

# Hartley Anderson Limited

Marine Environmental Science and Consultancy

## Appropriate Assessment

Cross Shannon 400 kV Cable Project  
Foreshore Licence Application

Report to  
Department of Housing, Local Government  
and Heritage



May 2022

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## **SECTION 1 - INTRODUCTION**

### **1.1 Background**

Arup with Hartley Anderson Limited have been commissioned by the Department of Housing, Local Government and Heritage (DHLGH) to conduct an Appropriate Assessment (AA) (stage 2) to ascertain whether an application for a Foreshore Licence (reference no. FS007083) for a proposed electricity transmission infrastructure development and associated works (known as the 'Cross Shannon Cable Project') will adversely affect the integrity of the Natura 2000 sites identified by AA Screening (stage 1) for the likelihood of significant effects. The application by EirGrid plc. (the licensed Transmission System Operator (TSO) who is applying for a licence to be granted to ESB Networks, the Transmission Asset Owner (TAO)), generally comprises the laying of 400 kV underground cables (UGC) across the Lower Shannon Estuary, between the existing Moneypoint 400 kV Electricity Substation in the townland of Carrowdotia South, Co. Clare and the existing Kilpaddoge 220/110 kV Electricity Substation in the townland of Kilpaddoge, Co. Kerry. The connection at Moneypoint will be at the existing substation on ESB lands. The connection at Kilpaddoge requires an extension of 5,500m<sup>2</sup> to the existing substation on ESB lands.

In September 2020, EirGrid applied to An Bord Pleanála (Ref. ABP-307798-20) for the same electricity transmission infrastructure to be considered as a Strategic Infrastructure Development (SID). In June 2021 An Bord Pleanála granted planning permission, subject to conditions, to EirGrid for the installation of the Shannon Electricity Cable.

### **1.2 Application documents submitted**

A number of application documents submitted by EirGrid have informed this AA, including:

- Application form [Applicant: EirGrid]
- Series of drawings
- Screening for Appropriate Assessment and Natura Impact Statement [Aquafact International Services Ltd, July 2020]
- NIS Appendices
- Planning and Environmental Considerations Report (PECR) [Mott MacDonald Ireland Ltd, 30 July 2020]
- PECR Appendices
- Planning permission – Applicant response to ABP
- An Bord Pleanála Order [4 June 2021]
- ABP Inspector's Report [19 March 2020]. A later ABP Inspector's Report [11 January 2021] was downloaded from the ABP website.
  
- Prescribed Bodies Consultation (7 May – 7 June 2021)
  - Prescribed Bodies Observations
  - Applicant's response to Public Bodies Observations.
  
- Prescribed Bodies Consultation (31 March – 29 April 2022)
  - Prescribed Bodies Observations
  - Applicant's response to Public Bodies Observations.

### **1.3 Relevant consultation responses**

On 11 March 2022, the Department determined that an Appropriate Assessment of the proposed project was required. The following documents were published on the Department's website:

- Article 12 Risk Assessment - Cross Shannon Cable Project Foreshore Licence Application [Hartley Anderson 2022]
- Environmental Report with Statutory Declarations (prepared by Department Marine Advisor) [dated 8 March 2022]
- Screening for Appropriate Assessment Determination [dated 10 March]
- Screening for Appropriate Assessment - Cross Shannon Cable Project Foreshore Licence Application [Hartley Anderson 2022]
- AA Screening Submission to Minister [dated 11 March 2022]

A notice of the fact that the Minister had made an Appropriate Assessment Screening Determination was published on 30 March 2022. The notice stated that any person could make a submission or observation concerning the project from 31 March to 29 April.

The following tables provide a summary of consultation submissions received following the most recent consultation (31 March – 29 April 2022) from the Prescribed Bodies and Applicant's responses (Table 1.1). Also provided are summaries of observations made by Prescribed Bodies and Applicant's responses with respect to the initial consultation (7 May – 7 June 2021, Table 1.2). No public submissions were received during either consultation periods.

Table 1.1: Summary of Observations made by Prescribed Bodies to consultation (31 March to 29 April) and Eirgrid's Response

Statutory Body	Applicant's Response
<p><b>Department of Housing, Local Government and Heritage – Marine Advisor (Technical / Engineer)</b> No further observations.</p>	<p>The Applicant acknowledged that no further observations have been made by the Prescribed Bodies.</p>
<p><b>Environmental Protection Agency (EPA)</b> The Agency has no further observations on the Appropriate Assessment at this time.</p>	
<p><b>Marine Institute (MI)</b> The MI had read over the additional documentation provided and it did not change the view of the Marine Institute first communicated in March 2021 (and subsequent communications).</p>	
<p><b>Department of Housing, Local Government and Heritage – Marine Advisor (Environment)</b> The proposed works will be undertaken within two European sites Lower River Shannon SAC (IE002165) and the River Shannon and River Fergus Estuaries SPA.</p> <p>This Special Area of Conservation includes Shannon and Fergus Estuaries and form the largest estuarine complex in Ireland. It has vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation which are Annex I habitats for which it is designated. Smaller estuaries also feature mudflats which have their own unique characteristics. The SAC is also designated for the priority habitat Coastal Lagoons of which there are a number of examples within the site. It is also designated for Bottlenose Dolphin and this is the only known resident population of this species in Ireland.</p> <p>The River Shannon and River Fergus Estuaries SPA (IE004077) is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species, i.e. Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance and also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which</p>	<p>The Applicant noted that the Department of Housing, Local Government and Heritage Marine Advisor (Environment) had no objection to this application, subject to the completion of the current environmental assessment, which will be informed by the current consultation with prescribed bodies.</p> <p>The Applicant acknowledged that “site specific conditions” will be agreed as part of the licencing process.</p>

Statutory Body	Applicant's Response
<p>occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit.</p> <p>As you will note from my Screening Stage Report Environmental Report of the 8th of March 2022 I agreed with and accepted the outcome of the IEC's review of the environmental reports associated with this application.</p> <p>I have no objection to this application subject to a complete environmental assessment. I will provide site specific conditions once the environmental assessment process is complete.</p>	
<p><b>Geological Survey Ireland (GSI)</b> The GSI had no specific comment or observations to make on this matter at this time since our last response.</p>	<p>The Applicant acknowledged that no further observations have been made by the Prescribed Bodies.</p>
<p><b>Commissioners of Irish Lights (CIL)</b> The CIL had no further observations with respect to the project from a safety of navigation perspective.</p>	
<p><b>Met Eireann (ME)</b> No further observations.</p>	
<p><b>Inland Fisheries Ireland (IFI)</b> The IFI had no further comment to make on the application other than to second the comments from the Marine Institute that further research into the topic of electromagnetic fields on fish species behaviour particularly the Annex fish species of sea lamprey and river lamprey is needed.</p>	<p>The Applicant noted that IFI had no further comment to make on this application other than to second the comments from the MI regarding the need for consideration of the effects of Electromagnetic Fields (EMFs) on fish species behaviour, in particular the noted Annex fish species.</p> <p>The Applicant has previously responded to these comments from the MI as part of the previous prescribed bodies consultation (see Table 1.2 below). The Applicant noted that the MI have no further comments for the current consultation (see above).</p>
<p><b>Marine Survey Office (MSO)</b> The application was assigned and processed on the MSO Task Management System (TMS). No further observations.</p>	<p>The Applicant acknowledged that no further observations have been made by the MSO.</p>
<p><b>Department of Agriculture, Food and the Marine (DAFM)</b></p>	<p>The Applicant pointed to responses made to observations by BIM and SFPA, respectively, below.</p>

Statutory Body	Applicant's Response
<p>Please note the attached concerns from both BIM and the SFPA in particular regarding the fishery order that will need to be taken into consideration in granting a license.</p>	
<p><b>Bord Iascaigh Mhara (BIM)</b> Advice was taken from the BIM Aquaculture Development Officer for the area. Their view is that the proposed development would appear to cut through the eastern end of the oyster fishery order T08/004BOFO, which is owned by Atlantic Shellfish Ltd. Is it safe to assume that the Applicant's Project Liaison Officer will be contacting local stakeholders in this regard, if not, then this possible impact will need to be brought to the Applicant's attention as a matter of urgency.</p>	<p>The Applicant drew attention to Table 5.1 of the Planning and Environmental Considerations Report that supports the application. As noted therein, the Applicant has engaged with Atlantic Shellfish Ltd since 2017 in respect of the proposals. It is noted that Atlantic Shellfish Ltd. has previously advised the Applicant that in their opinion the proposals will not cause any significant harm to their oyster beds in the area, and they confirmed that they had no objection to the making of this application; nor indeed have they subsequently made any submission to the Department in respect of the Foreshore Licence application. The applicant will continue to engage with relevant stakeholders during construction and operation.</p>
<p><b>Sea Fisheries Protection Authority (SFPA)</b> No issues with the attached application. However, it runs through an old fishery order site which covers a large proportion of the Shannon estuary. The order refers to bottom culture and dredging of mussels. This site has not been in operation over the last 20 years but, despite this, it remains in legal existence. Given the recent proceedings in the high court in relation to fishing activities and marine cables on the southern coast (GTT Communications v' O'Flaherty Bros), it may be wise to await judgement in the case before proceeding. On the longer term, the continued existence of this order should be reviewed, and if deemed necessary, consideration should be taken to revoke this order as it impacts other operations and the decision making processes in the Shannon estuary i.e. its existence limits expansion of other aquaculture activities in an SAC as, on paper, a large percentage of the estuary is already dedicated aquaculture.</p>	<p>The Applicant acknowledged that the SFPA have no issues with this specific application.</p> <p>It is the Applicant's understanding that the fishery order referred to is order T08/004BOFO, which is owned by Atlantic Shellfish Ltd. As noted above, the Applicant has engaged with Atlantic Shellfish Ltd since 2017 in respect of the proposals. It is noted that Atlantic Shellfish Ltd. has previously advised the Applicant that in their opinion the proposals will not cause any significant harm to their oyster beds in the area. Given that, Atlantic Shellfish Ltd has confirmed that they had no objection to the making of this application, and given that they have not subsequently made any submission to the Department in respect of the Foreshore Licence application, and given the required urgent delivery timelines of the current project to assist in meeting National Climate Action Plan targets and National policies for security of energy supply, vis-à-vis the likely significantly longer timelines for the conclusion of high court proceedings, the Applicant considers that any delay to granting this Foreshore Licence solely in order to wait for the conclusion of those Legal proceedings to be both untenable and unnecessary.</p>

Statutory Body	Applicant's Response
	The matter of whether the order stays in existence is irrelevant to the current application and the Applicant does not take any position in this matter.
<b>Health and Safety Authority (HSA)</b> The Central Competent Authority under the Control of Major Accident Hazards Regulations 2015 had no observations to make regarding this development.	The Applicant noted that the HSA had no observations to make regarding the proposed development.
<b>National Parks and Wildlife Service (NPWS) and Underwater Archaeology Unit (UAU)</b> NPWS and UAU had no further comment to make on this application.	The Applicant acknowledged that no further observations have been made by NPWS or UAU.



