent. Maintain the extent of the maërl- and *Zostera*-dominated communities and the *Edwardsia delapiae* associated community complexes, subject to natural processes. Community structure. Conserve the high quality of the maërl-dominated community, subject to natural processes. Community structure: *Zostera* density. Conserve the high quality of the *Zostera*-dominated community complex, subject to natural processes. Community structure. Conserve the high quality of the *Edwardsia delapiae* associated community, subject to natural processes. Community distribution. Conserve the following community types in a natural condition: Intertidal sand with nematodes and polychaetes community complex; Medium to fine sand with *Nephtys cirrosa* and *Spiophanes bombyx* community complex; Coarse sediment with *Pisione remota* community complex; Sandy mud to mixed sediment with *Melinna palmata* community complex; Mixed sediment with *Chaetozone gibber* community complex; *Fucus*-dominated intertidal reef community complex; *Laminaria*-dominated community; and Echinoderm-dominated reef community complex.	Favourable.	Habitat area estimated as 2629 ha. Estimated area of each community: • Maërl-dominated community – 59 ha; • *Zostera*-dominated community – 6 ha; • *Edwardsia delapiae* associated community – 2 ha; • Intertidal sand with nematodes and polychaetes community complex - 111 ha; • Medium to fine sand with *Nephtys cirrosa* and *Spiophanes bombyx* community complex- 294 ha; • Coarse sediment with *Pisione remota* community complex - 130 ha; • Sandy mud to mixed sediment with *Melinna palmata* community complex - 359 ha; • Mixed sediment with *Chaetozone gibber* community complex - 715 ha; • *Fucus*-dominated intertidal reef community complex - 127 ha; • *Laminaria*-dominated community - 451 ha; • Echinoderm-dominated reef community complex - 374 ha.
	Bottlenose dolphin (*Tursiops truncatus*)	To maintain the favourable conservation condition of Common Bottlenose Dolphin in West Connacht Coast SAC, which is defined by the following list of attributes and targets: Access to suitable habitat. Species range within the site should not be restricted by artificial barriers to site use. Disturbance. Human activities should occur at levels that do not adversely affect the bottlenose dolphin population at the site	Favourable.	Minimum 123 permanent individuals at site. Maximum 219 permanent individuals at site.
	Grey seal (*Halichoerus grypus*)	No conservation objectives set for this feature for this site	Not available	Population in the site: data deficient

SAC name [site code]	Relevant features as a reason for site designation[13] (As listed on Annex I (habitats) or Annex II (species) of the EC Habitats Directive 92/43/EEC)	Conservation Objectives[14]	The current condition / status of the qualifying interests of the site[15] or conservation status (bird species only)[16]	Site-specific and regional estimates for abundance or areas of specific qualifying interests[17]
	Harbour porpoise (*Phocoena phocoena*)	No conservation objectives set for this feature for this site	Not available	Population in the site: data deficient
	Harbour seal (*Phoca vitulina*)	No conservation objectives set for this feature for this site	Not available	Population in the site: data deficient

Appendix A.2 SPAs

All SPAs and the bird features listed in the table below were considered for in Appropriate Assessment.

The conservation objectives for all the sites listed in the Table below are set out by NPWS as follows:

- *"To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.*
- *The favourable conservation status of a species is achieved when:*
    - *population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and*
    - *the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and*
    - *there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis"*

SPA name [site code]	Distance from the Project (km)	Special Conservation Interests (as listed on Annex I of the EC Birds Directive 2009/147/EC)[18]	Conservation status of species[19]	Site-specific and regional estimates for abundance of specific qualifying interests[20]
Beara Peninsula [004155]	230	Northern fulmar (*Fulmarus glacialis*)	Least concern	575 breeding pairs
		European herring gull (*Larus argentatus*)	High conservation concern	20 breeding pairs
		Common shag (*Phalacrocorax aristotelis*)	Medium conservation concern	12 breeding pairs
Bills Rocks [004177]	394	Atlantic puffin (*Fratercula arctica*),	Medium conservation concern	1500 breeding pairs
		Northern fulmar (*Fulmarus glacialis*),	Least concern	108 breeding pairs
		Storm petrel (*Hydrobates pelagicus*)	Medium conservation concern	500 breeding pairs
		Common shag (*Phalacrocorax aristotelis*),	Medium conservation concern	5 breeding pairs
		Black-legged kittiwake (*Rissa tridactyla*),	Medium conservation concern	105 breeding pairs
Blasket Islands [004008]	227	Razorbill (*Alca torda*),	Medium conservation concern	512 breeding individuals
		Atlantic puffin (*Fratercula arctica)*	Medium conservation concern	5,000 breeding individuals
		Northern fulmar (*Fulmarus glacialis*)	Least concern	3000 breeding pairs
		Storm petrel (*Hydrobates pelagicus*),	Medium conservation concern	51965 breeding pairs
		Common gull (*Larus canus*),	Medium conservation concern	6 breeding pairs
		Lesser black-backed gull (*Larus fuscus*)	Medium conservation concern	421 breeding pairs
		Leach's petrel (*Oceanodroma leucorhoa*)	High conservation concern	5 breeding pairs
		Manx shearwater (*Puffinus puffinus*)	Medium conservation concern	23500 breeding pairs
		Common shag (*Phalacrocorax aristotelis*)	Medium conservation concern	5 permanent pairs
		Black-legged kittiwake (*Rissa tridactyla*)	Medium conservation concern	700 breeding pairs
		Arctic tern (*Sterna paradisaea*),	Medium conservation concern	Minimum 1 breeding pair Maximum 100 breeding pairs
		Common guillemot (*Uria aalge*)	Medium conservation concern	473 breeding individuals
Cliffs of Moher [004005]	350	Razorbill (*Alca torda*)	Medium conservation concern	7,835 breeding individuals
		Atlantic puffin (*Fratercula arctica*)	Medium conservation concern	1,365 breeding individuals
		Northern fulmar (*Fulmarus glacialis*)	Least concern	3,566 breeding pairs

