

Rowan

Marine Usage Licence Application Assessment of Annex IV Species Report



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Report Sign Off Page

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1. Introduction

To ensure MARA can fully assess all potential impacts of a proposed maritime activities, all applicants are required to consider any potential impacts to Annex IV species, as listed in the EU Habitats Directive (Council Directive 92/43/EEC) and transposed into national law under the European Communities (Birds and Natural Habitats) Regulations 2011, in support of their maritime usage license application.

This report contains an analysis of the any potential effects on Annex IV species for the proposed maritime activities involved in using Remote Operated Vehicles (ROV) and Autonomous Underwater Vehicles (AUV) to survey a number of wrecks on the Irish South Coast in the waters off Cork, Waterford and Wexford (**Figure 1-1**).

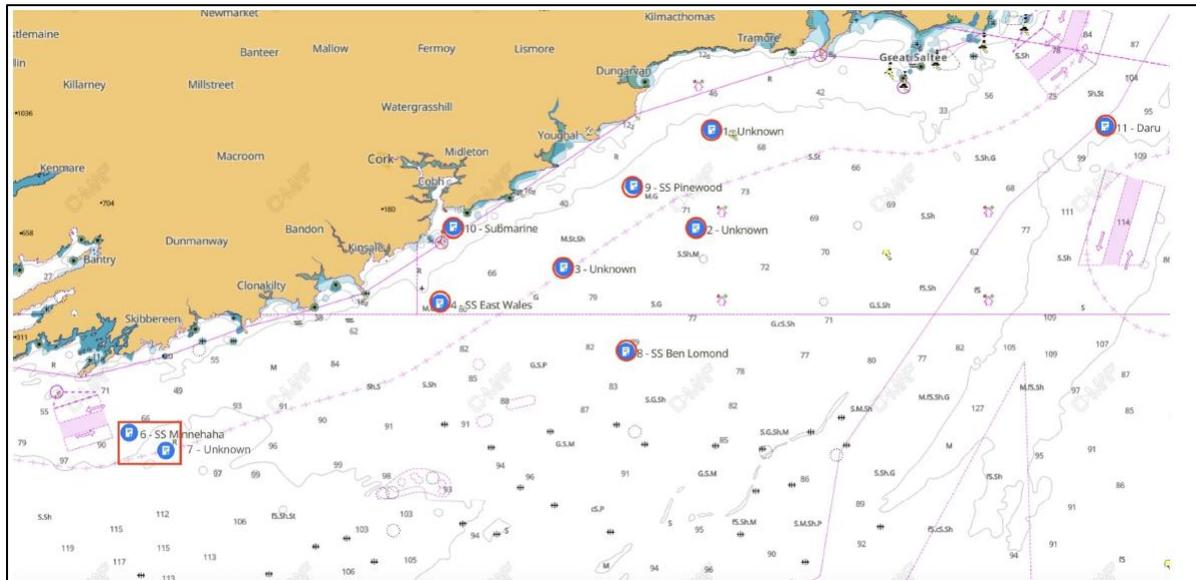


Figure 1-1: Proposed Survey Plan

This report is a risk assessment is based on the requirement and guidance as provided by the 'Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters' (DAHG, 2014) to support the application for a Marine Usage Licence (MUL).

2. Project Description

Oceyon are a compliance and technology company based in Switzerland, developing underwater technology on Remote Operated Vehicles (ROV) and Autonomous Underwater Vehicles (AUV) to survey and support salvage and safety interventions of anthropogenic structures (wrecks) by creating 3D and other models from data. This technology has been tested in alpine lakes in Switzerland, and the company now wish to test the methodology on marine shipwrecks.

The aim is to augment Oceyon's proprietary deep learning technology, which processes survey data into models. These models can be used to identify, wreck, identify historic seabed environmental or navigational risks and the output of the surveys can be used to provide public data analysis on heritage assets to the community at large.

Oceyon now wish to test the equipment in saline waters in the North Atlantic and have identified a number of wrecks off the south coast of Ireland to investigate. The assessment is based on non-invasive visual and acoustic surveys of the wrecks using ROV and AUVs deployed from a single small vessel.

The proposed Marine Usage Licence (MUL) is for a small, chartered vessel (up to 5 people and crew) to operate from coastal ports or harbours and visit a series of wrecks deploying remotely operated electric underwater vehicles (ROV and AUV) that will not disturb the wrecks, taking only photography and acoustic data scans. No divers will be used.

The proposal is for approximately one day surveys to each wreck site over the course of 2-3 week deployment period (**Figure 2-1** and **Table 2-1**).



Figure 2-1: Survey Plan

Table 2-1 Listing of proposed wrecks for survey

No	Name	Lat	Long	Length	Width	Depth	Distance from Coast (nm)
1	Unknown	51.96232	-7.31195	106	19	49.9	10
2	Unknown	51.74800	-7.36768	78	10.5	66.6	17
3	Unknown	51.66267	-7.82900	153.7	28	72.98	12
4	SS East Wales	51.58418	-8.26282	118	26.8	71.5	8
5	<i>removed</i>						
6	SS Minnehaha	51.30054	-9.34774	185	0	71.7	9
7	Unknown	51.26097	-9.21967	35.5	8.2	110.4	14
8	SS Ben Lomond	51.47836	-7.61222	96	17	74	25
9	SS Pinewood	51.84073	-7.58448	100	19	61.19	8
10	Submarine	51.75132	-8.21518	45	8	27	2
11	Daru	51.96990	-5.93738	113	15	88.7	20

2.1 Proposed Survey Equipment

The proposed survey is to deploy Remote Operated Vehicles (ROV) and Autonomous Underwater Vehicles (AUV) from a small 15m offshore craft to investigate wrecks off the southern coast of Ireland. The ROV will be deployed at each site, the AUV will be deployed only as required.

2.1.1 Equipment

The ROVs will be using the SeaTrac USBL by BluePrint for underwater positioning from a vessel and unit transponder.