Table 1.2: Responses from prescribed bodies to the initial consultation (7 May – 7 June 2021)

Statutory Body	Applicant's Response
<p><b>Marine Survey Office</b> The Marine Survey Office had no objection to the application from a navigational safety perspective. However, it made the following points:</p> <ul style="list-style-type: none"> <li>• The applicant shall engage with Shannon Foynes Port company throughout the construction phase of the subsea cables to ensure the safety of navigation is maintained for all mariners within the sea area covered by the application.</li> <li>• An appropriate Marine Notice detailing the works and vessels engaged in said works shall be published for the information of all marine users in the Shannon Estuary.</li> <li>• The applicant shall ensure the information regarding the final location, depth and shore markings of submarine cables is submitted to the UKHO for inclusion on relevant navigation charts.</li> </ul>	<p>The Applicant acknowledged the observations made by the Marine Survey Office and accepted the recommendations made by the Marine Survey Office.</p>
<p><b>Department of Defence (DOD)</b> Following consultations with the Naval Service, the Department of Defence had the following observations:</p> <ul style="list-style-type: none"> <li>• A Temporary Notice to Mariners (NTM) should be issued during the cable laying operation to inform vessels transiting through the area that the operation is taking place.</li> <li>• In addition, a NTM will should be issued once the work is complete clearly indicating the cables location on the river bed to indicate that vessels should not anchor in the location of the cable.</li> </ul>	<p>The Applicant acknowledged the observations made by the Department of Defence and accepted the recommendations made above by the Department of Defence.</p>
<p><b>Geological Survey Ireland (GSI) Observation 1</b> The Geological Survey Ireland (a division of the Department of the Environment, Climate and Communications) made the following comments.</p> <p><u>Geoheritage</u> Geological Survey Ireland is in partnership with the National Parks and Wildlife Service (NPWS, Department of Housing, Local Government and Heritage), to identify and select important geological and geomorphological sites throughout the country for designation as geological NHAs (Natural Heritage Areas). This is addressed by the Geoheritage Programme of Geological Survey Ireland, under</p>	<p>The Applicant acknowledged the observations made by Geological Survey Ireland and will make available reports on any site investigations.</p>

Statutory Body	Applicant's Response
<p>16 different geological themes, in which the minimum number of scientifically significant sites that best represent the theme are rigorously selected by a panel of theme experts.</p> <p>County Geological Sites (CGSs), as adopted under the National Heritage Plan, include additional sites that may also be of national importance, but which were not selected as the very best examples for NHA designation. All geological heritage sites identified by Geological Survey Ireland are categorised as CGS pending any further NHA designation by NPWS. CGSs are now routinely included in County Development Plans and in the GIS of planning departments, to ensure the recognition and appropriate protection of geological heritage within the planning system. CGSs can be viewed online under the Geological Heritage tab on the online Map Viewer.</p> <p>The CGSs for Kerry remain unaudited and as such there is limited detailed information on each site available publicly. The sites are listed in a master list of unaudited sites and are presented on Geological Survey Ireland's Map Viewer as sites with buffer zones but no specific site boundary. The audit for Co. Clare was completed in 2005. The full report details can be found here. Our records show that there are no CGSs in the vicinity of the Cross Shannon Electricity Cable.</p> <p><u>Groundwater</u></p> <p>Groundwater is important as a source of drinking water, and it supports river flows, lake levels and ecosystems. It contains natural substances dissolved from the soils and rocks that it flows through, and can also be contaminated by human actions on the land surface. As a clean, but vulnerable, resource, groundwater needs to be understood, managed and protected. Geological Survey Ireland's Groundwater and Geothermal Unit, provides advice, data and maps relating to groundwater distribution, quality and use, which is especially relevant for safe and secure drinking water supplies and healthy ecosystems.</p> <p>Proposed developments need to consider any potential impact on specific groundwater abstractions and on groundwater resources in general. We recommend using the groundwater maps on our Map viewer. which should</p>	

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<p>include: wells; drinking water source protection areas; the national map suite - aquifer, groundwater vulnerability, groundwater recharge and subsoil permeability maps. For areas underlain by limestone, please refer to the karst specific data layers (karst features, tracer test database; turlough water levels (gwlevel.ie). Background information is also provided in the Groundwater Body Descriptions. Please read all disclaimers carefully when using Geological Survey Ireland data.</p> <p>Groundwater flooding maps (historic &amp; predictive) are available through our web viewers. The historic flood maps provide information of historic flooding, both surface water and groundwater. The predictive groundwater flood map provides information on the probability of future karst groundwater flooding (where available). For information on the development and limitations of these flood maps, please check the user guidance notes on our website.</p> <p><u>Geological Mapping</u> Geological Survey Ireland maintains online datasets of bedrock and subsoils geological mapping that is reliable and accessible including depth to bedrock and physiographic maps. These datasets include bedrock data and subsoil classifications. We would encourage you to use these data which can be found here, in your future assessments.</p> <p>Geological Survey Ireland is continually developing new 3D models and improving upon existing models, as new geological data and software tools emerge. Our 3D models are accessible on our model viewer, where they can be interrogated, faults and stratigraphic units examined, virtual cross-sections and boreholes created.</p> <p>Depending on their intended application and audience, models are developed at different scales and to different depths below the ground surface. Our 3D models offer a key element of geotechnical risk management by identifying areas requiring more site investigation.</p> <p><u>Geohazards</u> Geohazards can cause widespread damage to landscapes, wildlife, human property and human life. In Ireland, landslides, flooding and coastal erosion are</p>	

Statutory Body	Applicant's Response
<p>the most prevalent of these hazards. We recommend that geohazards be taken into consideration, especially when developing areas where these risks are prevalent, and we encourage the use of our data when doing so.</p> <p>Geological Survey Ireland also engaged in a national project on Groundwater Flooding. The data from this project may be useful in relation to Flood Risk Assessment (FRA) and management plans, and is described in more detail under 'Groundwater' above.</p> <p>Coastal Vulnerability while seen as a potential geohazard, is discussed in more detail under our marine and coastal unit information below</p> <p><u>Natural Resources (Minerals/Aggregates)</u> Geological Survey Ireland provides data, maps, interpretations and advice on matters related to minerals, their use and their development in our Minerals section of the website. The Active Quarries, Mineral Localities and the Aggregate Potential maps are available on our Map Viewer. We would recommend use of the Aggregate Potential Mapping viewer to identify areas of High to Very High source aggregate potential within the area.</p> <p>In keeping with a sustainable approach we would recommend use of our data and mapping viewers to identify and ensure that natural resources used in the proposed development are sustainably sourced from properly recognised and licensed facilities, and that consideration of future resource sterilization is considered.</p> <p><u>Geotechnical Database Resources</u> Geological Survey Ireland continues to populate and develop our national geotechnical database and viewer with site investigation data submitted voluntarily by industry. The current database holding is over 7500 reports with 134,000 boreholes; 31,000 of which are digitised which can be accessed through downloads from our Geotechnical Map Viewer. We would encourage the use of this database as part of any baseline geological assessment of the proposed development as it can provide invaluable baseline data for the region or vicinity of proposed development areas. This information may be beneficial</p>	

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<p>and cost saving for any site-specific investigations that may be designed as part of the project.</p> <p><u>Marine and Coastal Unit</u> Our marine environment is hugely important to our bio-economy, transport, tourism and recreational sectors. It is also an important indicator of the health of our planet. Geological Survey Ireland's Marine and Coastal Unit in partnership with the Marine Institute, jointly manages INFOMAR, Ireland's national marine mapping programme; providing key baseline data for Ireland's marine sector. The programme delivers a wide range of benefits to multi-sectoral end-users across the national blue economy with an emphasis on enabling our stakeholders. Demonstrated applications for the use of INFOMAR's suite of mapping products include Shipping &amp; Navigation, Fisheries Management, Aquaculture, Off-shore Renewable Energies, Marine Leisure &amp; Tourism and Coastal Behaviour.</p> <p>INFOMAR also produces a wide variety of seabed mapping products that enable public and stakeholders to visualize Ireland's seafloor environment <a href="https://www.infomar.ie/maps/downloadable-maps/maps">https://www.infomar.ie/maps/downloadable-maps/maps</a>. Story maps have also been developed providing a different perspective of some of the bays and harbors of the Irish coastline <a href="https://www.infomar.ie/maps/story-maps/exploring-dingle-bay-different-perspective">https://www.infomar.ie/maps/story-maps/exploring-dingle-bay-different-perspective</a>. We would therefore recommend use of our Marine and Coastal Unit datasets available on our website and Map Viewer.</p> <p>The Marine and Coastal Unit also participate in coastal change projects such as CHERISH (Climate, Heritage and Environments of Reefs, Islands, and Headlands) and are undertaking mapping in areas such as coastal vulnerability and coastal erosion. Further information on these projects can be found at <a href="#">here</a>.</p> <p><u>Other Comments</u> Should development go ahead, all other factors considered, Geological Survey Ireland would much appreciate a copy of reports detailing any site investigations carried out. Should any significant bedrock cuttings be created, we would ask that they will be designed to remain visible as rock exposure rather than covered with soil and vegetated, in accordance with safety guidelines and engineering constraints. In areas where natural exposures are few, or deeply weathered, this</p>	

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<p>measure would permit on-going improvement of geological knowledge of the subsurface and could be included as additional sites of the geoheritage dataset, if appropriate. Alternatively, we ask that a digital photographic record of significant new excavations could be provided. Potential visits from Geological Survey Ireland to personally document exposures could also be arranged. The data would be added to Geological Survey Ireland's national database of site investigation boreholes, implemented to provide a better service to the civil engineering sector.</p>	
<p><b>Geological Survey of Ireland (GSI) Observation 2</b> Having reviewed ABP's further information request and the subsequent information submitted by the applicant, Geological Survey Ireland had no further response or submission to make in light of this information and its original comments and observations remain unchanged.</p>	<p>The Applicant acknowledged the observations made by Geological Survey Ireland and will make available reports on any site investigations.</p>
<p><b>Geological Survey of Ireland (GSI) Observation 3</b> The Geological Survey of Ireland had no further comments or observations to make on the matter.</p>	<p>The Applicant had no further comment to make in response to same.</p>
<p><b>Marine Institute Observation 1</b> A foreshore application has been submitted for the Cross Shannon Subsea Cable project development by EirGrid Plc. The development comprises the installation of a 400kV circa 5km AC (alternating current) underground cable between the existing Moneypoint 400kV GIS substation in County Clare and the existing Kilpaddoge 220kV substation.</p> <p>Laying of 400 kV Submarine Cables across the Lower Shannon Estuary, including:</p> <ul style="list-style-type: none"> <li>The laying of 4 no. 400 kV submarine cables (approx. 2.8 km each) from the proposed land-submarine transition bays located east of the existing Moneypoint Generation Station in Co. Clare across the Lower Shannon Estuary to the proposed 400 kV Air Insulated Switchgear (AIS) Compound at the existing Kilpaddoge 220/110 kV Electricity Substation in Co. Kerry. The submarine cables will be installed by standard submarine installation techniques, which primarily involves them being buried in the seabed.</li> </ul>	<p>The Applicant noted that the issue of EMF was responded to in the further information submitted to An Bord Pleanála (Planning Permission - Applicant Response to ABP, December 2020). The following further information was provided.</p> <p>Electric and magnetic fields, often referred to as EMFs, are produced both naturally and as a result of human activity. EirGrid designs, develops and operates the transmission grid in accordance with stringent safety recommendations which are made by national and international agencies. The proposed cable will include a sheath covering that will act to reduce the emission of electric fields to negligible levels. The following sections therefore relate to static magnetic fields produced by the transmission of electricity.</p> <p>The environmental assessment of the potential effect of EMF fields on behaviours of marine species was informed by a review of available literature.</p>

Statutory Body	Applicant's Response
<ul style="list-style-type: none"> <li>• The installation of communication links between both substations, this will take the form of a fibre optic cable that will be integrated into each of the proposed 400 kV cables.</li> <li>• The installation of fibre optic cables for maintenance and cable monitoring, this will take the form of an armoured fibre cable wrapped helically around each of the proposed 400 kV cables.</li> <li>• Associated works in the foreshore include the reinforcement of the ground beneath and around the cables by various methods including concrete ramps, concrete cable channels, infilling with gravel/concrete, articulated pipes, gabion wall and rock protections where required.</li> </ul> <p>A Planning and Environmental Considerations Report and Natura Impact Statement (NIS) were prepared and submitted with the application. These documents consider both the onshore and foreshore aspects of the overall project.</p> <p>The NIS identifies the likely interactions between the proposed project and the conservation features of all Natura 2000 sites in the vicinity. With certain mitigation measures, the interactions identified during construction conclude that the construction phase of the development is unlikely to impact on the integrity of the conservation sites.</p> <p>What does not appear to have been considered in the NIS is the operational aspects of the development and if this may have an impact on certain conservation features. In particular, no consideration is given to the likely impact of the operation of 400 kV DC transmission line and if this will be any different to the current configuration that uses 220 kV. In particular, the impact that magnetic fields may have on designated fish species (Salmon, lamprey) and marine mammals (Bottlenose dolphin) should have been considered.</p> <p>The closest licenced aquaculture site (T06/233) to the proposed development is approximately 4km. On the basis of the information provided in the planning report, the development is unlikely to impact on any licenced aquaculture activities. There are no known fisheries in the area. It should be noted the closest aquaculture site indicated in the Planning and Environmental Considerations Report is identified as T08/004BO and while this is correctly</p>	<p>Reviews of studies on the effects of EMF emissions in migratory fish species have reported a lack of data on Atlantic salmon (<i>Salmo salar</i>) and sea trout (<i>Salmo trutta</i>) (e.g. Waterside Ecology 2017, Gill and Bartlett 2010). To overcome this lack of data, Gill and Bartlett (2010) appraised the likely responses of Atlantic salmon and sea trout to EMF based on documented responses of other salmonid species, (e.g. Lohmann <i>et al.</i> 2008; Putman <i>et al.</i> 2014). Studies undertaken by Lohmann <i>et al.</i> (2008) and Putman <i>et al.</i> (2014) on salmonid species including sockeye salmon (<i>Oncorhynchus nerka</i>), chinook salmon (<i>Oncorhynchus tshawytscha</i>), chum salmon (<i>Oncorhynchus keta</i>) suggested that earth's magnetic field combined with other directional information, such as stellar cues, are used to identify particular coastal or oceanic regions. If salmonids do use magnetic cues for orientation or navigation it is likely that these cues are used at a large spatial scale and during the oceanic phase of outward and homeward migrations (Lohmann <i>et al.</i>, 2008; Putman <i>et al.</i>, 2014).</p> <p>Once an appropriate coastal region is identified, migration to home (natal) rivers is likely dependent on olfactory cues, with chemical cues extending from natal rivers strongly implicated in the final phases of salmonids migrations (Stabell, 1984; Johnstone <i>et al.</i> 2012).</p> <p>Thorstad <i>et al.</i> (2011) suggested that once salmon have reached sheltered fjords and sea lochs olfactory cues are the most important sense for homing. Given that the last phase of the spawning migration in salmonids is primarily governed by olfactory cues (Thorstad <i>et al.</i> 2011) it can be concluded that salmonid species migration will not be significantly affected by EMF produced by the Cross Shannon cable.</p> <p>As for salmonid species, cross ocean migration in European eel (<i>Anguilla anguilla</i>) is likely to be influenced by the species ability to detect the earth's magnetic field (Durif <i>et al.</i> 2013; Naissbett-Jones <i>et al.</i> 2017), when located closer to the coast olfaction play a large part in locating river and streams (Waterside Ecology 2017).</p>