[1818] The list only includes European sites and features for which a likely significant effect could not be excluded out during the Appropriate Assessment Screening.
[19] Categorised using list of species on red/amber lists as per BirdWatch Ireland - https://www.birdwatchireland.ie/LinkClick.aspx?fileticket=VcYOTGOjNbA%3d&tabid=178
[20] Taken from Natura 2000 data from for each site from NPWS - https://www.npws.ie/protected-sites/spa

SPA name [site code]	Distance from the Project (km)	Special Conservation Interests (as listed on Annex I of the EC Birds Directive 2009/147/EC)[18]	Conservation status of species[19]	Site-specific and regional estimates for abundance of specific qualifying interests[20]
		Black-legged kittiwake (*Rissa tridactyla*)	Medium conservation concern	8,063 breeding pairs
		Common guillemot (*Uria aalge*)	Medium conservation concern	20,402 breeding individuals
Cruagh Island [004170]	362	Manx shearwater (*Puffinus puffinus*),	Medium conservation concern	85 wintering individuals
		Barnacle goose (*Branta leucopsis*)	Medium conservation concern	3286 breeding pairs
Deenish Island and Scariff Island [004175]	234	Northern fulmar (*Fulmarus glacialis*),	Least concern	385 breeding pairs
		Storm petrel (*Hydrobates pelagicus*)	Medium conservation concern	1400 breeding pairs
		Herring gull (*Larus argentatus*)	High conservation concern	28 breeding pairs
		Black-backed gull (*Larus fuscus*)	Medium conservation concern	97 breeding pairs
		Manx shearwater (*Puffinus puffinus*)	Medium conservation concern	2,311 breeding pairs
		Arctic tern (*Sterna paradisaea*),	Medium conservation concern	54 breeding pairs
Dingle Peninsula [004153]	241	Northern fulmar (*Fulmarus glacialis*),	Least concern	1,016 breeding pairs
Galley Head to Duneen Point [004190]	316	Northern fulmar (*Fulmarus glacialis*),	Least concern	106 breeding pairs
		Herring gull (*Larus argentatus*),	High conservation concern	62 breeding pairs
High Island, Inishshark and Davillaun [004144]	362	Barnacle goose (*Branta leucopsis*)	Medium conservation concern	371 wintering individuals
		Northern fulmar (*Fulmarus glacialis*)	Least concern	830 breeding pairs
		Herring gull (*Larus argentatus*),	High conservation concern	18 breeding pairs
		Common gull *(Larus canus)*	Medium conservation concern	13 breeding pairs
		Common shag (*Phalacrocorax aristotelis*)	Medium conservation concern	30 breeding pairs
		Manx shearwater (*Puffinus puffinus)*	Medium conservation concern	73 breeding pairs
		Black-legged kittiwake (*Rissa tridactyla*)	Medium conservation concern	230 breeding pairs
		Arctic tern (*Sterna paradisaea*)	Medium conservation concern	64 breeding pairs
Illanmaster [04074]	457	Barnacle goose (*Branta leucopsis*)	Medium conservation concern	Minimum 1 wintering individual Maximum 50 wintering individuals
		Atlantic puffin (*Fratercula arctica*)	Medium conservation concern	1,367 breeding pairs
		Storm petrel (*Hydrobates pelagicus*)	Medium conservation concern	7,500 breeding pairs
Inishglora and Inishkeeragh [04084]	427	Barnacle goose (*Branta leucopsis*)	Medium conservation concern	136 wintering individuals
		Storm petrel (*Hydrobates pelagicus*)	Medium conservation concern	3,405 breeding pairs
		Herring gull (*Larus argentatus*)	High conservation concern	78 breeding pairs
		Common gull *(Larus canus)*	Medium conservation concern	6 breeding pairs
		Lesser black-backed gull (*Larus fuscus*)	Medium conservation concern	66 breeding pairs
		Common shag (*Phalacrocorax aristotelis*)	Medium conservation concern	61 breeding pairs
		Great cormorant (Phalacrocorax carbo)	Medium conservation concern	57 breeding pairs
		Arctic tern (*Sterna paradisaea*)	Medium conservation concern	105 breeding pairs
Inishkea Islands [04004]	415	Common teal (*Anas crecca*)	Medium conservation concern	150 wintering individuals
		Ruddy turnstone (*Arenaria interpres*)	Least concern	300 wintering individuals
		Barnacle goose (*Branta leucopsis)*	Medium conservation concern	45 wintering individuals

