

REF : MGE0078LT0002 AMETS SI FS007062

1. Summary of noise sources associated with the proposed site investigations and survey vessel

Table 2.1 Summary of noise sources. (reference: Marine Institute, 2021)

Noise Source	Sound type	Frequency Range	Spl: dB re 1 μ Pa @1m	SEL: dB re 1 μ Pa2s @1m
usbl	Impulsive	26.5 to 33.5 kHz	206.3	154.6
SBES	Impulsive	38/200 kHz	227	181
MBES	Impulsive	300	210	185
SSS	Impulsive	100/400	210	162
SBP (Voyager)	Impulsive	3.5kHz	212	188
SBP (Explorer)	Impulsive	1.7 to 5.5kHz	215	191
Vessel (Both)	Continuous	<1KHz		<151.1

2. Assessment of potential for effects on fish

All fishes (including elasmobranchs) detect and use particle motion, particularly at frequencies below several hundred Hz (Nedelec *et al.*, 2016; Popper & Hawkins, 2018; 2019). Every species of fish studied to date studied is able to hear (Popper and Hawkins, 2019), with the majority of fishes detecting sounds from <50 Hz (even as low as 10–30 Hz) or even lower (Sand & Karlsen, 2000) to perhaps 300–500 Hz), up to approximately 1000 Hz. A smaller number of species have specialisations that enable them to detect sounds to 3 - 4000 Hz (Ladich & Fay, 2013; Popper & Hawkins, 2019).

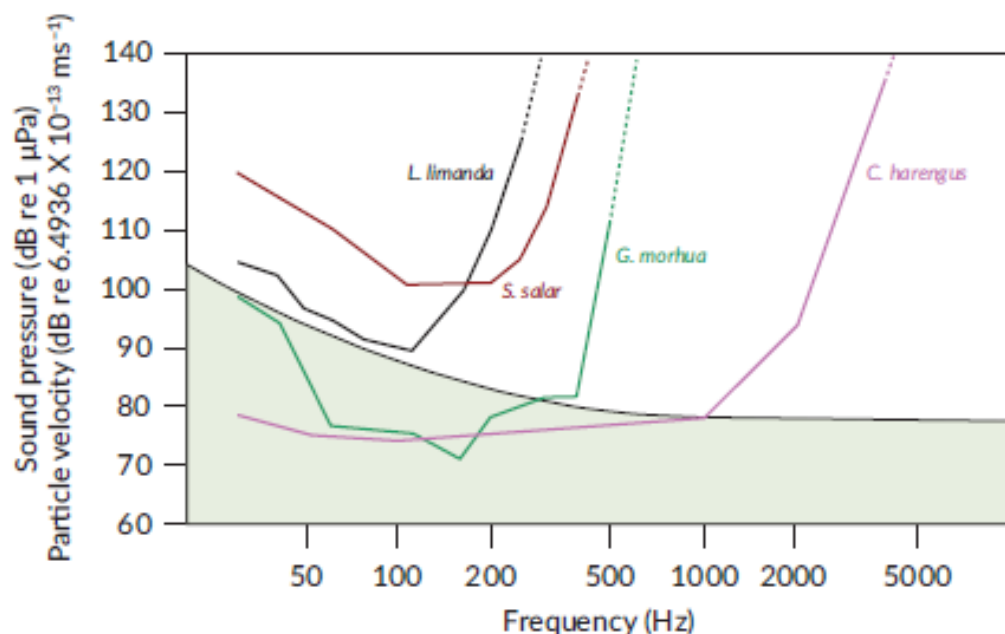


Figure 2.1 Fish hearing sensitivity (thresholds) obtained under open sea, free-field conditions in response to pure tone stimuli at different frequencies. *Salmo salar* are only sensitive to particle motion. Taken from (Popper and Hawkins 2019)

The US National Marine Fisheries Service (NMFS), and other agencies, currently use 150 dB re 1µPa (rms) as the sound pressure level that may result in onset of behavioural effects (Caltrans, 2015). Sound pressure above the 150 dB rms are expected to cause temporary changes in behaviour inclusive of startle responses, feeding disruption, area avoidance, etc (Popper and Hawkins, 2019). However, there are a number of problems with the 150 dB rms criterion in that its origin and scientific basis is not known (Hastings, 2008; Popper & Hawkins, 2019).