ROV 1 equipped with:

- Sonoptix obstacle avoidance sonar dual frequency (400kHz and 700kHz)
- Tracker 650 DVL (Doppler velocity log) Frequency 650kHz
- Omniscan Side Scan Sonar Frequency 450kHz

ROV 2 equipped with:

- Oculus Imaging Sonar Dual Frequency 750kHz and 1200kHz
- Nortec 500 DVL Frequency 500kHz Noise Levels
- No Side Scan Sonar

AUV equipped with

- Side scan sonar 400kHz to 900kHz

2.1.2 Vessel

The equipment will be deployed from port and harbour facilities along the coast as needed. It is likely that the primary ports of call will be Cork Harbour or Youghal. The vessel is classed as a 15m crew transfer vessel. The proposed specification is outlined below (Table 2-2) The survey will be from this vessel or similar dependant on availability for the survey window.

Table 2-2 Proposed Vessel Specification

VESSEL SPECIFICATION			
VESSEL NAME	Fionn Mac Cumhaill	TONNAGE	15.2 GT
CARGO	1t	BOLLARD PULL	3.28t
HULL MATERIAL	Marine grade aluminium	FUEL	Diesel
LENGTH OVERALL	16.1m	MAX SPEED	25 knots
BEAM	4.0m	FUEL BURN	120 litres per hour
DRAFT	0.6m	MAX WAVE HEIGHT	1.5m Hs
PASSENGERS &	12 PAX, 2 CREW	LICENCE	MSO P5 & MCA Cat. 2



Figure 2-2: Fionn MacCumhail vessel

2.2 Project Programme

The project will plan its deployment, subject to conditions and vessel availability upon the receipt of an MUL. Early planning was for October 2025; however, the project will await the appropriate licencing to commence the project programme. The next likely window for survey is Spring (March-April) 2026 or will be conducted at the next available window in 2026-7. The survey duration is approximately 14 days over a period of 2-3 weeks dependant on weather.

3. Relevant Annex IV species

In order to assess the potential risk of internation or impact with Annex IV species in the area, the following section summarises the most likely species encountered by the survey based on national datasets.

3.1 Cetaceans

Cetaceans are listed under Annex IV of the EU Habitats Directive (Council Directive 92/43/EEC), meaning they are a protected species requiring evaluation for activities which could pose a threat. The Directive is transposed into national law. In Ireland, the European Communities (Birds and Natural Habitats) Regulations 2011 provides for the protection of Annex IV species of which the primary marine species of concern are cetaceans. The Regulations deem it an offense to deliberately capture, kill, injure, or disturb cetaceans such as whales, dolphins, and porpoises. Marine mammals (dolphins, whales and porpoises) are listed as present in the area from national datasets such as the National Biodiversity Data Centre, and from Special Area of Conservation (SAC) feature of conservation interest listings and records and include the following species:

- Atlantic White-sided Dolphin (*Lagenorhynchus acutus*)
- Beluga Whale (*Delphinapterus leucas*)
- Bottlenose Dolphin (*Tursiops truncatus*)
- Common Dolphin (*Delphinus delphis*)
- Common Porpoise (*Phocoena phocoena*)
- Cuvier's Beaked Whale (*Ziphius cavirostris*)
- False Killer Whale (*Pseudorca crassidens*)
- Fin Whale (*Balaenoptera physalus*)
- Humpback Whale (*Megaptera novaeangliae*)
- Killer Whale (*Orcinus orca*)
- Long-finned Pilot Whale (*Globicephala melas*)
- Minke Whale (*Balaenoptera acutorostrata*)
- Pygmy Sperm Whale (*Kogia breviceps*)
- Risso's Dolphin (*Grampus griseus*)
- Sowerby's Beaked Whale (*Mesoplodon bidens*)
- Sperm Whale (*Physeter macrocephalus*)
- Striped Dolphin (*Stenella coeruleoalba*)
- True's Beaked Whale (*Mesoplodon mirus*)
- White-beaked Dolphin (*Lagenorhynchus albirostris*)

Of the species listed above, Harbour porpoise (*Phocoena phocoena*) and Bottlenose dolphin (*Tursiops truncatus*) have both been consistently recorded in the area and are most likely to be present during the proposed survey. The other species are present only infrequently in the south coast area. Common Dolphin can occur in this area in late summer; however, the survey is likely to be conducted in Spring / early summer period.

3.2 Harbour porpoise

The harbour porpoise is the most widespread and frequently recorded species in Irish waters, sighted largely in inshore waters in the Celtic Sea throughout the entire year (Ó Cadhla et al., 2004; Berrow et al., 2010; Wall et al., 2013; Rogan et al., 2018). They are known for being generally shy, avoiding other species and rarely interacting with boats. This limits observation in anything other than calm waters and rarely occurring in deep water but they have been observed in overly shallow (<200 m) offshore banks (DAHG, 2009). Porpoise sightings in the Celtic Sea differ by season, with densities peaking in summer (Berrow et al., 2010). They are listed as a species of Least Concern on the International Union for Conservation of Nature (IUCN) Red List (Braulik et al., 2020). Harbour porpoises are opportunistic foragers with a varied diet and are known to forage at high energy, near-shore sites, where their distribution is linked to year-round proximity to small shoaling fish species, such as sandeel (*Ammodytidae*) (Santos and Pierce, 2003). Harbour porpoise are typically observed as individuals or in small groups of two to three animals throughout the year and will tend to avoid medium and large vessels (IWDG, 2024a).