SPA name [site code]	Distance from the Project (km)	Special Conservation Interests (as listed on Annex I of the EC Birds Directive 2009/147/EC)[18]	Conservation status of species[19]	Site-specific and regional estimates for abundance of specific qualifying interests[20]
		Sanderling (*Calidris alba*)	Least concern	80 wintering individuals
		Dunlin (*Calidris alpina)*	High conservation concern	5 breeding pairs 300 wintering individuals
		Purple sandpiper (*Calidris maritima*)	Least concern	50 wintering individuals
		Ringed plover (*Charadrius hiaticula*)	Medium conservation concern	300 wintering individuals
		Northern fulmar (*Fulmarus glacialis*)	Least concern	216 breeding pairs
		Common snipe (*Gallinago gallinago*)	Medium conservation concern	5 breeding pairs
		Eurasian oystercatcher (*Haematopus ostralegus*)	Medium conservation concern	200 wintering individuals
		Storm petrel (*Hydrobates pelagicus*)	Medium conservation concern	44 breeding pairs
		Common gull *(Larus canus)*	Medium conservation concern	47 breeding pairs
		Lesser black-backed gull (*Larus fuscus*)	Medium conservation concern	40 breeding pairs
		Golden plover (*Pluvialis apricaria*)	High conservation concern	1,000 wintering individuals
		Little tern (*Sternula albifrons*)	Medium conservation concern	50 breeding pairs
		Common tern (*Sterna hirundo*)	Medium conservation concern	25 breeding pairs
		Arctic tern (*Sterna paradisaea)*	Medium conservation concern	182 breeding pairs
		Redshank (*Tringa totanus*)	High conservation concern	5 breeding pairs
		Northern lapwing (*Vanellus vanellus*)	High conservation concern	14 breeding pairs
Inishmore [004152]	347	Razorbill (*Alca torda*)	Medium conservation concern	231 breeding pairs
		Northern fulmar (*Fulmarus glacialis*)	Least concern	320 breeding pairs
		European herring gull (*Larus argentatus*)	High conservation concern	27 breeding pairs
		Common shag (*Phalacrocorax aristotelis*)	Medium conservation concern	14 breeding pairs
		Black-legged kittiwake (*Rissa tridactyla*)	Medium conservation concern	587 breeding pairs
		Little tern (*Sternula albifrons*),	Medium conservation concern	Minimum 3 breeding pairs Maximum 13 breeding pairs
		Arctic tern (*Sterna paradisaea)*	Medium conservation concern	338 breeding pairs
		Common guillemot (*Uria aalge*),	Medium conservation concern	2,312 breeding pairs
Iveragh Peninsula [004154]	231	Razorbill (*Alca torda*)	Medium conservation concern	90 breeding pairs
		Northern fulmar (*Fulmarus glacialis)*	Least concern	766 breeding pairs
		European herring gull (*Larus argentatus*)	High conservation concern	30 breeding pairs
		Common shag (*Phalacrocorax aristotelis*)	Medium conservation concern	11 breeding pairs
		Great cormorant (*Phalacrocorax carbo*)	Medium conservation concern	33 breeding pairs
		Black-legged kittiwake (*Rissa tridactyla*)	Medium conservation concern	1,150 breeding pairs
		Common guillemot (*Uria aalge*)	Medium conservation concern	2,860 breeding pairs
Kerry Head [004189]	290	Northern fulmar (*Fulmarus glacialis*)	Least concern	421 breeding pairs
Loop Head [004119]	300	Razorbill (*Alca torda*),	Medium conservation concern	Minimum 20 breeding individuals Maximum 105 breeding individuals

SPA name [site code]	Distance from the Project (km)	Special Conservation Interests (as listed on Annex I of the EC Birds Directive 2009/147/EC)[18]	Conservation status of species[19]	Site-specific and regional estimates for abundance of specific qualifying interests[20]
		Northern fulmar (*Fulmarus glacialis*)	Least concern	Minimum 45 breeding pairs Maximum 66 breeding pairs
		Black-legged kittiwake (*Rissa tridactyla*)	Medium conservation concern	Minimum 260 breeding pairs Maximum 690 breeding pairs
		Common guillemot (*Uria aalge*)	Medium conservation concern	Minimum 4,010 breeding individuals Maximum 5,000 breeding individuals
Magharee Islands [004125]	278	Barnacle goose (*Branta leucopsis)*	Medium conservation concern	Minimum 200 wintering individuals Maximum 270 wintering individuals
		Northern fulmar (*Fulmarus glacialis*)	Least concern	85 breeding pairs
		Common gull (*Larus canus*)	Medium conservation concern	43 breeding pairs
		Lesser black-backed gull (*Larus fuscus*)	Medium conservation concern	20 breeding pairs
		Great cormorant (*Phalacrocorax carbo*)	Medium conservation concern	20 breeding pairs
		Little tern (*Sternula albifrons*)	Medium conservation concern	36 breeding pairs
		Common tern (*Sterna hirundo*)	Medium conservation concern	12 breeding pairs
		Arctic tern (*Sterna paradisaea*)	Medium conservation concern	164 breeding pairs
Mid-Clare Coast [04182]	334	Ruddy turnstone (*Arenaria interpres*)	Least concern	571 wintering individuals
		Barnacle goose (*Branta leucopsis)*	Medium conservation concern	254 wintering individuals
		Sanderling (*Calidris alba*)	Least concern	272 wintering individuals
		Dunlin (*Calidris alpina)*	High conservation concern	2,708 wintering individuals
		Purple sandpiper (*Calidris maritima*)	Least concern	393 wintering individuals
		Ringed plover (*Charadrius hiaticula*)	Medium conservation concern	316 wintering individuals
		Great northern diver (*Gavia immer*)	Medium conservation concern	9 wintering individuals
		European herring gull (*Larus argentatus*)	High conservation concern	Minimum 1 breeding pair Maximum 40 breeding pairs
		Common gull (*Larus canus*)	Medium conservation concern	10 breeding pairs 426 wintering individuals
		Lesser black-backed gull (*Larus fuscus*)	Medium conservation concern	24 breeding pairs
		Black-headed gull (*Larus ridibundus*),	High conservation concern	304 wintering individuals 329 wintering individuals
		Common curlew (*Numenius arquata*),	High conservation concern	486 wintering individuals
		Common shag (*Phalacrocorax aristotelis*),	Medium conservation concern	Minimum 1 breeding pair Maximum 40 breeding pairs
		Great cormorant (*Phalacrocorax carbo*)	Medium conservation concern	60 breeding pairs
		Golden plover (*Pluvialis apricaria*),	High conservation concern	1,446 wintering individuals
		Grey plover (*Pluvialis squatarola*),	Medium conservation concern	36 wintering individuals
		Redshank (*Tringa totanus*)	High conservation concern	77 wintering individuals