The sound pressure levels at which fish are at risk of death or sustaining serious injury to internal organs are considered to be SPLpeak 207 dB re 1µPa, SELss174 dB re 1µPa2s-1 and SELcum 204 dB re 1µPa2s-1 (Popper and Hawkins 2019). Thresholds for fish larvae and eggs were based on the fact that no negative effects were observed at exposures of up to SPLpeak 217 dB re 1µPa, SELss187 dB re 1µPa2s-1 and SELcum 207 dB re 1µPa2s-1 (Popper and Hawkins 2019).

Based on Table 2.1 above, it is clear all operations of equipment are at frequencies well above what fish hear. However, based on the sound pressure values in the SPL and SEL columns, it is clear that some behavioural response would be expected if fish occur close to the sound source. The risk of death or sustaining serious injury is likely within the immediate area when equipment is first switched on – but mitigation following a series of soft starts as followed for marine mammals will help allow fish react and move away from the sound source before it is on at full power. **It is therefore agreed that soft starts for all proposed operations will be implemented.**

The AMETS, which is the location of the proposed site investigations, lies in an area of open marine water located west of the Mullet Peninsula/Annagh Head. With due regard to the source-path-receptor model no potential for significant adverse impacts on fish species were identified.

In Ireland a number of fish species with a marine phase in their life cycle are associated with European sites. These include:

Salmo salar (Atlantic Salmon)
Petromyzon marinus (Sea lamprey)
Lampetra fluviatilis (River lamprey)
Alosa fallax (Twaite shad)

The nearest site to the proposed project, designated for any Annex II fish species with a marine phase in their life cycle, is Glenamoy Bog Complex SAC (Site code: 000500) for which Atlantic Salmon are a qualifying interest. This site is at least 20km (hydrologically) from the proposed project.

While there is the potential for temporary changes in the behaviour of the fish species, resulting from the influence of underwater noise, which form a qualifying interest for a number of SACs through which such mobile species may transit it is considered highly unlikely that such temporary changes in the behaviour of fish would lead to significant effects in their migration through the area. The proposed site investigations would be over a short duration of time (weeks) and not considered to be at a scale which could lead to any significant effect on fish migration.

The nearest European site designated for any fish species is Glenamoy Bog Complex SAC. The conservation objectives for this site are to restore the favourable conservation condition of Atlantic Salmon in Glenamoy Bog Complex SAC, which is defined by the attributes and targets listed in table 2.2.

Table 2.2 Attributes and targets for Glenamoy Bog Complex SAC

Atlantic Salmon (<i>Salmo salar</i>)	
Distribution: Extent of anadromy	100% of river channels watercourses down to second order accessible from estuary
Adult spawning fish	Conservation limit (CL) for each system constantly exceeded.
Salmon fry abundance	Maintain or exceed 0+ fry mean catchment wide abundance threshold value. Currently set at 17 fry/15 minute sampling.
Out-migrating smolt	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

Distribution: Extent of anadromy/Artificial barriers: No physical artificial barriers will be created. The noise related influence of the proposed project will not create a physical or artificial sound barrier.

Adult spawning fish: There are no suitable spawning habitats for salmon within the likely zone of impact of the proposed development. There are no pathways for impacts from the proposed development to such habitats in any European site. It can be concluded, therefore, that the proposed project will not give rise to any effect on the distribution, quantity or quality of spawning habitat for these species. Nor will the proposed project cause any change the number and distribution of redds. Spawning fish habitat and redds are upstream of a hydrological gradient from the proposed project location

Salmon fry abundance: No potential for impact has been identified. The proposed project is downstream of a hydrological gradient.

Out-migrating smolt: Impacts on Smolt abundance are generally considered to result from impacts such as estuarine pollution, predation and sea lice. The proposed project does not have the potential to lead to any such impacts or effect out-migrating smolt abundance.

Water quality: No impacts on water quality as a result of the proposed project have been identified or are considered likely.

3. Assessment of potential for effects on Marine mammals

3.1 Cetacean and pinniped species

The NIS prepared for the proposed project did not identify any potential for impacts on marine mammals.

The NIS considered the potential for direct and indirect impacts on Bottlenose dolphin and grey seal which are both present within the zone of influence of the proposed project. It is considered that the same potential for impacts, considered for Bottlenose dolphin and grey seal, would apply to all cetacean and pinniped species that might be migrating through, or using the waters, within the zone of influence of the proposed site investigations.

Table 7. TTS- and PTS-onset thresholds for marine mammals exposed to impulsive noise: SEL thresholds in dB re 1 $\mu\text{Pa}^2\text{s}$ under water and dB re (20 μPa)²s in air (groups PCA and OCA only); and peak SPL thresholds in dB re 1 μPa under water and dB re 20 μPa in air (groups PCA and OCA only).