3.3 Bottlenose Dolphins

Bottlenose dolphins are one of the most frequently recorded cetaceans in Ireland (NPWS, 2019) and have been observed throughout Irish waters year-round. They are listed as a species of Least Concern on the IUCN Red List (Wells et al., 2019). Bottlenose dolphins are typically encountered in group sizes of five to thirty animals. Larger group sizes have been recorded but predominately in offshore areas. Inshore animals will readily approach vessels but are less likely to engage in extended periods of bow riding than common dolphins (IWDG, 2022). In Ireland, there are thought to be at least three distinct populations of bottlenose dolphin, as determined by genetic studies (Mirimin et al., 2011). One of these populations is highly mobile and the same individuals have been recorded off all Irish coasts, with individuals recorded in Dublin Bay recaptured (i.e., sighted and identified through photographic identification (hereafter 'photo-ID') using distinctive features) in Galway Bay, approximately 650 km away (O'Brien et al., 2010). Comparison of images within bottlenose dolphin photo-ID catalogues confirm movement of individuals through prospective corridors linking designated Special Areas of Conservation (SACs) in the Moray Firth (Scotland), Cardigan Bay (Wales) and Shannon Estuary (Ireland) (Robinson et al., 2012). There is a small 'semi-resident' group described in Cork Harbour (Berrow et al., 2010, Ryan et al., 2010). Recent photo-ID of bottlenose dolphins by IWDG have recorded the same individuals off counties Dublin, Cork, Kerry, Galway, Mayo, Donegal and Antrim (Berrow et al., 2010), suggesting that inshore dolphins recorded within and / or near the survey sites and Cork Harbour and coast in particular potentially use the entire Irish coast. Most coastal sightings around Ireland fall within 10 km from shore (O'Brien et al., 2010; Robinson et al., 2012). Irish coastal bottlenose dolphins have a widely variable diet including benthic and pelagic

species; prey includes, but is not limited to, hake (*Merluccius merluccius*), whiting (*Merlangius merlangus*), haddock (*Melanogrammus aeglefinus*), conger eel (*Conger conger*), gadoids, flatfish, and cephalopods (Hernandez-Milian et al., 2012; 2015). Bottlenose dolphins with calves in Irish waters were recorded primarily in the summer months (Berrow et al., 2010).

3.4 Common Dolphin (seasonal)

Deemed the second most frequently reported species of cetacean after the harbour porpoise, common dolphins are widely distributed within Irish waters, with higher abundances off the south and southwest coasts, as well as, in deeper waters and over the continental shelf (Reid et al., 2003; Berrow et al., 2010; Wall et al., 2013; IWDG, 2024b). The chance of encountering this species is dependent on the timing of the survey. Most likely to occur in late spring, Summer or Autumn, based on current scheduling it is unlikely the survey will interact with this species. It is reported that common dolphins have a seasonal presence occurring in low densities over summer and autumn, with sightings peaking between September and January off Co. Cork (Berrow et al., 2010). They are then almost absent over the winter period due to an eastward movement along the south coast (Wall et al., 2013, Berrow et al., 2010). They are gregarious and commonly occur in groups of tens of animals that readily approach vessels and may bow ride for extended periods (IWDG, 2022). They are listed as a species of Least Concern on the IUCN Red List (Braulik et al., 2021). They prey on a variety of fish and cephalopod species, particularly schooling fish such as herring and sprat (Brophy et al., 2009). Common dolphins are thought to calve in Irish waters, with calves primarily sighted from late summer to late autumn (Wall et al., 2013).

3.5 Marine Turtle species

According to data from the National Biodiversity Data Centre Ireland, the following turtle species have potential to be present in the area:

- Kemp's Ridley Turtle (*Lepidochelys kempii*) (last recorded 1982 – West Connacht Coast SAC);
- Leatherback Turtle (*Dermochelys coriacea*) (last recorded 2005); and
- Loggerhead Turtle (*Caretta caretta*) (last recorded 1957).

Leatherback turtles are the only species recorded as occasional visitors to Irish waters and are most recently recorded in 2005. Considering the rarity in Irish waters of these widely roaming marine species, that may utilise entire oceans, it is not likely that there will be any significant interactions with these Annex IV species. Studies have shown that species of marine turtle can detect sounds at frequencies under 2 kHz (Dow Piniak 2012; Dow Piniak et al., 2012a; Dow Piniak et al., 2012b; Lavender et al., 2012; Lavender et al., 2014; Martin et al., 2012; Ridgeway et al., 1969). However, little to no studies have been conducted on the physiological effects of anthropogenic noise on marine turtles. Popper et al., (2014) provide mortal injury thresholds for marine turtles from explosives between SPL peak 229 – 234 dB re 1 µPa and >207 dB re 1 µPa for seismic survey. No evidence of adverse behaviour to the surveys of the type proposed have been published. There is no risk to the number of

individuals nor any sensitive life cycle stages, nor to the survival of the population or its natural range is secure and will not be considered further.

3.6 Otters and Bats

The Eurasian otter (*Lutra lutra*) in Ireland is geographically widespread and is found within a diverse range of aquatic habitats. The adult population of otters is thought to be 12,000 to 15,000 individuals (Reid et al., 2013). Otters usually feed in shallow, sheltered waters within 100 m of the shore (Kruuk et al., 1998) and avoid any deeper waters (Scottish Executive, 2007), as such they will not occur in the Survey areas and are not considered further.

The survey consists of a single vessel and subsurface ROV and AUV. There is no potential interaction with bat species and therefore these species are not considered further.

3.7 Non-Annex IV species

3.7.1 Seals

Although pinnipeds are not Annex IV species, they have been included in this assessment as they are protected under the Wildlife Act, 1976 where it is an offence to hunt, injure or wilfully interfere with, disturb or destroy the resting or breeding place of a protected (listed) species in Irish territorial seas. Further legal protection of seals in Ireland is provided by the Habitats Directive where they are listed as an Annex II species whose conservation requires the designation of SACs.

Any proposed control measures for noise or physical presence for the Annex IV species included in this assessment will also be appropriate and / or relevant to these seals, as well as any other species of cetacean and turtle not taken forward in this assessment.

Two species of pinniped, the grey seal (*Halichoerus grypus*) and harbour seal (*Phoca vitulina*), inhabit Irish waters year-round and are recorded along the south Irish coast. Both are listed as species of Least Concern on the IUCN Red List (Bowen, 2016; Lowry, 2016). Both species have established haul-out sites along all coastlines of Ireland for resting, breeding, and engaging in social activity (Cronin et al., 2004; Ó Cadhla et al., 2007). The largest proportion of the grey seal population is hauled out ashore during the annual moult which begins in November and continues until April (Ó Cadhla and Strong, 2007). Grey seals also aggregate in large colonies during the breeding season between August and December (Ó Cadhla et al., 2013), with peak pup production during October and November (Lyons, 2004).