SPA name [site code]	Distance from the Project (km)	Special Conservation Interests (as listed on Annex I of the EC Birds Directive 2009/147/EC)[18]	Conservation status of species[19]	Site-specific and regional estimates for abundance of specific qualifying interests[20]
		Northern lapwing (*Vanellus vanellus*),	High conservation concern	1,252 wintering individuals
Old Head of Kinsale [04021]	345	Razorbill (*Alca torda*)	Medium conservation concern	59 breeding pairs
		Northern fulmar (*Fulmarus glacialis*)	Least concern	37 breeding pairs
		Herring gull (*Larus argentatus*)	High conservation concern	11 breeding pairs
		Common shag (*Phalacrocorax aristotelis*),	Medium conservation concern	26 breeding pairs
		Black-legged kittiwake (*Rissa tridactyla*),	Medium conservation concern	951 breeding pairs
		Common guillemot (*Uria aalge)*	Medium conservation concern	2,330 breeding pairs
Puffin Island [04003]	229	Razorbill (*Alca torda*)	Medium conservation concern	800 breeding pairs
		Atlantic puffin (*Fratercula arctica*)	Medium conservation concern	5,125 breeding pairs
		Northern fulmar (*Fulmarus glacialis*)	Least concern	447 breeding pairs
		Storm petrel (*Hydrobates pelagicus*)	Medium conservation concern	5,177 breeding pairs
		Herring gull (*Larus argentatus*),	High conservation concern	47 breeding pairs
		Lesser black-backed gull (*Larus fuscus*)	Medium conservation concern	139 breeding pairs
		Manx shearwater (*Puffinus puffinus)*	Medium conservation concern	6,329 breeding pairs
		Black-legged kittiwake (*Rissa tridactyla*)	Medium conservation concern	250 breeding pairs
		Common guillemot (*Uria aalge)*	Medium conservation concern	250 breeding pairs
Seven Heads [04191]	328	Herring gull (*Larus argentatus*),	High conservation concern	23 breeding pairs
		Great cormorant (*Phalacrocorax carbo*)	Medium conservation concern	45 breeding pairs
Sheep's Head to Toe Head	254	Northern fulmar (*Fulmarus glacialis*)	Least concern	57 breeding pairs
		Herring gull (*Larus argentatus*)	High conservation concern	30 breeding pairs
		Common shag (*Phalacrocorax aristotelis*)	Medium conservation concern	17 breeding pairs
Skelligs [04007]	218	Razorbill (*Alca torda*)	Medium conservation concern	304 breeding pairs
		Atlantic puffin (*Fratercula arctica*)	Medium conservation concern	4,000 breeding pairs
		Northern fulmar (*Fulmarus glacialis*)	Least concern	806 breeding pairs
		Storm petrel (*Hydrobates pelagicus*)	Medium conservation concern	9,994 breeding pairs
		Manx shearwater (*Puffinus puffinus)*	Medium conservation concern	738 breeding pairs
		Kittiwake (*Rissa tridactyla*)	Medium conservation concern	944 breeding pairs
		Northern gannet (*Sula bassana*),	Medium conservation concern	29,683 breeding pairs
		Common guillemot (*Uria aalge*)	Medium conservation concern	1,709 breeding pairs
Slyne Head to Ardmore Point Islands [04159]	351	Barnacle goose (*Branta leucopsis)*	Medium conservation concern	646 wintering individuals
		Little tern (*Sternula albifrons*),	Medium conservation concern	41 breeding pairs
		Sandwich tern (*Thalasseus sandvicensis*),	Medium conservation concern	126 breeding pairs
		Arctic tern (*Sterna paradisaea).*	Medium conservation concern	582 breeding pairs
Termoncarragh Lake and Annagh Machair [004093]	433	Common teal (*Anas crecca*)	Medium conservation concern	38 wintering individuals
		Mallard (*Anas platyrhynchos*)	Least concern	48 wintering individuals
		Greater white-fronted goose (*Anser albifrons),*	Least concern	11 wintering individuals