Marine mammal hearing group	TTS onset: SEL (weighted)	TTS onset: Peak SPL (unweighted)	PTS onset: SEL (weighted)	PTS onset: Peak SPL (unweighted)
LF	168	213	183	219
HF	170	224	185	230
VHF	140	196	155	202
SI	175	220	190	226
PCW	170	212	185	218
OCW	188	226	203	232
PCA	123	155	138	161
OCA	146	170	161	176

For the HF and VHF cetaceans, impulsive noise TTS onset thresholds 170 and 140 dB re 1 $\mu\text{Pa}^2\text{s}$, and the median difference is 11 dB (Southall *et al.* 2019). HF cetaceans include dolphins and VHF exclusively harbour porpoise in this context. Harbour porpoise do occur at the site but they are not a qualifying interest.

Low frequency marine mammals, such as minke whales occur at the site during summer (May through to October). They are slightly more sensitive to impulsive sounds than mid-frequency species (dolphins, pinnipeds) but only by small margins (e.g., TTS SEL (weighted) 168 n dB re 1 $\mu\text{Pa}^2\text{s}$ under water compared to 170, PTS SEL (weighted) 183 compared to 185, (Southall *et al.* 2019) and thus no extra risk assessment is required for low-frequency marine mammals. Minke whales, nor other LF species, are qualifying interests.

These values are towards some of the upper limits SBP and MBES sound exposure levels at 1m. The proposed mitigation which identified the need for a Marine Mammal Observer (MMO) and adherence to Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (NPWS, 2014) would apply to all cetacean and pinniped species and otter. The area to be surveyed and duration of the surveys are minor compared to the range of qualifying interests and their highly mobile nature means they are able to move from the site temporally.

3.2 Otters

No potential for significant adverse effects on Otters (*Lutra lutra*) were identified. Otters are a qualifying interest for Mullet/Blacksod Bay Complex SAC, which is within the zone of influence of the proposed site investigations. Acquisition of geophysical data is planned within <10m of water, as far inshore as is possible.

While the intertidal area is within the commuting range of otters, hand coring of intertidal sediments would be too temporary in nature (less than 1 day) to lead to any disturbance related effects. Intertidal hand coring would cause no more disturbance than the current recreational use of the beach. Acquisition of geophysical data could lead to temporary disturbance but the provision of an MMO implementing NPWS (2014) guidelines including 30-minute pre-watch prior to initiating geophysical surveys will ensure no individuals are close to the vessel.

4. CUMULATIVE IMPACTS

At the time of submission of the Foreshore Licence Application for the proposed project the following projects were considered and assessed for in-combination impacts which are described in the NIS

1. *Development of the AMETS*

2. *ESB substation, underground cable and cable joint bay*

3. *Connection to the existing grid via the installation of a new 20kV overhead line to Belmullet.*

4. *Fishing*

In line with EU Guidance on in-combination assessment, no additional projects completed, approved but uncompleted, **or proposed**, at the time of submission of the application, were identified that could contribute to an in-combination effect together with the proposed project. We are of the opinion that the assessment made was appropriate to the scale and scope of the proposed project when assessed in terms of a source-path receptor model.

Foreshore Licence Application FS006889 was received by the Foreshore Unit on **25-11-2020** after the submission of the Foreshore application for the proposed SEAI Site Investigation project and was therefore not available for assessment at the time.

Nevertheless, we have subsequently reviewed this (FS006889) project and find no potential for cumulative impacts with the proposed SEAI Site Investigation project (FS007062).

The NIS for FS006889 assessed the potential for impacts as a result of the installation of a fibre optic cable and associated works with a landfall at Fallduff Strand Clew Bay, Co. Mayo. The NIS did not identify any potential for impacts. None of the activities associated with the installation of a fibre optic cable produce significant underwater noise. The cable laying vessel will be operational for a short period of time (less than 12 days for cable laying component of the project). The Appropriate Assessment Screening for this project noted that *“Disturbance to marine mammals utilising the area in and surrounding the proposed cable construction site is considered highly unlikely as the duration of cable laying operation is too short and temporary to lead to any significant effects to such species”*. Nonetheless, in line with the precautionary principle, mitigations measures were proposed (provision of an MMO) to rule out any risk of disturbance to marine mammals.