Grey seals tend to breed on exposed rocky shores, on sandbars or in sea caves with ready access to deeper water. Haul-out sites for harbour seals have tended historically to be found among inshore bays and islands, coves and estuaries (Cronin et al., 2007), particularly around the hours of lowest tide. Seasonal and critical life-history events are shown to influence haul-out behaviour, with a maximum time ashore occurring during the moult and post-moult season between July and October. The females give birth to their pups in June and July (Lyons, 2004). The diet of grey and harbour seals in Irish coastal waters are broadly similar, with both species having a highly variable diet. Sandeels make up a large percentage of prey for both grey and harbour seals, with other prey species including salmonids, squid, dragonets and flatfish species (Hernandez-Milian et al., 2012). The majority of foraging trips

for grey and harbour seals fall within 100 km and 50 km from a haul-out site, respectively (Carter et al., 2022; Cunningham et al. 2009; Cronin 2010; SCOS, 2021).

Grey seals are the most frequently observed marine mammal species on the coastal south coast area around Cork, followed by harbour porpoise

Aerial surveys of the Celtic Sea (Morris and Duck, 2019) show that some grey seal sightings were made outside Cork Harbour, e.g., 2017/18 sightings within South-west Region Area, while more grey seals and harbour seals were sighted on the southwest coast of the same survey region compared to sea area near Cork Harbour. This aligns with abundance estimates by Russell et al. (2017) generated from count and telemetry data. Slight increases in the number of harbour seals counted along the southwest Irish coast were identified between 2003 to 2017/18, and the increases in grey seal numbers over this time period were even more prominent (Morris and Duck, 2019).

Telemetry data and habitat preference modelling indicate both species occur in low densities in offshore areas (Carter et al., 2022).

The closest known breeding site for grey seals is within the Roaringwater Bay and Island SAC (for which the grey seal is qualifying feature (Ó Cadhla et al., 2013)), which is a significant distance (approx. 40km) from the proposed survey sites (see the Appropriate Assessment Screening report).

In comparison, harbour seals are much less frequently recorded within the general south coast area. The closest known breeding site for harbour seals is within the Slaney River Valley SAC (for which the harbour seal is listed as qualifying interest (NPWS, 2013)), which is approximately 100km away.

3.7.2 Fish

Fish species are included in the assessment for information. No Annex IV fish species are designated in Ireland. There are a number of Annex II fish species (lamprey, shad, pollan and salmon), however, none of these are expected to occur in the survey areas. Fish species are included for the purposes of assessing potential impact from the marine noise emissions of the survey, but primarily as behavioural response from fish as the primary prey for cetaceans.

3.7.3 Basking Sharks

Basking Sharks are not protected under Annex IV but have protection under the Wildlife Act. Basking sharks (*Cetorhinus maximus*). Basking shark is solitary predominantly but aggregations of 6 - 12 sharks can occur in areas of dense zooplankton abundance (Speedie, 1999), and in rare circumstances, groups may contain hundreds of individuals (Skomal et al., 2004). Aggregations can occur along the south coast area in late May and early June. Basking sharks are sensitive to low-frequency sounds, with a hearing threshold likely in the 10–800 Hz range, which is typical for sharks and other elasmobranchs. However, as filter feeders, they are less reliant on hearing for hunting than predatory sharks, so their specific hearing thresholds and how they use sound are not as well-studied. Behavioural responses in elasmobranchs have been detected in predatory species where low-frequency sounds, especially irregular pulses below 40 Hz, are an attractant as they are similar to the

sounds of struggling fish. No published evidence of ROV survey having detrimental effects to basking sharks have been published. Given the unlikelihood of presence in the area will not be considered further, however the MMO controls will include elasmobranchs as well as cetaceans.

4. Guidance Policy and Standards

4.1 Legislation

4.1.1 Habitats Directive

All species of cetacean, marine turtle, otter and bat in and around waters of Ireland are listed under the Annex IV of the Habitats Directive (Council Directive 92/43/EEC) which covers animal and plant species of community interest in need of strict protection, termed European Protected Species (EPS). The Habitats Directive has been transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), as amended.

Regulation 51 provides for the strict protection of Annex IV animals. The aim of the strict protection measures is that the species in question will reach and remain favourable conservation status (FCS). FCS is defined in the Habitats Directive as when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable element of its natural habitats;
- The natural range of the species is neither being reduced nor is likely to be reduced nor is likely to be reduced for the foreseeable future; and
- There is, and will probably continue be, a sufficiently large habitat to maintain its populations on a long-term basis.

It is an offence to do any of the following without first obtaining a derogation licence in accordance with Regulation 54:

- a) Deliberately capture or kill any specimen of these species in the wild;
- b) Deliberately disturb these species particularly during the period of breeding, rearing, hibernation and migration;
- c) Deliberately take or destroy eggs of those species from the wild;
- d) Deterioration, or destruction of a breeding site or resting place of such an animal; or
- e) Keep, transport, sell, exchange, offer for sale any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive.

Derogation licences for Annex IV species may be granted by MARA, which would allow otherwise illegal activities to go ahead, provided that:

- There is no satisfactory alternative.
- The action authorised will not be detrimental to the maintenance of the population of the species concerned at a FCS in their natural range.

The purpose of this report is to support MARAs evaluation of the Regulation 51. The likelihood of collision or physical interactions with a marine mammal is highly unlikely and therefore is not considered further in this assessment. As such the only potential negative interaction with cetaceans from the survey is the noise generation by the survey equipment.

4.1.2 Marine Strategy Framework Directive

The European Marine Strategy Framework Directive (MSFD) establishes regulations to protect the marine ecosystem and biodiversity upon which our health and marine-related economic and social activities depend. To help EU countries achieve a good environmental status (GES), the Directive sets out 11 illustrative qualitative descriptors a number of descriptors by which the health of the marine areas of Europe can be managed. Marine biodiversity (Descriptor 1) is managed through a number of areas including the Habitats and Birds Directives and the Marine Protected Areas. Monitoring requirements to the European Union Member States under Descriptor 11 (Noise/Energy) of Good Environmental Status: *“Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment”* (MSFD, 2008). Whilst the original proposal for Descriptor 11 included levels for impulsive sound (originally, only sounds exceeding SEL of 183 dB re 1 $\mu\text{Pa}^2\text{s}$ @ 1m or SPL PEAK of 224 dB re 1 μPa @ 1m would need recording) and for continuous sound (the original aim was to keep noise at the 1/3 octave bands centred at 63 Hz and 125 Hz below 100 dB re 1 μPa rms).