SPA name [site code]	Distance from the Project (km)	Special Conservation Interests (as listed on Annex I of the EC Birds Directive 2009/147/EC)[18]	Conservation status of species[19]	Site-specific and regional estimates for abundance of specific qualifying interests[20]
		Barnacle goose (*Branta leucopsis)*	Medium conservation concern	394 wintering individuals
		Dunlin (*Calidris alpina*).	High conservation concern	14 breeding pairs
		Ringed plover (*Charadrius hiaticula*),	Medium conservation concern	20 wintering individuals
		Whooper swan (*Cygnus Cygnus*),	Medium conservation concern	35 wintering individuals
		Common snipe (*Gallinago gallinago*),	Medium conservation concern	5 breeding pairs
		Golden plover (*Pluvialis apricaria*)	High conservation concern	405 wintering individuals
		Northern lapwing (*Vanellus vanellus*)	High conservation concern	22 breeding pairs
The Bull and The Cow Rocks [04066]	226	Razorbill (*Alca torda*)	Medium conservation concern	88 breeding pairs
		Atlantic puffin (*Fratercula arctica)*	Medium conservation concern	200 breeding pairs
		Northern fulmar (*Fulmarus glacialis*)	Least concern	40 breeding pairs
		Storm petrel (*Hydrobates pelagicus*),	Medium conservation concern	3,500 breeding pairs
		Herring gull (*Larus argentatus*)	High conservation concern	20 breeding pairs
		Great cormorant (*Phalacrocorax carbo*)	Medium conservation concern	40 breeding pairs
		Kittiwake (*Rissa tridactyla*)	Medium conservation concern	350 breeding pairs
		Northern gannet (*Sula bassana*)	Medium conservation concern	3694 breeding pairs
		Common guillemot (*Uria aalge*)	Medium conservation concern	938 breeding pairs
Tralee Bay Complex [004188]	274	Northern pintail (*Anas acuta*)	High conservation concern	54 wintering individuals
		Common teal (*Anas crecca*)	Medium conservation concern	623 wintering individuals
		Wigeon (*Anas penelope*)	High conservation concern	1,634 wintering individuals
		Mallard (*Anas platyrhynchos*),	Least concern	571 wintering individuals
		Ruddy turnstone (*Arenaria interpres*),	Least concern	229 wintering individuals
		Greater scaup (*Aythya marila*)	Least concern	892 wintering individuals
		Brent goose (*Branta bernicla*)	Least concern	1,412 wintering individuals
		Sanderling (*Calidris alba*)	Least concern	228 wintering individuals
		Dunlin (*Calidris alpina*)	High conservation concern	2,444 wintering individuals
		Ringed plover (*Charadrius hiaticula*)	Medium conservation concern	344 wintering individuals
		Whooper swan (*Cygnus Cygnus*)	Medium conservation concern	101 wintering individuals
		Eurasian oystercatcher (*Haematopus ostralegus*)	Medium conservation concern	1011 wintering individuals
		Common gull (*Larus canus*)	Medium conservation concern	599 wintering individuals
		Black-headed gull (*Larus ridibundus*)	High conservation concern	1,320 wintering individuals
		Bar-tailed godwit (*Limosa lapponica*)	Medium conservation concern	608 wintering individuals
		Black-tailed godwit (*Limosa limosa*)	Medium conservation concern	139 wintering individuals
		Common curlew (*Numenius arquata*)	High conservation concern	1,170 wintering individuals
		Golden plover (*Pluvialis apricaria*)	High conservation concern	6,393 wintering individuals
		Grey plover (*Pluvialis squatarola*)	Medium conservation concern	195 wintering individuals
		Common shelduck (*Tadorna tadorna*)	Medium conservation concern	220 wintering individuals

SPA name [site code]	Distance from the Project (km)	Special Conservation Interests (as listed on Annex I of the EC Birds Directive 2009/147/EC)[18]	Conservation status of species[19]	Site-specific and regional estimates for abundance of specific qualifying interests[20]
		Redshank (*Tringa tetanus)*	High conservation concern	635 wintering individuals
		Northern lapwing (*Vanellus vanellus*)	High conservation concern	6,016 wintering individuals

APPENDIX B SOURCE NOISE DATA FOR THE UNDERWATER NOISE SOUND PROPAGATION MODELLING

Appendix B.1 Summary of Noise Sources

The potential sources of underwater noise associated with the drilling phases of this project are as follows:

1. Drilling a single exploration well in deep water using a drill ship;
2. Vessel activity – e.g. drilling support vessel, supply vessels; and
3. Vertical seismic profiling (VSP).

Noise source data has been taken from a combination of publicly available noise data for similar equipment and activities, empirical calculations and theoretical predictions. It should be noted that even where specific noise measurement data is available, these data are often not in a suitable form for assessing the impacts of noise on wildlife. Consequently, it is often necessary to apply empirical corrections to convert from, for example, rms sound pressure levels to SEL or peak pressure levels.

For vertical seismic profiling (VSP), these operations can be characterised as impulsive i.e. series of repetitive sounds whereas noise from vessels and drilling operations tend to be continuous in nature. It is therefore necessary to model these two types separately and compare the results against their respective threshold limits for continuous noise (non-impulsive) and multi-pulse (impulsive) noise.

Appendix B.2 Drilling Operations

The deep-water drilling will be carried out a purpose-built drill ship which uses thrusters to maintain its position via dynamic positioning; along with noise from drilling operations it is the dynamic positioning systems that contribute significantly to the overall underwater noise signature.

As information relating underwater noise from drilling operations is extremely limited it has been necessary to utilise proxy data based on the Stena Forth drill ship (Kyhn *et al*., 2011). This drill ship is a double hulled, 228 m long, 42 m wide ship with a displacement of 96,000 Mt, equipped with six 5500 kW fixed pitch azimuth thrusters (Rolls Royce Aquamaster AQM UUC 455 L-Drive) and six 7430 kW diesel generators (Wartsilla 16V32). This is considered representative of the type of mobile offshore drilling unit likely to be deployed off the west coast of Ireland in the South Porcupine Basin.

Based on measured data an equivalent source level of 184 dB re 1 µPa (rms) at 1m was determine during drilling operations. Under drilling operations noise levels were comparable in all directions except in the aft direction (180°) where levels were consistently ~5 dB lower than the other directions in the range up to 10 kHz. As a result of this, a worst-case scenario has been assumed i.e. no directionality has been included in the calculations. Noise data for the drill ship includes the use of dynamic positioning systems required to keep the vessel stationary during drilling operations to maintain stability.