Statutory Body	Applicant's Response
<p>identified as a fishery order area, it should be noted that this is not a licenced aquaculture site and is not governed by DAFM aquaculture licencing legislation (Fisheries Act 1997).</p>	<p>A number of studies have reported no evidence that EMF presents obstructions to eel migrations. Westerberg and Lagenfelt (2008) assessed migration behaviour of the European eel passing an underwater high voltage cable extending between the Swedish mainland and the island Öland. The study reported that while eel reduced its swimming speed when crossing the cable there was no evidence that the cable was acting as an obstruction to migration. Similarly, a two year field study of migrating Silver eels passing the Baltic Cable showed the species crossed the cable with the same probability as if it were absent (Westerberg 2000). While a number of individuals changed their course slightly when passing the cable it was concluded that the cable did not pose a threat to migration. Given the above, it can be concluded that European eel migration will not be significantly affected by the proposed development.</p> <p>The review by Gill and Bartlett (2010) reported that there was no evidence that sea lampreys possess an ability to detect magnetic fields. Furthermore, the review reported no evidence that EMF plays any role in species migration during their homeward migrations to coasts and estuaries. Once at the coast lamprey appear to locate streams using a three-phase strategy (Vrieze <i>et al.</i> 2011). The first phase is the initial vertical and horizontal exploration of shorelines. This brings the species close to the mouth of rivers. Once at a river mouth the species turn to face into oncoming currents (rheotaxis). The last phase involves using olfactory cues, whereby adult sea lampreys 'sniff out' rivers populated with juvenile lampreys (Bjerselius <i>et al.</i> 2000; Polkinghorne <i>et al.</i> 2001; Waterside Ecology 2017). Given the above, sea lamprey migration will not be significantly affected by the proposed development.</p> <p>In studies investigating the effect of EMF on the decapod crab <i>Cancer pagurus</i>, Scott <i>et al.</i> (2019) investigated reported crabs showed a clear attraction to EMF and significantly reduced their time spent roaming. Experiments have reported varied responses in elasmobranchs to EMF. For example, Gill <i>et al.</i> (2009) reported the lesser spotted dogfish (<i>Scyliorhinus canicula</i>) were more likely to be found close to the energized cable. The study also showed some thornback ray (<i>Raja</i></p>



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	<p><i>clavata</i>) individuals moved more in the vicinity of the EMF. Hutchison <i>et al.</i> (2018 and 2020) investigated the effect of EMF associated with high voltage cables on the decapod American lobster (<i>Homarus americanus</i>) and the elasmobranch Little skate (<i>Leucoraja erinacea</i>). The studies showed that when exposed to EMF American lobster exhibited a subtle change in exploratory behavioural activity while little skate exhibited a strong exploratory/ foraging behavioural activity. While the behavioural changes are likely to have biological relevance in terms of how the animals will move around and be distributed within a cable EMF zone, it is considered that EMFs did not constitute a barrier to movements across the cable for either lobsters or skates. Consequently, it can be concluded that EMF produced by the proposed development is unlikely to significantly affect decapod (e.g. crab, lobster) or elasmobranch species (e.g. dogfish, skate, ray).</p> <p>No data were found that marine mammals are negatively impacted by EMF.</p> <p>With regard to the nearest aquaculture site, the information provided by the Marine Institute is noted.</p>
<p><b>Marine Institute (MI) Observation 2 in light of Applicant's response of 08 June 2021</b> Having reviewed the response from the applicant, the Marine Institute had a number of observations:</p> <ol style="list-style-type: none"> <li>1. The NIS is supposed to be a stand-alone document and should not have to rely on information derived from a communication during a separate licencing process.</li> <li>2. Furthermore, it is important to note that in relation to the submission as it related to aquatic species, that the lack of evidence of impact is not evidence of no impact. While the Marine Institute accepts that, for some species, magnetic fields as navigational aids may be replaced by olfactory cues in riverine situations, this does not mean that the sensitivity to magnetic fields is disabled.</li> <li>3. The Marine Institute suggests that the operators, if licenced, engage in research to address the issues raised in the attached (see Appendix 1)</li> </ol>	<p>The Applicant noted that, in line with its strategic commitment to update the EirGrid Evidence-Based Studies, to reflect marine receptors in 2023, EirGrid commits to engage with all relevant stakeholders, including the Marine Institute, in the coming years.</p> <p>The updates will include reviewing the evidence base for, and potential options to conduct primary research in, EMF.</p> <p>It is noted that, in their submission of 21 July 2021, the Marine Institute has stated that it is broadly satisfied with the response and have no further observations in relation to the Foreshore licencing process.</p> <p>EirGrid has no further response to make in this regard.</p>

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<p>reprint which have direct relevance to the issues highlighted. The recommendations therein will help identify (and model) specific interactions and behavioural modification (if any) between aquatic species and EMF.</p> <p>Notwithstanding and specifically in relation to the Foreshore licencing process, the Marine Institute was broadly satisfied with the response and had no further observation</p>	
<p><b>Marine Institute (MI) Observation 3 in light of Applicant's response of 23 August 2021</b></p> <p>The Marine Institute welcomed the commitment for future research with regard to EMF and will engage where relevant.</p> <p>The Marine Institute had no more observations on this application</p>	<p>There were no further comments.</p>
<p><b>Environmental Protection Agency (EPA)</b></p> <p>In accordance with the requirement as set out the Foreshore Regulations 2011 (S.I. No. 353 of 2011), the Agency advised as follows:</p> <ol style="list-style-type: none"> <li>1. The Agency notes from the Planning and Environmental Considerations Report (30th July 2020) submitted with the Foreshore application (page 6) that - "There are no planned dredging and/or 'Dumping at Sea' activities associated with the project. A Dumping at Sea permit is not required." Furthermore, the Natura Impact Statement (July 2020) notes on page 93 that "for the construction phase of the proposed project there will be no marine dredging or 'Dumping at Sea'" and has ruled out the potential for significant effects from the proposed project in combination with ongoing maintenance dredging activities in the Shannon estuary.</li> <li>2. Shannon Foynes Port Company was granted a Dumping at Sea Permit, Reg. No. S0009-03, on 21st December 2020 for dumping at sea activities associated with maintenance dredging in the Shannon Estuary over the period 2020 - 2026. This permit authorises the loading of dredged material at Ted Russell Dock and approaches, Limerick and at Foynes Harbour and the dumping of the dredged material at three established dumping sites in the upper and lower Shannon Estuary.</li> </ol>	<p>The Applicant acknowledged the observations made by the Environmental Protection Agency and will ensure that the proposed development will not result in a contravention of the Water Framework Directive 2000/60/EC, Habitats Directive 92/43/EEC, Bathing Water Directive 73/160/EEC or Environmental Liabilities Directive 2004/35/EC.</p>

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<p>3. L&amp;M Keating Maritime Limited was granted a Dumping at Sea Permit, Reg. No S0020-02, on 5th December 2017. This permit authorises plough dredging at Kilrush marina approach channel until 30th September 2024 to maintain sufficient draft for vessels using the marina.</p> <p>4. Aughinish Alumina Limited was granted a Dumping at Sea Permit, Reg. No S0026-01, on 28th July 2016, which authorises plough dredging activities adjacent to the jetty at Aughinish until 31st August 2024 to maintain navigational depths and berthing access for ships.</p> <p>5. All three permits and all associated application and enforcement documentation, including Annual Environmental Reports, are available to view on the Agency's website at the following web link: <a href="http://www.epa.ie/terminalfour/DaS/index.jsp">http://www.epa.ie/terminalfour/DaS/index.jsp</a></p> <p>The Agency would further advise:</p> <p>That the proposed activity shall not result in a contravention of the Water Framework Directive 2000/60/EC, Habitats Directive 92/43/EEC, Bathing Water Directive 73/160/EEC or Environmental Liabilities Directive 2004/35/EC</p>	
<p><b>Commissioners of Irish Lights (CIL)</b> Irish Lights reviewed the application for the above development and had the following observations:</p> <p>In relation to mitigation aspects with respect to marine traffic, it is stated in the Planning and Environmental Considerations Report (PECR) Section 15 Summary of Mitigation Measures' (Material Aspects, Including Traffic, P255) that "Navigational impacts will be minimised through consultation with the Shannon Foynes Port Company (SFPC) and other stakeholders as part of the Foreshore Licence process. These will be stipulated in the granted Foreshore Licence process". No specific mention is made of any possible installation of aids to navigation, or consideration if this may be required. Irish Lights recommends that SFPC as the Local Lighthouse Authority be consulted specifically on any requirements for installation of aids to navigation which will require Statutory Sanction from Irish Lights.</p>	<p>The Applicant acknowledges the observations made by the Commissioner for Irish Lights. The Applicant has and will continue to engage with Shannon Foynes Port Company to agree mitigation with regard to traffic movements in advance of construction. The Applicant noted the chartered anchorage area for smaller vessels at Glencloosagh Bay and will ensure that effects on the use of the anchorage area are minimised during construction.</p>

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<p>In relation to marine traffic movements in the estuary, the application and PECR note (section 14.2.2.1) approximately 1800 vessel movements annually, the majority of which are bulk carriers, cargo ships or chemical/oil tankers. The report notes that SFPC confirmed that there is "no defined navigational channel" and that the largest vessels tend to use the centre and northern parts of the estuary. Given the relatively narrow operational channel area for deep-draught vessels in this section of approximately 0.5NM/900m (due to the shallows to the west of Tarbert) and the requirement for vessels to maintain a safe distance of 500m from installation vessels, it will be important to manage and account for traffic movements during construction, particularly deep-draught vessels, so that safety of navigation is maintained. Irish Lights recommends that mitigation measures to account for traffic movements be agreed with SFPC in advance.</p> <p>The PECR notes that the Shannon Estuary is "predominantly a commercial estuary, with little recreational boats accessing the estuary". Nevertheless the applicant should be cognisant of the charted anchorage areas for smaller vessels at Glencloosagh Bay close to the existing 220kV cables immediately to the west of the southern landfall and how availability of this anchorage location for smaller vessels might be impacted by the works, particularly during the construction phase."</p>	
<p><b>Commission for the Regulation of Utilities (CRU)</b> The CRU stated that it was aware of the project and the project is present in the latest version of EirGrid's transmission development plan (project no. CP0970). However, regarding EirGrid's foreshore application itself, the CRU did not have any comments.</p>	<p>The Applicant acknowledged the response from the Commission for the Regulation of Utilities.</p>
<p><b>Inland Fisheries Ireland (IFI) Observation 1</b> <u>Overview:</u> The proposed works involves the laying of 400kV underground cables across the Lower Shannon Estuary between the existing Moneypoint 400kV Electricity Substation in the townland of Carrowdotia South Co. Clare and the existing Kilpaddoge 220/110 kV Electricity Substation in the townland of Kilpaddoge, Co. Kerry.</p> <p><u>IFI comment:</u> IFI noted the correspondence received to date in regard to this work. This application has a detailed mitigation measures for pollution and for the</p>	<p>The Applicant noted:</p> <p><u>Eels</u> As eel is not a Qualifying Interest species for the Shannon SAC, it is not an issue that can be considered for the NIS. However, a number of studies have reported no evidence that EMF presents obstructions to eel migrations. Westerberg and Lagenfelt (2008) assessed migration behaviour of the European eel passing an underwater high voltage cable extending between the Swedish mainland and the island Öland. The study reported that while eel reduced its swimming speed when crossing the cable there was no evidence that the cable was acting as</p>