These levels were removed from the final form of the descriptor since it became obvious that it would not be possible to respect the continuous noise threshold in vessels and shipping lanes, and that not enough information on impulsive sounds would be collected by imposing a minimum level for recording (Erbe, 2013). The subsequent Commission Decision 2017/848 Descriptor 11 *Introduction of energy, including underwater noise* states that levels do not adversely affect the marine environment and does not define a limit or guidance levels.

4.1.3 Water Framework Directive

The Water Framework Directive (WFD) focuses on ensuring good qualitative and quantitative health i.e. on reducing and removing pollution and on ensuring that there is enough water to support wildlife at the same time as human needs. The WFD is the main law for water protection in Europe. It applies to inland, transitional and coastal surface waters as well as groundwaters. Our study sites are offshore and not connected to any areas relevant for the WFD. Therefore, there is no need for consideration the WFD for the proposed project.

4.2 Relevant Guidance

This risk assessment is based on the requirement and guidance as provided by the *'Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters'* (DAHG, 2014) In relation to consideration of Annex IV species the following guidance has been referred to in preparing this report

- Guidance on the Strict Protection of Certain Animal and Plant Species under the Habitats Directive in Ireland (NPWS, 2021)
- EU Commission's Guidance document on the strict protection of animal species of Community interest under the Habitats Directive (EU, 2021).

There are no internationally agreed standards with regard to the assessment of underwater noise or impact to Annex IV species, though it is current practice to undertake assessments

based on criteria provided in the scientific literature or guidance published by regulatory authorities.

For this assessment, the criteria are based on:

- Southall et al. (2007) Marine mammal noise exposure criteria: Initial scientific recommendations. *Aquatic Mammals* 33, 411 - 521.
- Popper A N et al. (2014). Sound Exposure Guidelines for Fishes and Sea Turtles.

Nationally guidance '*Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters*' (DAHG, 2014) which has been used to inform this risk assessment. In line with its recommendation a Marine Mammal Observer (MMO) has been appointed for the risk assessment process, and an MMO will be aboard the vessel during the surveys.

4.3 Relevant standards

The Irish government does not stipulate national standards on underwater noise. International Standards on underwater acoustics were first developed in 2017 and revised in 2022 by the ISO Technical Committee (TC) 43 (*Acoustics*), Subcommittee SC 3 (*Underwater acoustics*), comprising experts on underwater acoustics from several countries around the world.

TC43 developed work in standards for "*Measurement of underwater sound from ships*" (SC3 Working Group 1), "*Underwater Acoustic Terminology*" (SC3 Working Group 2), "*Measurement of radiated noise from pile driving*" (Standard ISO18406, developed by SC3 Working Group 3), "*Standard-target method for calibrating active sonars*" (SC3 Working Group 4), "*Measurement and modelling of underwater ambient sound*" (SC3 Working Group 5) and "*Aquatic bioacoustics*" (SC3 Working Group 6).

Each of the above WG has produced, or will produce, a standard on their respective topic. The most relevant for are (both published and in draft form):

- ISO 18405:2017 Terminology, published in 2017 and revised in 2022; and
- ISO/DIS (Draft International Standard) 7605 Measurement of underwater ambient sound, due for publication in 2025.

4.4 Appropriate Assessment

There is a requirement under the EU Habitats Directive (92/43/EEC) to carry out Appropriate Assessment (AA). The information supporting this assessment is provided in an associated Appropriate Assessment Supporting Document.

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as 'The Habitats Directive', provides legal protection for habitats and species of European importance. Articles 3 to 9 of the Directive provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of a European Union (EU)-wide network of sites known as Natura 2000 (or 'European sites'). European sites comprise:

- Special Areas of Conservation (SAC) designated for habitats, plants, and non-bird species, under the Habitats Directive (92/43/EEC);
- Special Protection Areas (SPA) designated for bird species and their habitats, under the Birds Directive (79/409/ECC as codified by Directive 2009/147/EC).

Article 6 of the Habitats Directive plays a crucial role in the management of the sites that make up the Natura 2000 network⁶. Articles 6(1) and 6(2) set out the need to identify conservation objectives and prevent deterioration of the habitats and species for which the sites have been designated. Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect European Sites.

The requirement for an assessment derives from Article 6 of the Directive, and in particular Article 6(3) which requires that:

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

In recognition of this, an AA Screening will be undertaken, in parallel with the SEA process. The first stage, a screening will determine if the plan has the potential to negatively affect the designated site, or the species for which it is designated.

Article 6(4) states:

If, in spite of a negative assessment of the implications for the [European] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

The Habitats Directive has been transposed into Irish law by the Planning and Development Act 2000 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). In the context of the CAP, the governing legislation is principally European Communities (Birds and Natural Habitats) Regulations and specifically Article 27 which sets out the duties of public authorities (in this case the Local Authority, or the DHLGH) relating to nature conservation; and Article 42 which addresses AA. If screening for AA determines the likelihood for significant effects on a European site(s), in view of the

conservation objectives of the site, then AA must be carried out for the plan, including the compilation of a Natura Impact Statement (NIS) to inform the decision making.

The AA process follows a sequential staging, the conclusion of each stage determining whether subsequent stages are required. A separate Appropriate Assessment Supporting Document has been prepared for this survey.

4.5 Annex IV Species and Derogation

The EC (Birds and Natural Habitats) Regulations 2011, as amended, provide protection for all Irish species listed on Annex IV of the EU's Habitats Directive. The EC Regulations prohibit certain activities which could impact on the conservation status of these species.

These activities may only be permitted by way of a derogation, and you can apply for a derogation if you cannot avoid works which would present a risk of capture, kill or disturb them, damage or destroy their breeding sites or resting places. . It should be noted that the Minister can only issue such derogations in very limited circumstances and failure to obtain one or comply with the conditions of the Derogation could result in prosecution.