The SEAI Site Investigation for Floating Offshore Wind testing at AMETS Site Mayo (FS007062) project is over 30km north of the AEC2 Fibre Optic (FS006889) project. While it is possible that marine mammals, fish and birds migrate between the sites, it is considered highly unlikely that any potential for cumulative impacts could arise as no potential for significant impacts on any of the aforementioned species/species groups has been identified. Further, and with due consideration to the precautionary approach, both projects have recommended that a MMO is present and that the Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (NPWS, 2014) is followed for the duration of both projects.

Corrib Subsea Infrastructure Inspection and Maintenance Surveys – 2021 was submitted to the Department of the Environment, Climate and Communications on the **17 of November 2020** after the submission of the Foreshore application for the proposed SEAI Site Investigation project and was therefore not available for assessment at the time.

This project noted that *“Impacts resulting from the physical presence of the survey vessels will be limited in duration and localised in spatial extent in terms of the context of the foraging ranges of key receptor species of, marine mammals, fish and seabirds”*. It further noted that *“The impacts resulting from underwater noise from the vessel operations and the surveys have the potential to result in impacts that could have a wider spatial extent due to the ways in which these sources of underwater noise propagate. However, given the high frequencies and low source levels at which the survey equipment operates and the fact that the surveys will be conducted by ROV close to the seabed to limit the degree of propagation, the overall spatial extent of potential impacts will be minimised”*.

The NIS further noted that *“At the Corrib Field specifically, there are additional work programmes scheduled for 2021. Due to the location of these projects, marine mammals as qualifying features, particularly the bottlenose dolphins designated in the West Connacht SAC are likely to represent the worst case in terms of receptors to the potential cumulative impacts. The potential cumulative impacts from underwater noise on marine mammals, including bottlenose dolphins and grey and harbour seals, would be as described in Section 5.2.2 [of the NIS]. However, these species are mobile, with the ability to move in any direction and over long distances in an open marine environment, while the frequencies of the survey equipment are outside their peak hearing thresholds. Therefore, it is unlikely there will be an impact on the qualifying species of the West Connacht Coast SAC and other coastal sites that have pinnipeds as qualifying species”*.

This project relates to offshore infrastructure inspection and maintenance surveys. The proposed project site is, at its nearest point, approximately 5km north of the SEAI Site Investigation project. While it is possible that marine mammals, fish and birds migrate between the sites, it is considered highly unlikely that any potential for cumulative impacts could arise as no potential for significant impacts on any of the aforementioned species/species groups has been identified. Further, and with due consideration to the precautionary approach, both projects have recommended that a MMO is present and that the Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (NPWS, 2014) is followed for the duration of both projects.

Vermilion E&P Ireland Limited resubmitted application to conduct an offshore pipeline survey and inspection of the offshore facilities in the Corrib Field was Published on 16 April 2019.

This project related to an application to undertake a geophysical and visual survey programme of the Corrib offshore gas pipeline, sections of the umbilical, Bellanaboy Bridge Gas Terminal (BBGT) treated surface water outfall pipeline, and infield flowlines and umbilicals between the Corrib Field manifold and the landfall at Glengad, northwest Co. Mayo. In addition to a programme of repair / renewal works at the P3 wellhead including some potential rectification works and integrity testing at the Corrib Field, which will also require the use of acoustic survey equipment.

The NIS submitted as part of this application concluded that *“As a result of the assessment undertaken in support of Stage 2 of the AA process, which takes account of the best scientific knowledge and the conservation objectives of each European site, it can be determined that the proposed survey operations either individually or when taken in combination with other plans or projects, are not likely to have a significant effect on a European site”*.

While it is possible that marine mammals, fish and birds migrate between the sites, it is considered highly unlikely that any potential for cumulative impacts could arise as no potential for significant impacts on any of the aforementioned species/species groups has been identified. Further, and with due consideration to the precautionary approach, both projects have recommended that a MMO is present and that the Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (NPWS, 2014) is followed for the duration of both projects.

4.1 Conclusion

In line with EU Guidance on in-combination assessment, no additional projects completed, approved but uncompleted, or proposed, at the time of submission of the application, were identified that could contribute to an in-combination effect together with the proposed project. We have conducted a subsequent review of additional projects listed on the Foreshore Licence applications section of the DHLGH website and applications listed for public consultation under the gov.ie website.

We have not identified any additional projects that could lead to in-combination impacts. Therefore, we are of the opinion that the assessment made was appropriate and proportionate to the scale and scope of the proposed project, when assessed in terms of a source-path receptor model, and no in-combination impacts are likely.

5. References

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