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<p>construction works. Section 3.6.2 of NIS details mitigation measures in terms of pollutants, sediment and biosecurity. If all mitigations measures are put in place this should reduce the risk of any incident affecting the estuarine environment.</p> <p>In terms of noise, while the NIS details no significant adverse effects of the noise to the diadromous species (salmon or lamprey) as species will move out of the vicinity. These species are migratory and will potentially need to pass through the site on the migrations either upstream or downstream. The NIS document does not mention the European Eel which is protected under Eel Regulation 1100/2007 and should be taken into account, glass eels will be arriving in December-February, but a cohort of the population will remain in the estuary for the duration of the continental phase of lifecycle, while silver eels will be migrating out to sea from August to January.</p> <p>While the reference to the Habitats Annex II species is noted there are other fish species inhabiting the vicinity of the works sites and IFI would point out that the mitigation measures and guidance of NPWS in regard to marine mammals are not transferrable to fish species. The fish remain invisible to any shore or boat-based observer. Mitigation measures should aim to reduce the sound generated, in intensity and duration. The use of soft-start and ramp-up procedures for any sound generating surveys undertaken – both on a day-to-day basis and on re-start after any stoppages within any day should be undertaken. This measure should be a condition of the foreshore licence. The comments of IFI in this regard relate to fish species of conservation significance and of leisure angling significance all of which constitute part of IFI's brief.</p> <p>It is recommended to contact the Sea Fisheries Protection Agency (SFPA) to seek advice regarding the timing of survey works to avoid clashing with spawning periods of commercial fish in the area. This will reduce any potential for noise damage to larval and juvenile life stages of fish when they are more susceptible to noise damage than adults.</p> <p>The timings of the work should be cognisant of the migratory window of diadromous species. We would like to clarify how the construction works will progress across the channel. It will be important to ensure that there is free passage for fish species along one bank to allow species migrating up and</p>	<p>an obstruction to migration. Similarly, a two year field study of migrating Silver eels passing the Baltic Cable showed the species crossed the cable with the same probability as if it were absent. While a number of individuals changed their course slightly when passing the cable it was concluded that the cable did not pose a threat to migration. Given the above, it can be concluded that European eel migration will not be significantly affected by the proposed development.</p> <p><u>Soft start/ramp up procedures</u> Trenching vessels and associated support vessels e.g. tugs will generate noise in the water even before trenching or tunnelling commences and these noise sources will act as soft start/ramp up noises. Where possible, trenching and tunnelling equipment will be started in sequence so that there will be gradual increase of noise.</p> <p><u>SFPA and spawning/nursery areas</u> The SFPA was contacted and commented that as the area is neither a spawning nor a nursery site, it does not require an assessment for same.</p>

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<p>downstream. While some works will take place during the 7am - 7pm time period others will be over 24 hours which could interfere with fish migrations.</p> <p>We note the additional information supplied to An Bord Pleanala in relation to the electromagnetic field and the documented effects on different fish species.</p> <p>The local IFI office in Limerick should be notified one (1) week in advance of the commencement of works</p>	
<p><b>Observations received from Inland Fisheries Ireland (IFI) Observation 2</b></p> <p>Inland Fisheries Ireland (IFI) considered the application and had the following further observations and recommendations to make. IFI acknowledged that considerable pre-planning consultation has taken place between the project proponents and Inland Fisheries Ireland and that the outcome of this consultation is reflected throughout the CEMP and NIS.</p> <p>During construction, IFI require that:</p> <ul style="list-style-type: none"> <li>• All discharges to and through the surface water collection and disposal system to groundwater and thence to surface water shall not be of environmental significance.</li> <li>• All mitigation measures identified in the CEMP and NIS are implemented in full.</li> <li>• IFI recommend that all marine activities begin with a ramp-up or 'soft-start' procedure to more fully mitigate the impact of any noise on the movement of fish species through the works area.</li> <li>• There shall be no permitted discharges to surface water resources of contaminated water or surface water run-off from the development.</li> <li>• Servicing including refuelling of plant and equipment shall only be undertaken on impermeable hard standing areas.</li> <li>• All plant and equipment used within the subject site shall carry spill clean-up kits and not be used or operated if there is evidence of leakage or damaged oil seals.</li> <li>• There shall be no discharge during the construction period of cementitious materials or residues thereof to the surface water or drainage network.</li> </ul>	<p>The Applicant acknowledged the recommendations made by Inland Fisheries Ireland and accepted the recommendations made by Inland Fisheries Ireland.</p> <p>Prior to commencing any work with subsea equipment, where such equipment has adjustable power levels the following soft start procedure will be conducted: -</p> <ol style="list-style-type: none"> <li>1. Conduct MMO watch as per the marine mammal observation plan in place.</li> <li>2. Once observation watch has been completed inform onboard MMO of intention to soft start subsea system.</li> <li>3. Turn on the subsea equipment.</li> <li>4. Select low power setting initially.</li> <li>5. Over the next 5 minutes gradually increase power to working power level.</li> </ol>

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<ul style="list-style-type: none"> <li>When cast-in-place concrete is required, all works shall be undertaken in the dry and effectively isolated from entering any receiving surface or foul sewers for a period sufficient to cure the concrete.</li> <li>Concrete delivery vehicles shall be precluded from washing out at locations that could result in a discharge to the surface or foul sewers.</li> <li>Where cement or lime is stored on site, it shall be held in a dry secure area.</li> <li>All oils and fuels used on or within the site shall be stored in secure bunded areas and servicing including refuelling of plant and equipment shall only be undertaken on impermeable hard standing areas.</li> <li>Where temporary diesel or petrol driven pumps are used within the site, they shall be positioned within portable bunded units.</li> <li>Any silt curtains to be deployed should comply with the relevant European Standard CE 1137-CPR-0613/29.</li> </ul> <p>In relation to the Emergency Response Plan, IFI suggest that all staff working in the vicinity of watercourses are aware of procedures to prevent silt or other pollutants from reaching watercourses. Sufficient materials to aid in diversion/containment on any such spillage should be readily available and stored at close distance. Contact details for local IFI staff can be supplied to the contractor once appointed to be added to the Emergency Response Manual.</p> <p>IFI will require consultation on the final CEMP, EOP and specific works method statements with the contractor as appointed</p>	
<p><b>Inland Fisheries Ireland (IFI) Observation 3 in light of applicant's response of 08 June.</b></p> <p>IFI was happy with the response and have no further comments to make</p>	<p>The Applicant had no further comment to make in response to same.</p>
<p><b>Department of Housing, Local Government and Heritage Water and Marine Advisor (WMA)</b></p> <p><u>Project Description:</u> As part of the Cross Shannon Cable Project EirGrid propose laying 4 no. 2.8km long 400kV Electricity Subsea Cables across the Shannon Estuary between Moneypoint Co. Clare and Kilpaddoge, Co Kerry. The cables will be installed by standard installation techniques, which in the most part involves them being</p>	<p>The Applicant acknowledged the recommendations made by the Water and Marine Advisory Unit and accepted the recommendations made by the Water and Marine Advisory Unit.</p>

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<p>buried in the seabed. Two (2) no fibre optic cables will be included with each of the 400 kV cables, 1 of the fibre optic cables for communication links between both substations which will be integrated into the 400 kV cables and the second fibre optic cable for maintenance and cable monitoring which will be an armoured cable wrapped around the 400 kV cable. The associated works will include the reinforcement of the ground beneath and around the cables by various methods including concrete ramps, infilling with gravel/concrete, articulated pipes and rock armour protection.</p> <p><u>Site Inspection:</u> The site of the southern landfall was inspected on 15 October 2020 and the site of the northern landfall on 03 December 2020. The northern landfall is directly adjacent to the Moneypoint Power station and an existing cable crossing landfall similar to the one now proposed. The foreshore at this location is very inaccessible and rocky. The southern landfall is at Kilpaddoge north of the under construction Electricity Substation. The shore and foreshore at Kilpaddoge is a cobble beach and is accessible to public from a public road 1km to the east.</p> <p><u>Assessment:</u> The foreshore of the Shannon Estuary is Stated owned and the works as proposed are part of EirGrid's development of the national electricity transmission infrastructure and so are in the public interest. Considering the shore and foreshore on the southern landfall is a cobble beach and assessable to the public it is important that when completed the proposed works do not impede access along the shore or foreshore and following the works the foreshore should be restored to a natural like condition. The works if completed as proposed and in compliance with the conditions set out below will not have significant adverse impacts on navigation, fisheries or the environment.</p> <p><u>Recommendation:</u> The Water and Marine Advisory Unit (WMAU) recommends approval of the application for a foreshore licence for 4 no. 400kV Electricity Subsea Cables across the Shannon Estuary between Moneypoint Co. Clare and Kilpaddoge, Co Kerry subject to the following conditions:</p>	



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<ul style="list-style-type: none"> <li>• The Drawing Titled “Foreshore Licence Map”, Drawing No: 379408-MMD-XX-00-GIS-N-1009 Rev. 2 Dated: 01/07/2020 should be attached to and referenced in the licence document</li> <li>• Following burial of the cables on the foreshore at the southern landfall the foreshore shall be back filled with native beach material at pre works beach grade level and foreshore restored to natural like condition so as to not impede public access along the foreshore and to reduce the visual impact of the works.</li> <li>• The works shall be conducted in accordance with documents and drawings submitted with the application.</li> <li>• The Department shall be notified 2 weeks prior to any works proceeding</li> </ul>	
<p><b>Underwater Archaeology Unit (UAU)</b> The UAU noted the response from the Applicant and FI as submitted to ABP. The submission made as FI in response to the National Monuments Service's (NMS) requirements is confusing and contradictory.</p> <p><u>Dive Survey/Archaeological Assessment: SS12:</u> It is unclear how the recommended exclusion zone of 100m can be narrowed to 60m until the archaeological assessment has been undertaken to inform on whether the potential anomaly SS12 is cultural in nature or not. EirGrid suggests that the depth of the water in the area precludes diving as it is at the safety limits and propose further remote sensing survey (without specifying what type of remote sensing will be employed). However, at the end of the paragraph, the submission states that a hand-held metal detection survey will accompany the dive survey. It is therefore unclear if an archaeological dive survey will be carried out or not. While remote sensing can be undertaken again to more closely assess this area, our previous recommendations (see below) as issued remain unchanged, i.e. for visual survey of SS12.</p> <p><u>Dive Survey and Archaeological Testing: M10 &amp; S1:</u> The response as submitted as FI by EirGrid suggests that archaeological testing can be done via remote sensing survey – which is an impossibility as both activities are completely different. It refers to the proposed survey methodology for SS12, as recommended by EirGrid. This is contradictory as remote sensing is, as the name suggests – remote, non-invasive assessment, while archaeological testing requires physical excavation by the archaeologist to</p>	<p>The Applicant noted that the detailed design for the landfall and cable routes will be developed following the appointment of a Contractor. The archaeological testing at the both landfalls and in the vicinity of magnetometer target M10 will be undertaken following the development of the detailed design and prior to commencement of construction.</p> <p>The Applicant accepted the recommendations of the UAU and will continue to liaise with the UAU throughout the project.</p>

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<p>assess and interpret directly the area under question. It is therefore also unclear as stated by EirGrid whether archaeological testing will be carried out, though there is reference to '...proposed test trenches for both sites will be included in a licence Application Report' to NMS. As above, if further geophysical survey is considered then that is fine, but our requirements for archaeological testing remains unchanged (see below).</p> <p>To reiterate NMS's and Kerry County Council's Archaeologist's observations, as issued previously: this is an area of extremely high archaeological potential and therefore requires more detailed archaeological assessment in the form of further archaeological assessment and testing.</p> <p><u>Archaeological dive survey &amp; Archaeological Testing:</u> It is stated that the report on the results of further archaeological assessment and testing will be submitted 'in advance of any proposed works taking place'. As previously recommended by NMS: It is strongly advised that the archaeological dive survey and archaeological testing is carried out in advance of the works contractor being engaged, to ensure that results inform final details for cable placement/completion, particularly if significant archaeological remains are identified, and thus prevent any risk of delays to works when plant and machinery are on site.</p> <p>It should be borne in mind that should significant archaeological remains be identified, further archaeological mitigation may be required by way or preservation in situ/avoidance or full archaeological excavation.</p> <p>As previously stated the National Monuments Service has no objections to the foreshore licence being granted once the following is included as conditions of any grant of permission:</p> <p><u>Dive Survey and Archaeological Testing: M10 &amp; S1:</u> A 100m exclusion zone shall remain in place until such time as SS12 has been fully and more closely assessed. Based on the results submitted to and consideration by the NMS of the results, the exclusion zone may remain in place (i.e. 100m), may be reduced (to 60m) or indeed prove to be unnecessary should the anomaly not be of cultural significance.</p>	

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<p>If, on safety grounds, there cannot be an archaeological dive survey, then an ROV survey should be undertaken to ensure the anomaly is visualised and can be fully assessed in real time by the archaeologist engaged for the project. The ROV survey shall assess the wider area around SS12 to ensure there is no associated material in the immediate area.</p> <p>The archaeologist should be on board the vessel when the ROV survey is being undertaken to ensure they can assess the results in real time.</p> <p><u>Dive Survey and Archaeological Testing: M10 &amp; S1:</u> A detailed plan for the archaeological testing in the area of the south landing S1 is to form part of the licence application and shall follow the route of the cables to the existing substation.</p> <p>The area where the localised magnetometer anomalies M10 are located on the nearshore/onshore area at Moneypoint for the northern landing N2 to be the subject to archaeological testing.</p> <p>The location, nature and extent of all test trenches should be provided and sufficient trenches should be put in place to assess fully the area from the foreshore (at low water) and inshore for N2 to identify what the magnetometer anomalies are on the foreshore (at low water) to the green field areas and on to the substation for S2 to ensure the line of the cables are fully archaeologically tested.</p> <p>The methodology submitted should include a detailed finds retrieval strategy.</p> <p><u>Archaeological Dive and Testing Report:</u> Once all surveys and testing have been completed, the full information should be compiled into a Report submitted to the Underwater Archaeology Unit, National Monuments Service for review and further comment in advance of any works taking place. The applicant shall be prepared to be advised by the Department in this regard</p>	