A Derogation may be issued to disturb the Annex IV species protected under the EU's Habitats Directive which includes cetaceans.

Regulation 51 makes it a criminal offence, subject to criminal prosecution, to carry out any of the following activities unless a derogation has been granted in accordance with regulation 54 of the Regulations:

- (a) Deliberately capture or kill any specimen of the relevant species in the wild
- (b) Deliberately disturb these species particularly during the period of breeding, rearing, hibernation and migration
- (c) Deliberately take or destroy eggs of the relevant species in the wild
- (d) Damage or destroy a breeding or resting place of such an animal, or
- (e) Keep, transport, sell, exchange, offer for sale or offer for exchange any specimen of the relevant species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive.

This protection only applies to the species listed above in their "natural range" in Ireland

The purpose of this report is to determine if there is a risk of impact to Annex IV species in their range in Irish waters, or any potential interaction with these species in designated sites and to determine whether there is a potential risk to the species from the survey which would require further mitigation or a Derogation licence

5. Assessment

5.1 Assessment Methodology

The aim of this report is only to assess potential impacts to Annex IV species (and other marine mammals) and determine if the project may affect these species and whether the project required mitigation or derogation. This report identifies the ranges to which marine ecological receptors may be affected by underwater noise resulting from proposed survey.

The approach is complemented by the receptor specific guidance '*Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters*' (NPWS, DAHG, 2014) which has been used to inform this risk assessment.

This guidance recommends that coastal and marine activities undergo a risk assessment for anthropogenic sound-related impacts on relevant protected marine mammal species to address any area-specific sensitivities, both in timing and spatial extent, and to inform the consenting process. The guidance states that an evidence-based risk assessment for each marine mammal species that occurs in and around the survey sites needs to consider the nature of the sound source, its likely and / or potential effects on individuals and / or populations and on their likely habitats,

Ambient underwater noise levels are highly variable, depending on a range of both natural and anthropogenic factors. Natural factors include sea state, rain, currents, movement of seabed materials, as well as sounds and vocalisations from marine animals. These factors can result in seasonal and even daily changes in the baseline noise levels. Anthropogenic noise will also contribute to the background levels; however, the significance of this contribution is difficult to quantify (due to the variability in the natural sources).

Very little data is available regarding baseline underwater noise levels in the south coast. However, the highly variable nature of the ambient noise levels in the vicinity of the south of Ireland and the shipping concentration for approaches to the Bristol and English Channel and on to European ports, means that baseline noise monitoring would not add substantially to the current understanding of the existing sound scape. As such no monitoring has been undertaken, and the baseline is informed by a review of the available literature.

5.2 Impact Assessment Methodology

The project has two potential sources of impact to Annex IV species, the operation of a small vessel to deploy the equipment and the associated ROV and AUV, and the noise generation from the non-invasive survey equipment. A Marine Mammal Observer (MMO) will be present for boat operations as per the DAHG 2014 guidelines. The likelihood of collision with a marine mammal is highly unlikely and therefore is not considered further in this assessment. As such the only potential negative interaction with cetaceans from the survey is the noise generation by the survey equipment.

The ROVs will be using the SeaTrac USBL by BluePrint. This has been selected as the most appropriate technology for the survey. The noise level document produced by their manufacturer is as follows:

- Seatrac USBL Frequency 24 - 32kHz Noise level 170 - 174dB

The other specific sensors on the ROVs that generate noise are: -

ROV 1

- Sonoptix obstacle avoidance sonar dual frequency (400kHz and 700kHz) Noise level 180 - 193dB
- Tracker 650 DVL (Doppler velocity log) Frequency 650kHz Noise level 199-207dB
- Omniscan Side Scan Sonar Frequency 450kHz 205-207dB

ROV 2

- Oculus Imaging Sonar Dual Frequency 750kHz and 1200kHz Noise Levels 183 - 194dB
- Nortec 500 DVL Frequency 500kHz Noise Levels 198 - 206dB
- No Side Scan Sonar

Optional AUV:

- Seaber Yuco-Scan (or similar) 650kHz 180-190 dB

In order to assess the potential impacts of underwater noise generated during the proposed surveys, it is necessary to understand whether the noise is in a frequency range that can be detected by the marine noise sensitive receptors likely to be present in the vicinity of the survey areas. Where a noise source is detectable, it is necessary to ascertain the nature of the potential impact resulting from the receptor being exposed to the noise source, as well as the distance to which that impact is likely to be experienced.

The primary underwater noise sensitive receptors in the marine environment are marine mammals and fish. Southall et al., 2007 presents hearing frequency thresholds for marine mammals, as well as noise exposure criteria for sound pressure levels which have the potential to cause injury and disturbance. The scientific literature also provides similar information for fish (Popper et al., 2014 & Slabbekoorn et al., 2010) which have been included for the completeness of the assessment, both for potentially conservational sensitive fish species and as the likely prey of cetaceans.

The frequencies and sound pressure levels of the noise sources likely to be associated with the survey equipment will be compared against the exposure criteria, in order to ascertain whether a risk of injury or disturbance to marine mammals and fish exists. Where a risk of injury or disturbance exists for a noise source, the range from the source to which that effect could be expected to occur will be calculated.

5.3 Marine Mammals Sensitivity

Marine mammals (cetaceans and pinnipeds) have hearing sensitivity thresholds, which are the frequency bands in which they can detect and are sensitive to underwater noise (Southall et al, 2007). **Table 2** overleaf details the hearing thresholds of different marine mammal species. These hearing thresholds will be used to ascertain which noise sources associated with the survey equipment will be detected by the marine mammals likely to be present within

the vicinity of the consenting corridor and hence need to be considered further in the assessment.

Table 3 Hearing Thresholds of Marine Mammals (after Southall et al, 2007 and Southall et al, 2019).

Species	Hearing Threshold (kHz)
Harbour Porpoise	0.2-180
Bottlenose Dolphin	0.15-160
Minke Whale	0.007-22
White Beaked Dolphin	0.15-160
Short-Beaked Common Dolphin	0.15-160
Atlantic White-Sided Dolphin	0.15-160
Long-Finned Pilot Whale	0.15-160
Killer Whale	0.15-160
Risso's Dolphin	0.15-160
Grey & Common Seals	0.075-75

Southall et al, (2007) also propose precautionary noise exposure criteria for marine mammal disturbance and injury; where injury is defined as either Permanent or Temporary Threshold Shift (PTS and TTS respectively); these criteria are presented in **Table 3**.