The third-octave band spectrum shape for drilling activities for the Stena Forth is shown in Figure B.1.

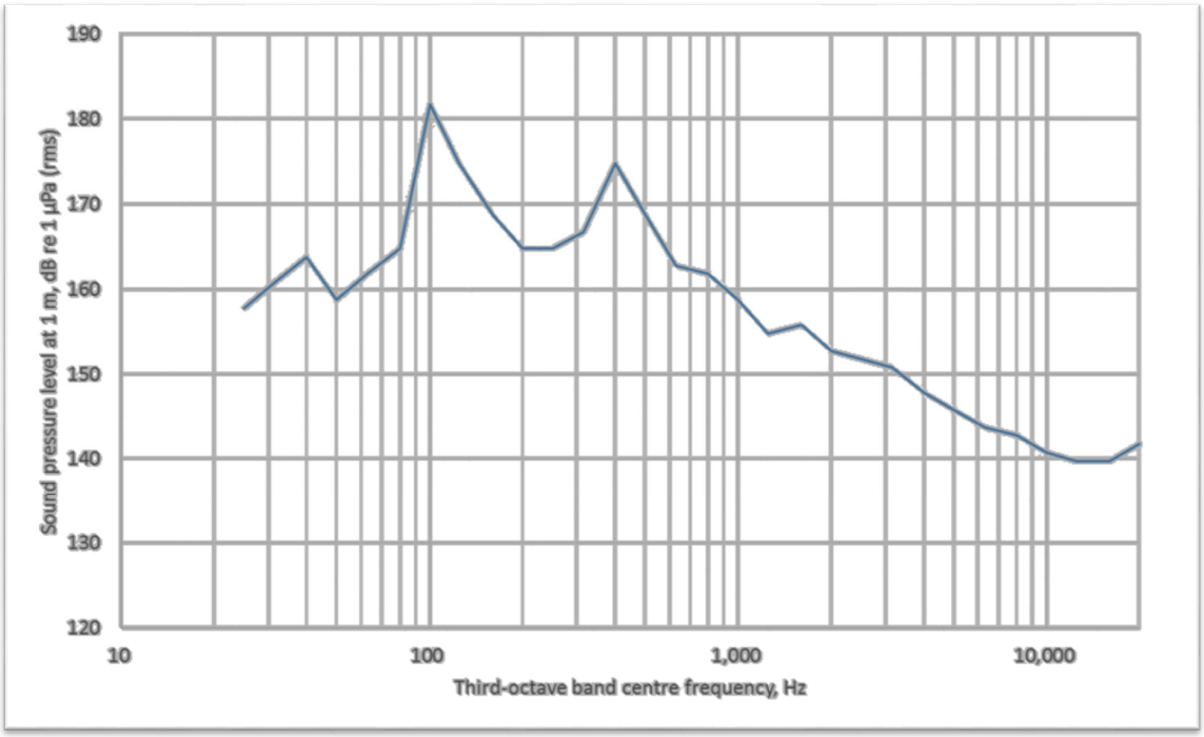

Figure B.1 **Third-octave band sound pressure level spectrum of drill ship under drilling operations (Kyhn *et al.,* 2011)**

For the source levels a correction of 3 dB has been applied to the rms sound pressure level to derive the peak sound pressure level. The SEL is based on the rms sound pressure level integrated over the exposure time.

The report (Kyhn *et al*., 2011) also stated that during maintenance operations a level of 190 dB re 1 µPa (rms) was obtained although full details of this particular operation were not provided i.e. what equipment was operating and whether other vessels were working in the vicinity. As such this data has not been disregarded.

Drilling is generally acknowledged (NPWS, 2014) to produce moderate levels of continuous omnidirectional sound at low frequency (several tens of Hz up to c.10 kHz). Source sound pressure levels have been reported to lie within the 145-190 dB re 1 µPa range. While sound exposure levels from such operations are thought to be below that expected to cause injury to a marine mammal, they have the potential to cause lower level disturbance, masking or behavioural impacts. However, it is noted that the use of dynamically-positioned platforms and associated vessel activity can combine to make drilling operations a potentially significant source of anthropogenic sound.

Appendix B.3 Support Vessels

A drilling support vessel is likely to be in attendance during drilling operations and a marine survey vessel will also be required during VSP operations.

In the absence of specific underwater data, source noise levels for the standby / support vessel has been based on those presented in Austin & McGillivray (2005). The vessel on which the measurements were carried out is the Maersk Rover which is a Type: R (L) class vessel of 67 m length. This gives a source level of 188 dB re 1 µPa (rms). A correction of 3 dB has been applied to the rms sound pressure level to derive the peak sound pressure level, and the SEL is based on the rms sound pressure level integrated over the exposure time.

Note that noise from shipping movements is not covered by NPWS (2014).

Appendix B.4 Vertical Seismic Profiling

VSP refers to measurements made in a vertical wellbore using geophones inside the wellbore and a source at the surface near the well. Operations vary in terms of 'well configuration', the number and location of sources and geophones, and how they are deployed. In a marine environment, the source used is an air gun which can produce noise levels that are harmful to marine mammals.

There is considerable literature relating to airgun noise underwater (e.g. Breitzke *et al.,* 2008; Tolstoy *et al*., 2009; Richardson *et al.,* 1995).