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<p><b>Department of Agriculture, Food and the Marine (DAFM)</b> The DAFM had no specific conditions to be included.</p> <p>BIM have expressed concern as it appears the proposed activity may cut through the eastern end of the oyster fishery order T08/004BOFO, which is owned by Atlantic Shellfish Ltd. This needs to be brought to the attention of EirGrid and BIM suggest that the EIRGRID Project Liaison Officer make contact with local stakeholders in this regard</p>	<p>The Applicant drew attention to Table 5.1 of the Planning and Environmental Considerations Report that supports the application. As noted therein, EirGrid has engaged with Atlantic Shellfish Ltd since 2017 in respect of the proposals. It is however noted that Atlantic Shellfish Ltd has previously advised EirGrid that in their opinion the proposals will not cause any significant harm to their oyster beds in the area. The applicant will continue to engage with relevant stakeholders during construction and operation.</p>
<p><b>Irish Coast Guard (ICG)</b> The Irish Coast Guard drew attention to the provisions of the National Maritime Oil/HNS Spill Contingency Plan (and its suite of standard operation procedures), June 2021 and the associated national legislation articulated in the Plan. Specifically in terms of contingency preparedness and planning for emergency response and environmental protection for offshore/at sea operations.</p>	<p>The Applicant acknowledged the Irish Coast Guard recommendations with regard to the National Maritime Oil/HNS Spill Contingency Plan and would seek to adhere to same.</p>
<p><b>Sea Fisheries Protection Authority (SFPA)</b> Proposed electricity transmission cables (Cross Shannon Cable Project), which includes the laying of 400kV underground cables across the lower Shannon estuary from Moneypoint, Co. Clare and Kilpaddoge, Co. Kerry. Three (3) elements make up the proposed project, connection of the cable at Moneypoint, laying the cable and connection to Kilpaddoge.</p> <p>Within Part 4 (pre-application process) of the application form submitted it is recorded that the SFPA advised that the area is not within their remit and directed the project to IFI for comment.</p> <p>The location of the proposed development is in the lower Shannon Estuary and therefore unlikely to disrupt any wild fisheries in the immediate area.</p> <p>There is a presumed dormant, licenced aquaculture site for oysters on the Clare side of the development (Licence number T08/004BO). The applicant has stated that they are investigating the oyster fishery order and if any plans for developing the aquaculture site.</p> <p>The shellfish production area of Ballylongford is outside and seaward of the proposed development area and should not be affected by the cable laying.</p>	<p>The Applicant acknowledged the response of the SFPA and will report all spillages and pollution events which may cause contamination of seafood to the Dingle SFPA office.</p>

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All spillages and pollution events at the development sites which may cause potential contamination of seafood are to be immediately reported to the Dingle SFPA office	
<b>Met Eireann (ME)</b> After studying the application, ME did not envisaged that this project would have any negative impact on the Met Eireann observational infrastructure	The Applicant acknowledged the response from Met Eireann.
<b>Health and Safety Authority (HSA)</b> The Health and Safety Authority, in its role as the Central Competent Authority under the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015, had advised An Bord Pleanala that it does not advise against the granting of planning permission	The Applicant acknowledged the response from the Health and Safety Authority.
<b>Bord Iascaigh Mhara (BIM)</b> BIM, Ireland's Seafood development Agency wished to use the opportunity to ensure that the current and future needs and concerns of the seafood sector are appropriately considered.  BIM noted that fisheries and aquaculture interests had already been identified. The proposed route of the cable intersects with the corner of an oyster fishery order and the proposed route is approximately 5.5km from the nearest aquaculture licence.  BIM requested that consultation is carried out with the aquaculture operators in the area and that operators are made aware of construction works and timings in advance of their commencement. It is noted that consultation has been held with Atlantic Shellfish Ltd, who hold the oyster fishery order. Should you require assistance with any further engagement, BIM can provide assistance.  Construction and excavation works associated with laying the cables and reinforcement of the ground beneath and around the cables may have the potential for suspension of sediments which together with any pollutants within them, could have a negative impact on filter feeding oysters	The Applicant will consult with the aquaculture operators in the area and ensure that operators will be made aware of construction works and timings in advance of their commencement.
<b>Sustainable Energy Authority of Ireland (SEAI)</b> With regards to this application which is for the installation of 4 x 400 KV submarine cables across the Shannon Estuary from Moneypoint to Killpaddoge in Co Kerry, SERAI supported the development as it will allow for improved	The Applicant had no further comment to make in response to same.

## Appropriate Assessment

Statutory Body	Applicant's Response
export capability from wind generation projects in South West Kerry into the existing 400KV network. Such work is of benefit to the South West and will ensure more efficient transmission of renewable generation and prevent local constraints on the system	
<b>National Parks and Wildlife Service (NPWS)</b> The NPWS had no comment to make on this application	The Applicant had no comment.

## 1.4 Legislative context

The *Foreshore Act 1933* (as amended), requires that a lease or licence must be obtained from the Minister for Housing, Local Government and Heritage for the carrying out of works or placing structures or material on, or for the occupation of or removal of material from, State-owned foreshore.

The 1992 EU Habitats Directive (Council Directive 92/43/EC) and Birds Directive (2009/147/EC) are transposed into Irish law by Part XAB of the *Planning and Development Act 2000* (as amended) and the *European Communities (Birds and Natural Habitats) Regulations 2011* (as amended). The latter outlines the requirements for screening for AA and AA under Regulation 42:

*42. (1) A screening for Appropriate Assessment of a plan or project for which an application for consent is received, or which a public authority wishes to undertake or adopt, and which is not directly connected with or necessary to the management of the site as a European Site, shall be carried out by the public authority to assess, in view of best scientific knowledge and in view of the conservation objectives of the site, if that plan or project, individually or in combination with other plans or projects is likely to have a significant effect on the European site.*

*(2) A public authority shall carry out a screening for Appropriate Assessment under paragraph (1) before consent for a plan or project is given, or a decision to undertake or adopt a plan or project is taken.*

*(6) The public authority shall determine that 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 following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site.*

*(9) Where a public authority is required to conduct an Appropriate Assessment pursuant to paragraph (6) in relation to a plan or project that it proposes to undertake or adopt, it shall —*

*(a) prepare a Natura Impact Statement,*

*(b) compile any other evidence including, but not limited to, scientific evidence that is required for the purposes of the Appropriate Assessment, and*

*(c) submit a Natura Impact Statement together with evidence compiled under subparagraph (b) to the Minister not later than six weeks before it proposes to adopt or undertake the plan or project to which the Natura Impact Statement and evidence relates.*

*(11) An Appropriate Assessment carried out under this Regulation shall include a determination by the public authority under this Regulation pursuant to Article 6(3) of the Habitats Directive as to whether or not a plan or project would adversely affect the integrity of a European site and the assessment shall be carried out by the public authority before a decision is taken to approve, undertake or adopt a plan or project, as the case may be.*

*(12) In carrying out an Appropriate Assessment under paragraph (11) the public authority shall take into account each of the following matters —*

- (a) the Natura Impact Statement,*
- (b) any other plans or projects that may, in combination with the plan or project under consideration, adversely affect the integrity of a European Site,*
- (c) any supplemental information furnished in relation to any such report or statement,*
- (d) if appropriate, any additional information sought by the authority and furnished by the applicant in relation to a Natura Impact Statement,*
- (e) any information or advice obtained by the public authority,*
- (f) if appropriate, any written submissions or observations made to the public authority in relation to the application for consent for proposed plan or project,*
- (g) any other relevant information.*

Given that an application for statutory approval has also been made to An Bord Pleanála with respect to the project, the following is also relevant:

*42. (21)(a) Where a public authority, referred to in this paragraph as “the first authority”, has carried out a screening for Appropriate Assessment or an Appropriate Assessment in relation to a plan or project, any other public authority, referred to in this Regulation as “the second authority”, that is required to carry out a screening for Appropriate Assessment or an Appropriate Assessment of the same plan or project shall take account of the screening for Appropriate Assessment or Appropriate Assessment of the first authority in relation to that plan or project, and of any information, including a Natura Impact Statement that was prepared for consideration by the first authority or another second authority in relation to the plan or project.*

*(b) In taking account of a screening for Appropriate Assessment or Appropriate Assessment in relation to a plan or project and of a Natura Impact Statement, the second authority shall consider the extent to which the scope of that screening for Appropriate Assessment or Appropriate Assessment or Natura Impact Statement covers the issues that would be required to be addressed by the second authority in a screening for Appropriate Assessment or Appropriate Assessment of the plan or project in view of the scope of the consent to be given by it, and shall identify any issues that have not, in that regard, been adequately addressed.*

*(c) Subject to subparagraph (b) and without prejudice to its right to request all such information as it considers necessary to carry out a screening for Appropriate Assessment or Appropriate Assessment, the second authority may limit its requirement for information, including a Natura Impact Statement, to those issues that it determines have not been adequately addressed for the purposes of the second authority in the process of screening for Appropriate Assessment and Appropriate Assessment by the first authority or by another second authority.*

A Screening for Appropriate Assessment has been carried out and determined that it could not be excluded, on the basis of objective scientific information, that the Cross-Shannon Cable 400 kV Project, individually or in combination with other plans or projects, will have a significant



effect on a European site. This report details the Stage 2 Appropriate Assessment of the Project.

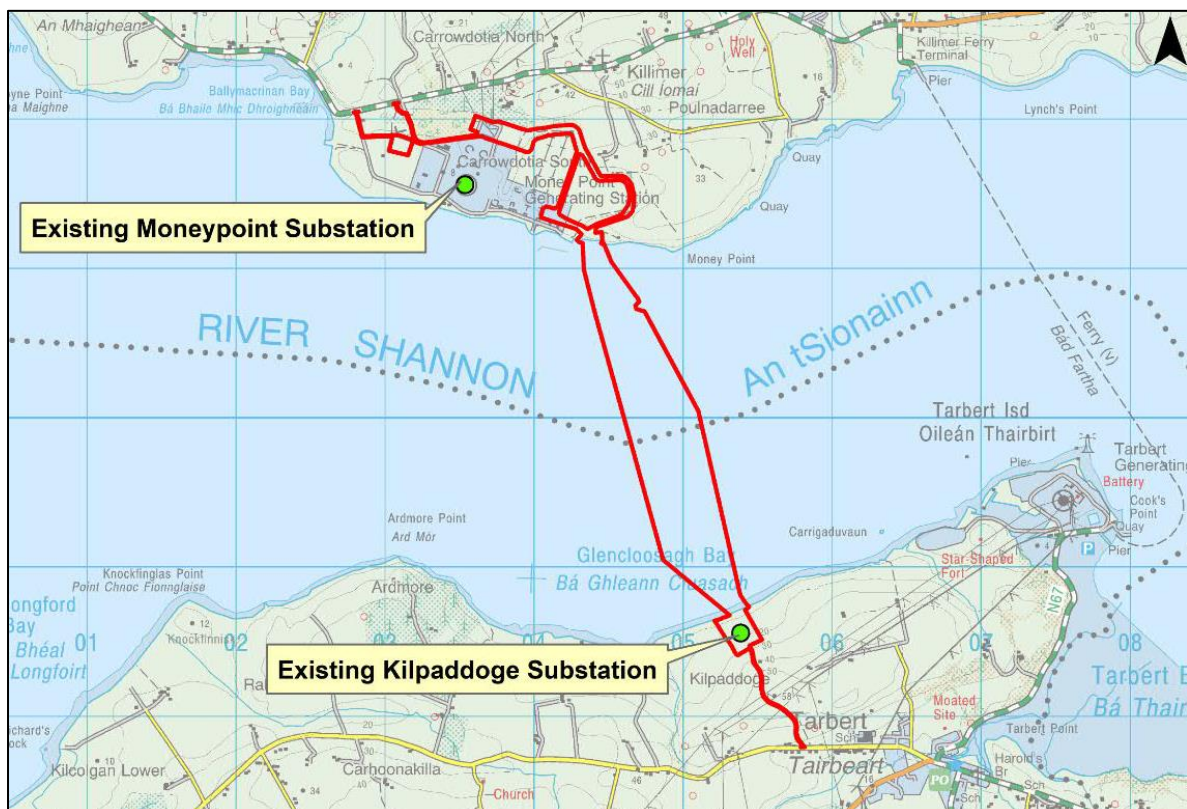
Relevant guidance informing the AA includes that at a European (European Commission 2019, European Commission 2021) and national (DoEHLG 2010) level.