Table 4 Auditory Injury and Disturbance Criteria for Marine Mammals. After Southall et al, 2007.

	Effect	Exposure Limit (dB re 1 μ Pa)
Injury	PTS Onset Cetaceans	230
	PTS Onset Seals	218
	TTS Onset Cetaceans	224
	TTS Onset Seals	212
Disturbance	All marine mammals	160

5.4 Fish Sensitivity

Considerably less information is available for the hearing capabilities of fish, or their sensitivity to underwater noise. Fish are considered as they form the primary prey species for marine mammals and therefore the assessment reflect the potential indirect effects on marine mammals. The current guidance and exposure criteria are based on very sparse information from limited field studies, and as such should be treated with caution, however it is thought that the current criteria are overly conservative, and as such the assessment can be taken as the worst case (Popper et al., 2014).

Fish hearing thresholds depend greatly on the hearing mechanisms of the species, and can be broadly grouped into two classes; fish that do not have a swim bladder (or have a swim bladder that is not involved in hearing), and hearing specialists which have a swim bladder that is linked to the hearing mechanism (including herring) (Slabbekoorn et al., 2010). A summary of the hearing thresholds is presented in **Table 4**.

Table 5 Hearing Thresholds of Fish. After Slabbekoorn et al., 2010.

Fishing Hearing Group	Hearing Threshold (kHz)
No swim bladder involved in hearing	0.03-1
Swim bladder involved in hearing	0.03-5

Currently, in Ireland, there are no nationally accepted standard noise exposure criteria for fish, however the United States National Marine Fisheries Service (NMFS) developed a set of interim injury and disturbance criteria, which has been broadly adopted (Popper et al., 2014). It should be noted that the literature strongly criticises the disturbance threshold, as the basis for setting the threshold is not provided, and further studies suggest it is significantly lower than the sound pressure level which results in a behavioural response (Popper et al., 2014). However, no alternative threshold value has been suggested, due to a lack of empirical evidence in the area, so the NMFS value is used for information. A summary of the fish noise exposure criteria is provided in **Table 5**.

Table 6 Auditory injury and disturbance criteria of fish. After Popper et al., 2014.

Effect	Exposure Limit (dB re 1 μ Pa)
Onset of physical injury in fish.	206
Onset of behavioural disturbance	150

5.5 Range Estimation

Where a noise source is detectable to marine mammals or fish and has a sound pressure level which exceeds the disturbance criteria; a simple but conservative propagation loss model will be used to estimate the range of potential disturbance from the noise source. The propagation loss model used is:

$$PL = 15 \log_{10}(R)$$

Where PL is propagation loss in dB re 1 μ Pa, and R is the distance from the noise source. The use of 15 as the scaler in the above equation makes it a hybrid between the cylindrical spreading model and the spherical spreading model. The cylindrical model is appropriate for shallow water, and assumes more horizontal spreading than vertical, so uses 10 as the scaler, while the spherical spreading model is appropriate for deeper water, and assumes equal vertical and horizontal spreading, so uses 20 as the scaler. Since the majority of the wrecks are in waters over 50m in depth, the spherical model could be applied throughout, however using 15 as the scaler will result in a reduced propagation loss, and hence can be considered a conservative approach.

5.6 Noise Impact Assessment

This section identifies the noise sources that will be associated with the surveys, the ranges that could pose impacts on noise sensitive marine receptors could expected be will then be identified.

5.6.1 Noise Sources

Previous studies have demonstrated that the principal noise source associated survey is vessel noise, and the acoustic devices utilised during the surveys (Meißner et al., 2006). However, all potential sources will be identified and discussed for completeness, following advice provided pre-application meeting. The acoustic sources that may be associated with the marine cable installation process include:

- Vessel Noise;
- Subsea survey equipment deployed from ROV / AUV including;
 - Dual frequency or multibeam Echo Sounder
 - Side-Scan Sonar (SSS), and
 - Video

5.6.2 Vessel

The vessel is an offshore small 15m Crew Transfer Vessel, the 'Fionn Mac Cumhail'. Based on the published data a vessel of this type is likely to emit broadband engine noise with tonal components, the bandwidth of the noise is generally lower than the equipment, concentrated between 50Hz and 2kHz.

The reported sound pressure levels are also lower than for the larger offshore or Dynamic Positioning (DP) vessels, and range between 170 to 180 dB re 1 μ Pa at 1m, for a selection of tugs boats and offshore fishing vessels (Richardson, 1995; Walker et al., 2018 & Wyatt, 2008).

Unlike DP vessels, the noise emission levels from these vessels are highly dependent on speed, and these figures are all for vessels at transit speed. As such the noise levels reported here are representative of those when the vessels are travelling between sites but will significantly overestimate the emission levels when the vessel is in position.

When compared to the marine mammal and fish hearing thresholds (**Tables 2 and 3**), it is clear that the vessel will be audible and detectable to both marine mammals and fish. This source will therefore be considered further in the assessment.

5.6.3 Subsea Survey Equipment

The proposed survey is to conduct survey and investigation of seabed wrecks using equipment that creates detailed digital terrain models that can be used to define topography or post processed for 3D rendering of the wreck structure. The sound energy produced by the survey is transmitted directly beneath the unit or front facing in a fan shape. The return signal (echo) that has bounced off the seafloor or other objects is then analysed to produce the terrain model. The survey operates at a sound pressure level of approximately 215 dB re 1 μ Pa at 1m with a peak frequency between 200-400kHz.

When compared to the marine mammal and fish hearing thresholds (**Tables 2 and 3**), it is clear that majority of the survey equipment bandwidths are out with the hearing capabilities of any receptor likely to be present in the vicinity of the wrecks and hence will not be considered further in this assessment.

The components that could be detectable by the cetaceans are evaluated in the impact assessment.