The following data was used to inform the modelling:

- Gun deployment: Boat crane, buoyed;
- Type: Sercel G-Gun air gun delta cluster;
- Number of guns: 3;
- Total volume: 250 cu in;
- Deployment depth: 5 m (within the water column);
- Peak amplitude: 3.5 bar-m; and
- Peak-to-peak amplitude: 5.4 bar-m.

A key assumption is that the source data provided above accurately reflects the source level of the array in practice, as encountered in the far field of the source. Zero-to-peak and peak-to-peak sound pressure levels (SPL) have been converted to dB re 1 µPa, resulting in a zero-peak sound pressure level of 235 dB re 1 µPa and a peak-to-peak sound pressure level 231 dB re 1 µPa.

For this study, the source sound levels have been based on a combination of those provided in the data sheet for the seismic energy source, supplemented by measured sound data from Breitzke *et al*., (2008), Tolstoy *et al*., (2009) and Richardson, *et al* (1995), in order to produce low- and mid-frequency data. The low- and mid-frequency data has been extrapolated to derive the third-octave frequency spectra at higher frequencies based on the gradient of the power spectral density and third-octave band plots.

The SEL represents the total energy of an event or number of events normalised to a standardised one second interval. This allows a comparison of the total energy of different sounds lasting for different time periods. As a pressure pulse from a source array propagates towards the receiver, the duration of the pulse increases. Thus, the relationship between the peak SPL and the SEL changes with distance. The SEL was calculated based on the rms SPL normalised to a one second time interval. The single pulse SEL values have been combined for each pulse as part of the various cumulative SEL modelling scenarios.

It is important to note that the rms SPL will depend upon the integration window used or, in other words, the measurement time for the rms. Using a longer duration measurement would result in a lower rms SPL than using a shorter one.

An additional phenomenon occurs where the seismic waveform elongates with distance from the source due to a combination of dispersion and multiple reflections. Measurements presented by Breitzke *et al*. (2008) indicate elongation of the T90 window up to approximately 800 ms at 1 km. This temporal "smearing" reduces the rms amplitude with distance (because the rms window is longer) and has been included within the disturbance modelling scenarios. Since the ear of most marine mammals integrates low frequency sound over a window of around 200 ms (Madsen *et al*., 2006), this duration was used as a maximum integration time for the received rms SPL.

The source levels stated above are likely to be overestimated in the near-field as the model back calculates to 1 m and does not consider the interaction between the source elements. This in turn overestimates near-field received levels, which are then compared to animal thresholds. Near field source sound levels will be lower than that predicted by this vertical far-field calculation. The spatial extent of the near-field effect can be derived from acoustic first principles (e.g. Urick 1983) and is proportional to the square of the largest array dimension and frequency. Over-prediction due to near-field errors can be expected at receiver distances closer than this.

Another important factor affecting the received sound pressure level from seismic source arrays is the source directivity characteristics. Source arrays are designed so that the majority of acoustic energy is directed downwards towards the ocean bottom. Therefore, the amount of energy emitted horizontally will be significantly less (20 dB +) than directed downwards. This is a frequency dependent effect and is more pronounced at higher frequencies than at lower frequencies. When detailed noise modelling is required then specific directivity corrections can be applied to the source sound level data based on the software model output, which provides broadband normalised amplitudes at varying angles of azimuth (angle around the boat parallel to the surface of the water, progressing around the boat from port to starboard) and dip angle (angle under the boat, progressing from prow to stern). Directivity corrections are applied assuming that the animal is directly in-line with the vessel (0º azimuth).

Appendix B.5 Effect of Background Noise

Background or “ambient” underwater noise is generated by a number of natural sources, such as rain, breaking waves, wind acting on the water’s surface, seismic noise, biological noise and thermal noise. Biological sources include marine mammals (which use sound to communicate, build up an image of their environment and detect prey and predators) as well as certain fish and shrimp. Anthropogenic sources also add to the background noise, such as fishing boats, ships, industrial noise, seismic surveys and leisure activities. Generalised ambient noise spectra attributable to various noise sources (Wenz, 1962) are shown in Figure B.2.