## SECTION 2 - DESCRIPTION OF PROPOSED WORKS

### 2.1 Proposed Project Location and Description

The Cross-Shannon Cable 400 kV Project involves the laying of four 400 kV cables across the Shannon Estuary (in the seabed) between the Moneypoint 400 kV Electricity Substation in the townland of Carrowdota South County Clare and Kilpaddoge 220/110 kV Electricity Substation in the townland of Kilpaddoge County Kerry. The connection at Moneypoint will be at the existing substation on ESB lands. The connection at Kilpaddoge requires an extension of 5,500m<sup>2</sup> to the existing substation on ESB lands (Figure 2.1).

Figure 2.1: Proposed Project Location



### 2.2 Route Description

The proposed development mainly consists of:

- An onshore development comprising 2 main elements: connection at Moneypoint Substation and connection at Kilpaddoge Substation;
- A submarine development, consisting of the laying of four 400 kV submarine cables across the Lower Shannon Estuary. The Foreshore consent application FS007083 refers to this part of the proposed development, specifically covering the impacted sites below the bed and shore, below the line of high-water of ordinary or medium tides. The Foreshore Licence Area (98.15 ha) is highlighted in red on Figure 2.2 which also shows the proposed submarine cable corridor.

Figure 2.2: Foreshore Licence Area



### 2.2.1 Onshore Development

The following information is provided as context as with respect to onshore development, only the cable landfalls on either side of the estuary is subject to foreshore consent.

#### Connection at Moneypoint Substation

Moneypoint Electricity Generating Station is an existing operational coal fired power station which consists of three generators to produce electricity to supply the main transmission network. Moneypoint 400 kV substation is a Gas Insulated Switchgear (GIS) type substation and is located inside the existing operational Moneypoint Electricity Generating Station. The substation is the marshalling point for the electricity, and it acts as a node on the transmission network.

The landfall generally comprises concrete cable troughing, associated civil works and transition joint bays. The joint bays enclose the connections made between the land-based cables and the submarine cables. The proposed northern landfall is located to the south of the main coal yard / ash storage area on third party lands.

The transition area, comprising four individual transition joint bays, each with the approximate footprint of 10m (length), 2.5m (width) and 2m (depth). This arrangement also includes a land submarine transition joint bay for the spare submarine cable.

The jointing bay will be constructed with concrete floor and sidewalls. Once the cables are connected to the relevant joints within the jointing bay, compact cement-bound sand is put into

the bay to surround the cables and joints. Additional sand and excavated material is then backfilled into the bay and the bay is subsequently covered over.

The geology of the nearshore approaches / intertidal area will determine how the cable will be installed into the transition joint bay. Usually, the cable is brought ashore by an open cut trench requiring access for excavation equipment. Where a rock shelf is present, further civil works will be required, taking the form of gabion bags filled with stone and revetments to support the approach by securing and protecting the cable installation. Cylindrical metallic cable protectors will also be installed as necessary at these locations to provide mechanical protection to the cables.

### Connection at Kilpaddoge Substation

Kilpaddoge station is a relatively newly constructed 220 / 110 kV GIS substation to the south of the Shannon Estuary in County Kerry. In order for the 400 kV cable circuit to connect to the station at Kilpaddoge a power transformer is required. This transformer is a piece of outdoor electrical plant that is used to change the system voltage from 400 kV to 220 kV, which is the operating voltage at Kilpaddoge. An extension to the existing Kilpaddoge Electrical Substation of approximately 5,500m<sup>2</sup> will be required to facilitate new 400 /220 kV AIS equipment and associated compound.

The proposed 400 kV cable circuit will run south from the southern landfall to the existing Kilpaddoge 220 kV GIS substation via a 400 kV AIS bay and a 400 / 220 kV power transformer. The proposed landfall is located approximately 60m north of the existing substation. No specific details are provided by the applicant on the Kilpaddoge landfall.

### 2.2.2 Submarine / River Shannon Crossing

The new 400 kV submarine cables route runs from a landfall adjacent to the Moneypoint Electricity Generating Station on the north side of the Shannon Estuary to a landfall at Glencloosagh Bay, directly to north of Kilpaddoge substation on the south side. The overall estimated submarine cable route length is approximately 2.8km. The area of the proposed submarine cable corridor between the high-water mark of ordinary or medium tides (MHWM) on each shoreline (for which this application for consent is applied) is approximately 0.737km<sup>2</sup>.

A communication link will also be provided between both substations, this will take the form of two fibre optic cables laid alongside or integrated into the proposed 400 kV cables. Environmental constraints, including the archaeological potential within the study area, were considered in parallel with the design optioneering process in determining the proposed route corridor.

The riverbed varies along the proposed route alignment from fine to coarse gravelly sand to fine sand. The gravelly clay is limited to the near shore areas. The proposed installation techniques (see below) are suitable given the sediment conditions encountered along the corridor.

## 2.3 Installation of Submarine Cables

### 2.3.1 Plant and equipment

The proposed submarine equipment includes:

- Primary Cable Laying Barge (CLB) or Cable Laying Vessel (CLV)
- Cable floatation devices for submarine-landfall pull in



- Cable burial tool
- Pre-lay Grapnel (PLG) and launch vessel
- Mass Flow Excavator (MFE) tool and launch vessel
- Post-lay trench jetting tool
- Support / guard vessel(s)
- Rock protection installation vessel
- Cylindrical cable protection.

It is anticipated that the launch vessel for the PLG and MFE will be the same vessel.

### 2.3.2 Installation sequence

The proposed installation sequence is summarised below. The actual methods and sequence of the cable installation are subject to detailed design, pre-construction surveys and review by stakeholders, authorities and contractors:

1. Moneypoint and Kilpaddoge landfall works (excavation and civil works). Site preparation works including civil and earthworks are required at both landfalls to re-profile the existing coastline to the final design profile to enable the cable pull in to take place. Following cable installation at Moneypoint, the concrete slipway structure will be backfilled (where appropriate) and encased by a pre-cast concrete slab that will sit on top of the backfilled material. Rock protection will be installed in front of the coastline at the toe of the concrete slipway to mitigate the risk of erosion underlying or outflanking the new structure. Earthworks at Kilpaddoge will likely involve installation of rock / gravel filled gabion bags or backfill material to prevent deep burial of the cable that could induce the risk of cable de-rating. Following cable installation, the existing coastline will be reinstated to its original profile and level. Rock protection may be installed in front of the coastline;
2. Route clearance (pre-lay grapnel run) along all four cable alignments;
3. Seabed preparation works along all four cable alignments. Seabed slopes between 10-25 degrees are observed in marine survey data near to the northern landfall. The steepest slopes angles occur for approximately 25-50m, between the 5m and 10m bathymetry contour. At these locations, seabed preparational works, such as rock filter bag placement, may be required to reduce the slope angles for cable installation purposes;
4. Submarine works for each cable alignment (assume starting with Cable No.1, most westerly alignment):
  - a. Sand wave re-profiling/dispersal by Mass Flow Excavation (MFE). A MFE tool will be used to flatten sand waves with amplitudes of more than 0.5m and allow a cable burial tool to bury the cable to a controlled and determined depth. Sand wave reprofiling is required along approximately a 2km chainage of each cable alignment.
  - b. Post-MFE route clearance (secondary pre-lay grapnel run) to clear any obstructions which may have been exposed during the use of the MFE tool.
  - c. Moneypoint landfall cable pull-in. The CLB/CLV will start from a position approximately over the 15m bathymetry contour (less than 100m from the shoreline at Moneypoint). A messenger wire will be transported by a support vessel to shore and passed through the cable quadrant, over onshore cable rollers, and up to the cable winch. The winch will then pull the cable from the CLB/CLV to beyond the transition joint bay (TJB) at the top of the cliff. Here,

- the cable armouring is removed and secured to an armour clamp which will likely be incorporated into the seaward concrete wall of the TJB (subject to the Contractors design).
- d. Submarine cable installation. A number of techniques may be employed including using a cable burial tool or jetting tool to install the cable (as described in Section 2.2.3.4 of the AA Screening and NIS report.
5. Repeat step 4 for cable no.2, no.3 and no.4. All sequences detailed in steps 4 above will be repeated until all four cables have been installed to KP2.2<sup>1</sup> and pulled ashore to Kilpaddoge.
  6. Post lay submarine cable installation for all four cables. After all four cables have been installed (buried) between KP0.0 and 2.2, post-lay burial of all four cables between KP2.2 and 2.8 will take place. A cable burial tool or jetting tool, either remotely operated (ROV) or pulled by a combination of the onshore winch and marine vessel.
  7. Landfall and submarine cable protection installation for all four cable alignments. Additional protection over the buried in submarine works areas (below LAT) will be installed by a specialist marine contractor with a marine vessel. Based on the preliminary burial risk assessment and the results of the marine surveys, approximately 1km of additional protection is identified as required at the approach to northern landfall, near the centre of the channel and southern landfall. Local rock supplies will be used as the priority but imported rock may be necessary. In either case it would be common practice that the rock grade, quality is screened and tested such that it meets the design specification as defined at the detailed design stage. A rock specification will ensure that fines are removed, and rock is washed if necessary.
  8. Post construction survey campaigns (cable burial depth and bathymetric surveys) to confirm the target burial depth has been achieved. Future marine surveys will assist in monitoring the performance of the cables over the life of the new asset.

### 2.3.3 Pre- and post-construction surveys

As indicated, pre-construction surveys will be carried out to inform the detail design of the cable route. Following completion of the cable installation works, a programme of post-construction surveys will be required to confirm the target burial depth has been achieved. Future marine surveys will assist in monitoring the performance of the cables over the life of the new asset. The applicant anticipates that the rights to maintain and survey the cables over the life of the asset will be subject to the conditions of the grant of Foreshore licence approval. Typically, this is a series of bathymetric surveys over the entire cable route with the frequency of surveys decreasing over the asset life (but informed on the analysis of the previous survey results).

The applicant's AA Screening and NIS did not provide details of the survey equipment that will be used for the subsea survey of the pipeline route pre- and post-cable installation. To inform assessment, Table 2.1 provides an example of side scan sonar, multibeam echosounder and sub-bottom profiler equipment that could be used and details of potential noise source levels<sup>2</sup>.

<sup>1</sup> The applicant's document uses chainage to describe the horizontal distance along the cable routes, starting at KP0.0 to Moneypoint, and ending at KP2.8 at Kilpaddoge.

<sup>2</sup> A previous 2018 geophysical survey included geophysical survey multibeam and single beam bathymetry, side scan sonar, sub bottom profiler, magnetometer, acoustic ground discrimination, terrestrial UAV survey and tomographic seismic refraction. Source: Step 4 Report Development

Table 2.1: Source level and frequency of survey equipment which could be used

Equipment type	Purpose	Frequency range	Maximum Source Pressure Level (dB re 1 $\mu$ Pa @ 1m)
Multibeam Echo Sounder (MBES)	Determines depth and nature of the seabed by transmitting sound pulses (active sonar). Transmits broad acoustic pulse.	400-700 kHz (depending on selected option)	225-231
Side Scan Sonar (SSS)	Determines depth and nature of the seabed by transmitting sound pulses (active sonar).	100 & 500 kHz	235
Sub-bottom Profiler e.g. Innomar SES-2000 Quattro Parametric <sup>3</sup>	Uses reflection seismology to give a 2D image of the sub-seabed geology	Primary: 85-115kHz Secondary: 2-20kHz	235-245

### 2.3.4 Duration of works

Subject to the grant of statutory approvals, it is programmed that construction will commence in 2022, for it to become fully operational by the end of 2023.

For the submarine development, the cable installation within the Shannon Estuary is expected to take approximately three weeks to complete. Each cable installation run is anticipated to take approximately 3-5 days to complete. These works will be carried out seven days a week 24 hours a day. The duration of the works is indicative only, safety requirements for the installation operations / procedures and weather condition may ultimately dictate the final programme. Also, works associated with the submarine cable installation will be carried out outside of the peak dolphin calving season (August) depending on weather conditions.

## 2.4 Operation of the Cables

If a fault/break is caused to a cable, a repair operation would be undertaken by a cable vessel, retrieving the faulted section of cable to the vessel and repairing on board. The repaired cable would then be returned and reburied in the seabed, using the ROV mounted cable burial technique, to the approximate original location.

## 2.5 Decommissioning of the Cables

Following the guidelines from the Commission for Regulation of Utilities (CRU) on decommissioning of submarine cables, typically such assets have an operational lifetime of at least 50 years. Depending on the results of the regular maintenance surveys carried out during the project operation, an exact timing for the decommissioning will be determined.

Options Report Cross Shannon 400 kV Cable, <https://assets.gov.ie/123244/bd0cec52-27f7-4cf2-9829-682959d31ef6.pdf>

<sup>3</sup> <https://www.nautilusoceanica.com/images/datasheets/innomar/Innomar-ses2000-quattro.pdf>

When decommissioning the submarine development, the cables will be disconnected at the landward joints and the cable will be left in the seabed. The sea protection rocks overlying the cables will not be recovered. The land-based transition joint pits are also to be left in situ.