5.7 Impact Range Calculation

The maximum predicted source noise levels resulting from the survey equipment together with the effect criteria exposure limits, and noise dissipation model, in order to

calculate the maximum predicted impact ranges for marine mammals and fish. The results are summarised in **Table 6**.

5.8 Exposure Calculation

From the maximum exposure level, the practical exposure durations are considered within the assessment. The proposed surveys will focus on subsea structures, surveying up to a maximum 350m² area per wreck. The vessel is a day boat with operations limited to daylight hours and will employ MMP scans prior to operations. The vessel will survey most likely 1 day per wreck, potentially revisiting a second day where weather reduces survey times or further information is required. The exposure per location is therefore site limited and to a period of hours per location.

Based on the assessment of the noise emitting elements of the survey, the assessment based on the emission and attenuation on a simple spherical assessment has been made. Table 6 outlines the distance from noise emission at which the noise exceeds the exposure limit. Where the exposure limit is not reached the area is shown as hatched.

Table 7 Maximum predicted impact ranges on marine mammals and fish resulting from underwater noise associated with the survey operations.

Effect		Exposure Limit (dB re 1 μ Pa)	Vessels – Source 180dB re 1 μ Pa	USBL 186dB re 1 μ Pa	Equipment Max 207 dB re 1 μ Pa
Marine Mammal Injury	PTS Onset Cetaceans	230			
	PTS Onset Seals	218			
	TTS Onset Cetaceans	224			
	TTS Onset Seals	212			
Marine Mammal Disturbance	All marine mammals	160	22m	46	293m
Fish	Physical Injury	206			>1m
	Behavioral Disturbance	150	100m	215m	1360m

The survey equipment is predicted not to exceed the injury criteria exposure limits for marine mammals or fish. Therefore, the underwater noise associated with the project poses no risk of injury to marine mammals or Annex IV species. However, the exposure limits for disturbance are exceeded for both marine mammals and fish.

For marine mammals, the maximum predicted disturbance range is 293m, resulting from the DVL and sidescan. Vessel activities have very small, predicted disturbance ranges of 22m respectively.

The exposure limit for disturbance in fish is 10dB re 1 μ Pa lower than that for marine mammals, as such the impact ranges are greater. The USBL and side scan are the only equipment likely to have any behavioural effects. It is noted that the 150dB re 1 μ Pa exposure limit for fish disturbance is widely disputed and considered to significantly overestimate fish sensitivity to noise (Popper et al., 2014); therefore, these disturbance ranges are likely to be an extremely conservative overestimate.

5.9 Manufacturers recommendation

The only piece of equipment that includes a significant underwater noise source that could be detectable by cetaceans is the USBL, or Ultra-Short Baseline which is an underwater acoustic positioning system used to track the location of ROV's. It works by using a transceiver on a surface vessel to send acoustic pulses that a transponder on the ROV replies to, calculating the ROV's position based on the time it takes for the signal to travel back and forth and the angle of the returning signal. This provides real-time 3D positioning, which is essential for operations like inspection, search and rescue, and deepwater work where GPS is unavailable.

The manufacturers publications in relation to the USBL provides a comprehensive set of recommended exposure limits for marine mammals including large and small Odontocetes ('Toothed whales' including dolphins, porpoises, beaked whales, sperm whales etc), and Mysticetes ('Baleen whales' including blue whales, minke whales, humpback whales, bowhead whales etc).

The paper suggests that as the sensitivity of marine mammals to high-level sound is neither well known nor consistent across species, a conservative, yet practical approach is prudent and necessary with the suggested sound level at the point of reception (i.e. the mammal) not exceeded the following levels:

- Up to 3kHz 186 dB re 1 μ Pa @ 1m
- 3kHz – 20kHz 181 dB re 1 μ Pa @ 1m
- 20kHz – 75kHz 178 dB re 1 μ Pa @ 1m

As the transmitted SPL of SeaTrac beacons is below the recommended maximum levels for sensitive marine mammals and below the level of impact to Annex IV species (as also shown by **Table 3 and 6**), Blueprint Subsea do not recommend any specific mitigating action is necessary to be taken during normal operations.

5.10 Identification and Assessment of Mitigation

The equipment proposed is standard for the survey industry. The proposed deployment is for very short duration, likely daylight hours for less than one day per site. The proposed investigation is of the wreck structures on the seabed; hence the noise energy focus is not in the open water or environment providing a degree of natural attenuation and limits the potential for any interaction with Annex IV species. The survey equipment is predicted not to exceed the injury criteria exposure limits for marine mammals or fish. Therefore, the underwater noise associated with the project poses no risk of injury to marine mammals or Annex IV species. However, the exposure limits for disturbance are exceeded for both marine mammals and fish.

For marine mammals, the maximum predicted disturbance range is 293m, resulting from the DVL and sidescan. Vessel activities have very small, predicted disturbance ranges of 22m respectively.

As such no further mitigation is proposed at this stage.

The project will employ an MMO for the survey duration and apply the 'Guidance to Manage the Risk to Marine Mammals from Man-Made Sound Sources in Irish Waters' (DAHG, 2014).

5.11 Assessment of Residual Effects

No mitigation is proposed, therefore the residual effects cannot be considered, however the extremely short duration of the survey per site, the focus on the subsea structure and the use of an MMO to ensure as far as possible the area is free of cetaceans before commencement means that the likelihood of interaction with Annex IV species is extremely low.

5.12 Limitations of Assessment

This assessment is based on predicted source noise levels, using data currently available in the literature and from the manufacturers. In addition, the noise calculations model is very simplistic based on a spherical attenuation calculation and does not take into account the real-world attenuation such as bathymetry and sediment types. The assessment can be seen as a worst case, in reality the focus of the survey is on fixed wreck structure which is the focus of the survey and provide a natural baffle for any survey noise emissions.

As such there is a potential for the actual noise levels, and hence impact ranges to be practically significantly less than those predicted. However, a conservative approach has been used throughout, so this assessment should be considered to be a worst-case scenario. Any interaction from the survey is limited to disturbance. The survey duration per location is limited to hours of exposure and therefore the likelihood of a detectable impact from the survey on Annex IV species is negligible.

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