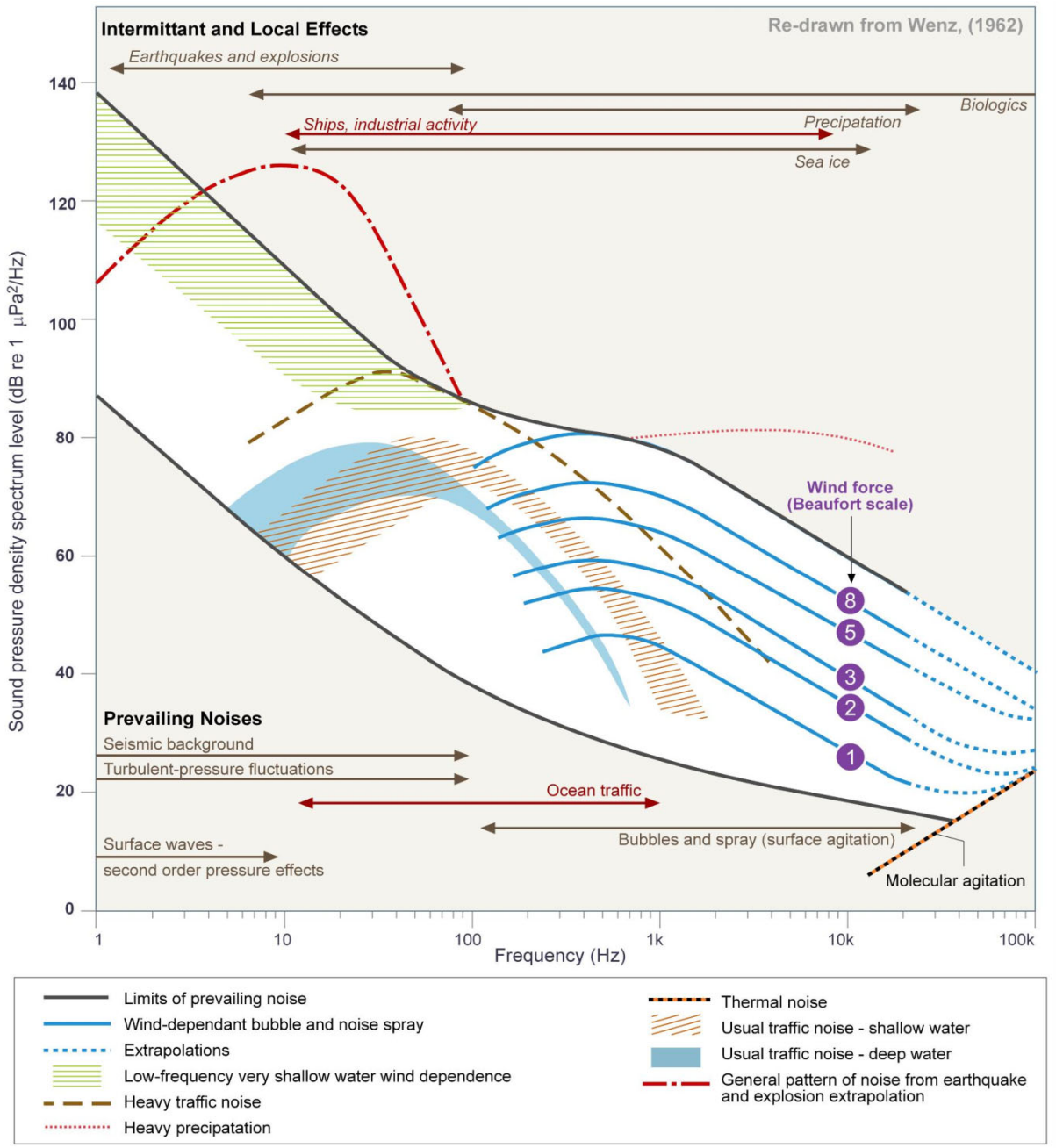

Figure B.2: Generalised ambient noise spectra attributable to various noise sources

Much of the research relating to both physiological effects and behavioural disturbance due to noise on marine species is based on determining the absolute noise level for the onset of that effect. As a result, criteria for assessing the effects of noise on marine mammals and fish tend to be based on the absolute noise criteria, as opposed to the difference between the baseline noise level and the specific noise being assessed (Southall *et al.* 2007; NPWS, 2014). Given the lack of evidence based studies investigating the effects of noise relative to background on marine species, the value of establishing the precise baseline noise level is somewhat diminished. It is important to understand that baseline noise levels will vary significantly depending on, amongst other factors, seasonal variations and different sea states, meaning that the usefulness of

establishing such a value would be limited. Nevertheless, it can be useful (though not essential) when undertaking an assessment of underwater noise to understand the range of noise levels likely to be prevailing in the area so that any noise predictions can be placed in the context of the baseline. It is important to note however, that even if an accurate baseline noise level could be determined, there is a paucity of scientific understanding regarding how various species distinguish anthropogenic sound relative to masking noise. An animal's perception of sound is likely to depend on numerous factors including the hearing integration time, the character of the sound and hearing sensitivity. It is not known, for example, to what extent marine mammals and fish can detect tones of lower magnitude than the background masking noise. Therefore, it is necessary to exercise considerable caution if attempting any comparison between noise from the development and the baseline noise level. For example, it does not follow that because the broadband sound pressure level due to the source being considered is below the numeric value of the baseline level that this means that marine mammals or fish cannot detect that sound. This is particularly true where the background noise is dominated by low frequency sound which is outside the animal's range of best hearing acuity. Until such a time as further research is conducted to determine a dose response relationship between the "signal-to-noise" level and behavioural response, a precautionary approach should be adopted.

Ambient noise levels have been recorded in the Porcupine basin by the Centre for Marine Science and Technology (2015) in the absence of noise from seismic / vessel operations. The time-averaged broadband noise levels (between 8 and 2500 Hz, 1/3 octave band limits centre frequencies) ranged from between 74-141 dB re 1µPa with mean and median levels of 107 and 109 dB re 1µPa.

It should therefore be noted that the 120 dB re 1 µPa rms sound pressure level criterion for disturbance from continuous noise lies within the range of likely background noise levels. It is therefore important to understand that exceeding the criteria for potential onset of disturbance effects does not in itself mean that disturbance will occur. Southall *et al*. (2007) notes that:

"…*the available data on behavioural responses do not converge on specific exposure conditions resulting in particular reactions, nor do they point to a common behavioural mechanism. Even data obtained with substantial controls, precision, and standardized metrics indicate high variance both in behavioural responses and in exposure conditions required to elicit a given response. It is clear that behavioural responses are strongly affected by the context of exposure and by the animal's experience, motivation, and conditioning. This reality, which is generally consistent with patterns of behaviour in other mammals (including humans), hampered our efforts to formulate broadly applicable behavioural response criteria for marine mammals based on exposure level alone*."

Consequently, the behavioural disturbance zones should be viewed as the maximum likely extent within which behavioural change could occur. The fact that an animal is within this area does not necessarily mean that disturbance will occur.

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