## SECTION 3 - APPROPRIATE ASSESSMENT

### 3.1 AA screening outcome

The screening assessment concluded that the following likely significant effects from the proposed works on the qualifying interests of two relevant sites could not be discounted, and that appropriate assessment was required, covering:

- **Lower River Shannon SAC**
  - Physical disturbance effects to seabed (Estuaries, Reefs)
  - Sediment resuspension effects from cable installation works (Sandbanks which are slightly covered by sea water all the time, Estuaries, Mudflats and sandflats not covered by seawater at low tide, Coastal lagoons, Large shallow inlets and bays, Reefs)
  - Onshore pre-construction effects (Estuaries, Reefs)
  - Construction noise/disturbance (Sea Lamprey, Brook Lamprey, River Lamprey, Salmon, Bottlenose Dolphin)
  - In-combination noise effects (Bottlenose Dolphin)
- **River Shannon and River Fergus Estuaries SPA**
  - Construction noise/disturbance and sediment resuspension from cable installation works (Cormorant, Whooper Swan, Shelduck, Wigeon, Teal, Pintail, Shoveler, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Wetlands)

### 3.2 Assessment of impact on European sites

#### 3.2.1 Lower River Shannon SAC

The applicant indicated that the proposed cable route will run from the high water mark across the estuary in waters with a maximum depth of ca. 60m. Substrate type between 0-30m towards the southern shore consists of a mix of sand, slightly gravelly sand, gravelly sand, slightly gravelly muddy sand, gravelly muddy sand and sandy gravel (AQUAFAC 2008, 2009, cited by applicant). Slightly gravelly sandy mud is present between 0-10m towards the northern shore and the 30-60m zone consists of a rocky seabed with boulders, cobbles and gravel.

Figure 3.1 shows the marine habitats in the cable laying area derived from NPWS Conservation Objective mapping for Lower River Shannon SAC. The habitats that overlap the cable laying area include 'subtidal sand to mixed sediment with *Nucula nucleus* community complex', 'faunal turf dominated subtidal reef community', 'subtidal sand to mixed sediment with *Nephtys* spp. community complex', 'fucoid dominated intertidal reef community complex' and '*Laminaria* dominated community complex'. These community types have been identified in the Annex I habitat Sandbanks which are slightly covered by sea water all the time, Estuaries, Mudflats and sandflats not covered by seawater at low tide, Large shallow inlets and bays and Reefs (see Figure 3.2, NPWS 2012).

Figure 3.1: Marine community types identified within qualifying interest habitats in relation to the proposed project (NPWS 2012).

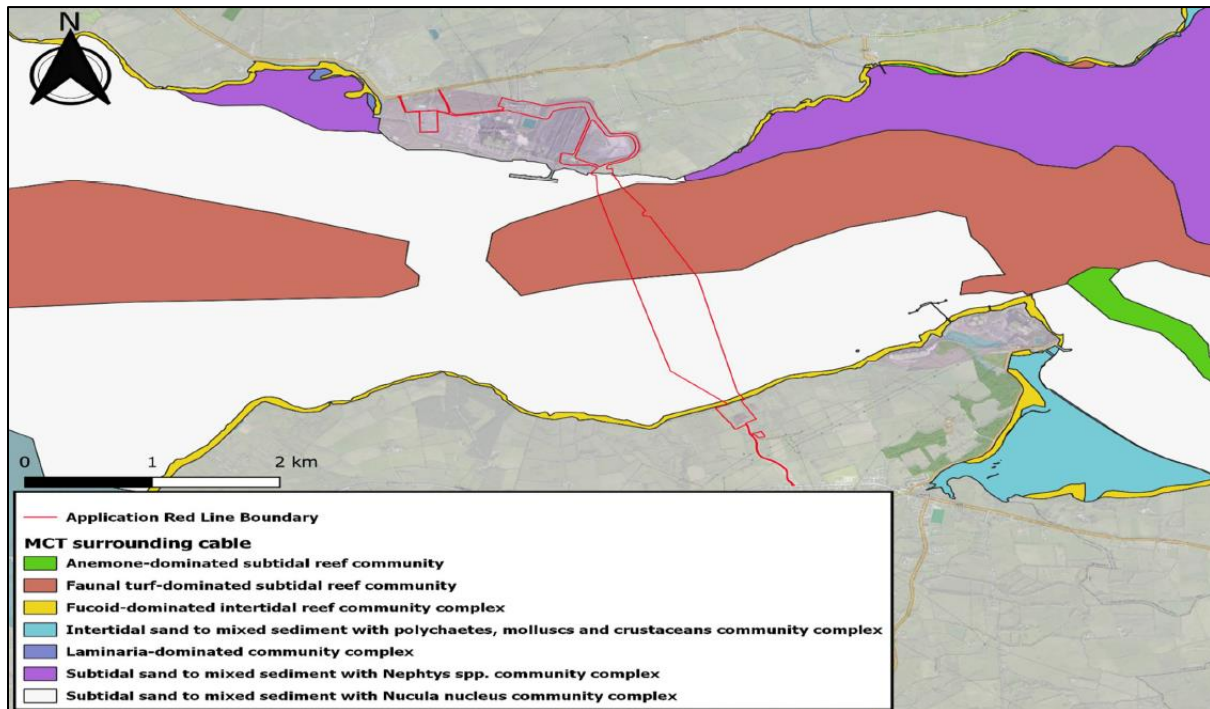
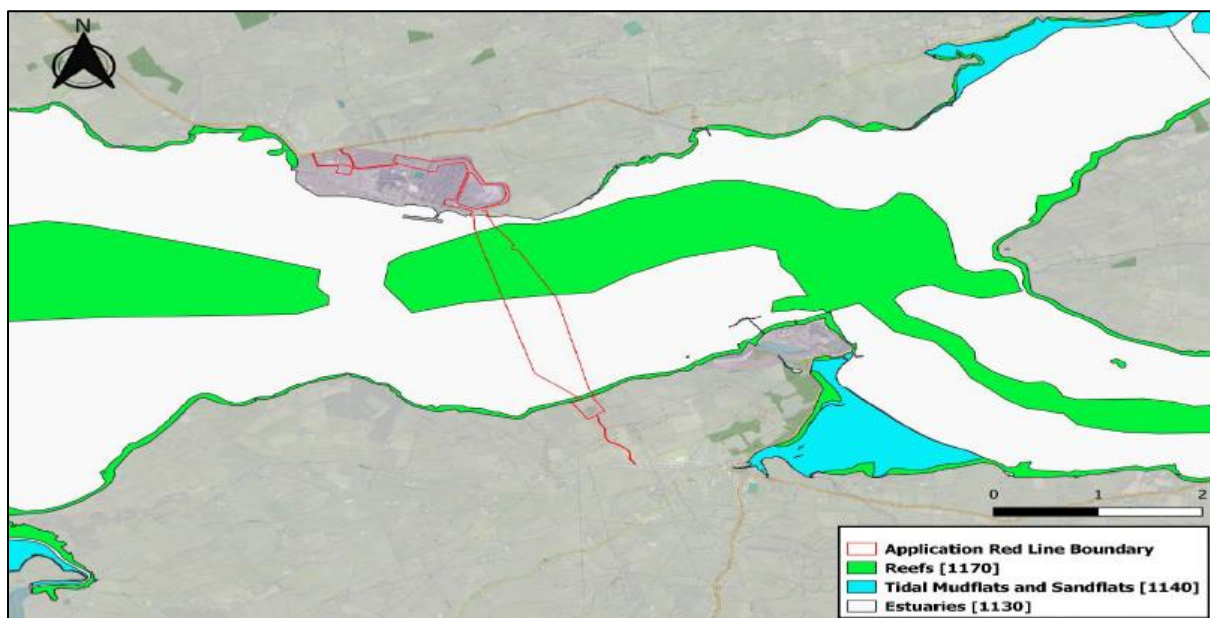


Figure 3.2: Known occurrences of qualifying interest marine habitats within the Lower River Shannon SAC in relation to the proposed project (NPWS 2012)



### 3.2.1.1 Physical disturbance to seabed and sediment resuspension from cable installation works

The applicant identified that activities associated with seabed clearance work, submarine trench excavation and cable laying activities had the potential to result in direct physical disturbance to Annex I habitats and constituent community types. These activities are limited to those habitats that are overlapped by the proposed cable route and consequently, there are

potential pathways for impact to the Estuaries and Reefs QI habitats (see Figure 3.2). With respect to sediment resuspension, the spatial overlap of the modelling plumes with Annex I habitats (Appendix 2 of the applicant's Screening statement for AA and NIS) indicated that Mudflats and Sandflats not covered by seawater at low tide may also be affected.

### Soft sediment communities

The applicant noted that clearance of seabed obstructions using the pre-lay grapnel (PLG) equipment had the potential to scrape the top-most substrate layers removing and dislodging fauna. It was noted, however, that PLG equipment damage will be of a limited footprint. It was concluded that the PLG activities proposed would be limited spatial and temporally, resulting in a temporary impact.

The applicant indicated that the target cable trench depth proposed (ca. 2.5m) would result in the elimination of natural seabed topography and the creation of sediment mounds of the sediment displaced from the trench by the excavation. The impacts to the seabed would be temporary. The trenches created would be infilled through natural sediment movement processes due to water currents, resulting in the flattening and removal of the mounds of displaced sediment.

The trenching activities proposed would result in resuspension of sediment. As shown by the sediment modelling exercise (Appendix 2 of the applicant's NIS), sediment plumes generated could lead to deposition of sediment on Annex I habitats and associated community types. The sediment modelling predicted sediment deposition depths after completion of the cable installation of:

- Up to 2mm towards the south of the cable route;
- Generally less than 1mm and located towards the shoreline where current flow speeds were lower than in the central part of the estuary; and
- Up to 20mm inside the small bay to the south east of the cable route.

Relatively high sediment deposition was predicted in the intertidal area of the small bay to the south east of the project supporting the Annex I habitat Mudflats and Sandflats not covered by seawater at low tide (Figure 3.2). However, it was noted rather generally that marine life can survive rapid sediment deposition up to depths of 100mm (OSPAR 2008, 2009), five times the depth predicted by the model for the worst-case scenario. The applicant could have noted that based on the description of the community present in this small bay, intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex (Figure 3.1). This indicates that the polychaete *Hediste diversicolor* and the bivalve *Macoma balthica* may be recorded in moderate to high abundances (NPWS 2012), the community may accord with the EUNIS 2008 habitat A2.4111 *Hediste diversicolor* and *Macoma balthica* in littoral gravelly mud, considered to have a low sensitivity to smothering (of up to 5cm of fine material)<sup>4</sup>.

The applicant noted that the conservation objectives supporting document for marine habitats in the Lower River Shannon SAC (NPWS 2012) indicates that significant continuous or ongoing disturbance of communities should not exceed an approximate area of 15% of the interpolated area of each community type. The applicant notes that as the disturbance of the proposed project to sedimentary community types is temporary and well below the threshold of 15%, it can be concluded that there will be no potential for significant adverse effects. In terms of the extent of disturbance to sedimentary communities associated with the project, from Figures 3.1 and 3.2, the Estuaries habitat supports a subtidal sand to mixed sediment

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[https://www.marlin.ac.uk/habitats/detail/1175/hediste\\_diversicolor\\_and\\_macoma\\_balthica\\_in\\_littoral\\_gravelly\\_mud](https://www.marlin.ac.uk/habitats/detail/1175/hediste_diversicolor_and_macoma_balthica_in_littoral_gravelly_mud)

with *Nucula nucleus* community complex which has an estimated extent of 4,196ha (NPWS 2012). From Section 2.2.2, the area of the proposed submarine cable corridor is estimated at approximately 0.737km<sup>2</sup> (73.7ha) which represents less than 1.8% of the community type. Similarly while the potential area of relatively high sedimentation on the Mudflats and Sandflats not covered by seawater at low tide habitat was not provided by the applicant, the submarine cable corridor area represents only 0.9% of the intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex (8,130ha). Therefore, there is no potential for significant adverse effects.

### Reef communities

The applicant indicated that should cable laying occur over rocky areas, then some damage to the community/species could occur. Cable laid across areas or reef will require additional protection provided by rock placement, installation of concrete mattresses or rock filter bags. In addition, clearance of seabed obstructions using the PLG equipment has the potential to remove and dislodge reef fauna. The area overlaid with rock protection or damaged by PLG activity will be re-colonised through various mechanisms including spreading of colonial species, mobile species moving in from neighbouring habitat, and through larval settlement.

The applicant confirmed in their response (22/02/2022) to an RFI that the cable routes cross two "Faunal turf-dominated subtidal reef community" types within Qualifying Interest habitats, namely Estuaries [1130] and Reefs [1170]. The area of the Estuaries [1130] reef community habitat was 981 ha, and for Reefs [1170] the reef community area was 9,692 ha. Based on a trench area of 4.005 ha, the percentage overlap of the 4 cable routes that cross the Faunal turf-dominated subtidal reef community in Qualifying Interest habitats Estuaries [1130] and Reefs [1170] was estimated at 0.41% and 0.05% respectively. These figures are an order of magnitude lower than the 15% significant disturbance threshold level stipulated in the conservation objectives for these habitats in the Lower Shannon SAC. Therefore, there is no potential for significant adverse effects.

With regard to the effect of Impact Mechanism 6 (sedimentation of resuspended solids) on the Faunal turf-dominated subtidal reef community, due the size of the Shannon River catchment, ca. 17,000 km<sup>2</sup> and the largely agricultural, bog and forestry land use, suspended solids levels in the Shannon are naturally high. The Faunal turf-dominated subtidal reef community that is present at the cable crossing site are therefore well adapted to such levels of suspended sediments. In addition however, as velocities in the western half of the Shannon are high reaching 2.5 m/sec, any sediments generated by the trenching activity will be quickly dispersed and diluted away from the site. Therefore, there is no potential for significant adverse effects.

#### 3.2.1.2 Activities associated with onshore pre-construction

The applicant indicated in Section 3.4.1.1 of the Screening statement for AA and NIS that activities associated with onshore pre-construction and civil works may result in the release of sediment, chemicals or other waste material pollution during construction periods. Consequently, there are potential pathways for impact to the Estuaries and Reefs QI habitats located immediately adjacent to the onshore works (see Figure 3.2).

A description of the onshore works required at Moneypoint and Kilpaddoge is provided in Section 2.2.1 of this report. In summary, at the landfall locations works are required to profile the coastline, excavate cable trenches on the foreshore for the cable, construct permanent concrete 'slipway' structure and cable protection works using rock/ gravel filled gabion bags or backfill material. Following cable installation, the existing coastline will be reinstated to its original profile and level. Cables will lead from the landfall points to the existing substations at Moneypoint and Kilpaddoge.



With respect to the Estuaries and Reefs qualifying interests, the applicant indicated that the release of sediment, chemicals or other waste material pollution or invasive plant species during construction could result in impact to constituent community types and ecological function, which could constitute a negative effect on site integrity (see Table 3.10 of the applicant's Screening statement for AA and NIS). Therefore, mitigation measures to avoid significant release of sediment and chemical pollutants or invasive plant species to the marine environment are required (see Section 3.3.1).

### 3.2.1.3 Construction noise/disturbance

#### **Bottlenose dolphin**

The applicant indicates that the resident population of bottlenose dolphin in the Shannon Estuary is the only known resident population of this species in Ireland, with an estimated population in 2006 of approximately 140 individuals (NPWS 2013). The most recent surveys of the species in the estuary were undertaken during June to early October 2018 and estimated the population to be approximately 139 (confidence interval: 121-160). This estimate lies within the range of previous estimates calculated since 1997 indicating a stable population size (Rogan *et al.* 2018). Bottlenose dolphins in the Shannon Estuary calve between June and September with the peak calving period occurring in August (Ingram 2000).

The proposed project is located in an area of the Lower River Shannon SAC identified as important for bottlenose dolphin (NPWS 2012). Specifically, the proposed project is located in a critical habitat area which is preferentially used by the species (NPWS 2012, Berrow *et al.* 2012). Surveys reported by Rogan *et al.* (2018) indicated relatively high counts of the species in the vicinity of the proposed project area. Of relevance, Carmen *et al.* (2021) showed that whilst bottlenose dolphins were detected on 71% of the days monitored at Moneypoint using static acoustic monitoring, only 7% of the detections were classified as foraging, suggesting that the area may not necessarily be used for foraging but mainly for other activities, for example, socializing.

The potential impacts of noise on marine mammals have been the subject of considerable research; reviews are provided by Richardson *et al.* (1995), Nowacek *et al.* (2007), Southall *et al.* (2007), Weilgart (2007) and Wright *et al.* (2007). Note that the sources, measurement, and propagation of anthropogenic underwater noise, along with the auditory abilities of marine mammals, evidence of effects and potential mitigation have been more recently reviewed (e.g. Southall *et al.* 2019, 2021).

The screening process indicated the potential for significant underwater noise effects for the bottlenose dolphin qualifying interest associated with construction noise and the applicant's response to an RFI assessed potential impacts associated with vessel noise, concluding that the temporary presence and additional noise emitted from the cable laying vessel would not have a significant effect on the population of dolphins present in the Lower Shannon.

#### *Construction noise*

The applicant concluded that since individual dolphins are unlikely to remain in the vicinity of sources of injurious noise, prolonged exposure of individuals is unlikely to occur. The assessment should have considered the likely sources of underwater noise associated with the construction phase. For example, a recent AA Screening and NIS<sup>5</sup> indicated that waterborne noise generated by cable laying vessels, cable burial and cable protection placement would not occur at levels great enough to result in either temporary or permanent auditory effects (citing Inch Cape Offshore Limited 2013, Niras 2015, Natural Power 2018).

<sup>5</sup> <https://assets.gov.ie/194855/6df1960c-66b9-45c7-88a9-66af27866bf0.pdf>

Natural Power (2018) estimated unweighted source level of ca. 172 dB re 1 $\mu$ Pa @ 1 m for rock placement and cable lay activities. Therefore, waterborne noise from activities such as placement of rock for cable protection and cable lay may result in localised and temporary behavioural effects (such as displacement), rather than exceeding PTS thresholds for non-impulsive sounds for high frequency cetaceans such as bottlenose dolphins ( $L_{E,24h} \geq 198$  dB re 1 $\mu$ Pa<sup>2</sup>·s, Southall *et al.* 2019). Mitigation measures required to avoid the potential for any significant adverse effects are summarised in Section 3.3.2.

Section 2.3.3 of this report indicates that pre- and post-construction survey campaigns (cable burial depth and bathymetric surveys) will be carried out to confirm the target burial depth has been achieved. The applicant did not provide details of potential survey equipment (or underwater noise source levels) that will be used and the screening assessment did not address this aspect. Given the potential for significant underwater noise effects on the bottlenose dolphin qualifying interest, examples of potential geophysical survey equipment that may be used and their respective noise source levels are provided in Table 2.1.

The emitted sound fields from sources such as SBPs, side-scan sonar and echosounders are of much lower amplitude and extent compared to seismic surveys using airguns due to their lower source levels, higher central operating frequencies and greater directionality (narrower beam widths) (e.g. Boebel *et al.* 2005, Genesis 2011). However, very few empirical field data are available to quantify these expectations. The most relevant work to date is part of the study funded by the US BOEM: following the calibrated measurements of Crocker & Fratantonio (2016), measurements were made in shallow ( $\leq 100$  m depth) open-water environments to investigate the propagation of sound from various high-resolution geophysical survey (HRGS) sources (Halvorsen & Heaney 2018). Problems were encountered during the open-water testing resulting in a lack of calibration in the reported sound source levels (Labak 2019). The accompanying advice note (Labak 2019) emphasises that these uncalibrated data should not be used to provide source level measurements, and consequently the reported isopleths (summarising sound propagation) should not replace project-specific sound source verifications. A further project to calibrate these measures and provide an expanded assessment of propagation commenced in 2019.

Despite these caveats, it is worth noting some general patterns observed in Halvorsen & Heaney (2018). In all test environments, broadband received levels from all SBP chirper, echosounder and side-scan sonar devices tested were rapidly attenuated with distance from source, with particularly pronounced fall-off for directional sources when the receiver was outside of the source's main beam. The greatest propagation was generally observed at the deepest test site (100 m water depth) from sources generating low frequencies ( $< 10$  kHz); by contrast, at 100 m water depth, some of the highest frequency sources ( $> 50$  kHz) experienced such attenuation that they were only weakly detectable or undetected by recording equipment. In all open-water test environments, broadband received levels did not exceed 160 dB re 1 $\mu$ Pa (rms)<sup>6</sup> beyond 200 m from any chirper SBP, echosounder or side-scan sonar device tested. While recognising that these results require refining, preliminary evidence suggests that these electromechanical HRGS sources generate a very limited sound field in the marine environment, and of a much lower magnitude than those generated by seismic airgun sources.

It is noted that neither of the BOEM studies tested a parametric SBP, and that this potential source has the highest indicative source level of those listed in Table 2.1. The mechanism by which these devices generate the low-frequency signal of interest (secondary) requires initial emission of a high amplitude signal (primary). However, the high frequency of this initial signal

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<sup>6</sup> The 160 dB re 1 $\mu$ Pa (rms) isopleth represents the acoustic exposure criterion for behavioural disruption from impulsive noise as described by NMFS (2016), although this criterion is not universally adopted in policy or guidance elsewhere (such as the UK).

and its associated narrow beam width (~2 degrees) will limit its horizontal propagation; in the absence of empirical measurements, a similar pattern to that observed by Halvorsen & Heaney (2018) for chirper SBPs and echosounders can be reasonably assumed for a parametric SBP of this specification.

Marine mammals, for which sound is fundamental across a wide range of critical natural functions, show high sensitivity to underwater sound. Generally, the severity of effects tends to increase with increasing exposure to noise with both sound intensity and duration of exposure being important. A distinction can be drawn between effects associated with physical (including auditory) injury and effects associated with behavioural disturbance. With respect to injury, risk from an activity can be assessed using threshold criteria of sound levels, with the most recent criteria presented in Southall *et al.* (2019). Auditory capabilities, and in particular the range of frequencies over which sensitivity is greatest, varies between species and criteria are assigned to functional hearing groups with accompanying injury criteria.

Bottlenose dolphin are classified as a high frequency cetacean with a threshold criteria for the onset of PTS at 230dB re 1µPa (peak) for impulsive noise. This hearing group has an estimated hearing range of between 150Hz and 160kHz, with a region of greatest sensitivity (8.8kHz to 110kHz) and peak sensitivity (58kHz) (see Southall *et al.* 2019). Given the source characteristics and evidence of propagation presented above, the potential sources in the proposed survey will not result in received sound levels exceeding this threshold beyond more than a few metres from the source (e.g. SSS and SBP), or are not within the estimated hearing range (e.g. MBES). Mitigation measures (Section 3.3.2) will ensure that significant effects associated with pre- and post-construction surveys are avoided.

#### **Diadromous fish**

The applicant indicates that both sea lamprey and river lamprey have the potential to feed and migrate within the project area although they do not spawn there.

The sea lamprey is a migratory species which grows to maturity in the sea and migrates to freshwater to spawn. They migrate through the estuary from the sea in April and May (Hardisty 1969) and spawn in rivers in late May or June and then return to sea.

The river lamprey is a migratory species which grows to maturity in estuaries and migrates to freshwater to spawn from October to December (Maitland 2003). Spawning occurs in the rivers in March and April. Between July and September young adults at 3-5 years of age migrate during darkness to the estuary.

A number of rivers that flow into the Shannon Estuary are fished for salmon. These include the River Fergus, Castleconnell Salmon Fishery, River Mulchair, River Maigue and River Deel. Salmon Smolts typically head out to sea between March and June and adults return to the river between March and August. There are no spawning sites at the project area; however adult fish will pass through the site when travelling up the river to spawn or on return to the sea or as smolts on their first migration to the sea.

It is worth noting that there have been numerous recent reviews of the effects of anthropogenic sound on fish (e.g. Popper *et al.* 2014, Hawkins *et al.* 2015, Carroll *et al.* 2017, Slabbekoorn *et al.* 2019).

Atlantic salmon *Salmo salar* have been shown through physiological studies to respond to low frequency sounds (below 380Hz), with best hearing at 160Hz (threshold 95 dB re 1 µPa). Harding *et al.* (2016) note a lower sensitivity at 100Hz than previously reported (Hawkins & Johnstone 1978), and greater sensitivity at frequencies of >200Hz, with evidence of some response at 400-800Hz. However, the authors qualify their results with differences in

methodological approach, and the use of fish maintained in tanks receiving low frequency ambient sound within the greatest range of sensitivity (<300Hz) for some time in advance of the experiments taking place. The ability of salmon to respond to sound pressure is regarded as relatively poor with a narrow frequency span, a limited ability to discriminate between sounds, and a low overall sensitivity relative to other fish species (Hawkins & Johnstone 1978, Harding *et al.* 2016). A study of the hearing ability of sea lamprey (*Petromyzon marinus*) reported that, consistent with fish lacking a swim bladder, sea lamprey showed a limited sensitivity to sound, with juveniles detecting tones of 50-300Hz, but not higher frequencies (Mickle *et al.* 2019).

The applicant indicates that prolonged exposure of individual fish to injurious noise from excavation and cable laying activities is unlikely to occur as fish are unlikely to stay in the vicinity of noise sources; there will therefore be no potential for significant adverse effects. Given the limited evidence of physical injury to fish from exposure to high amplitude low-frequency seismic survey noise (as reviewed in Carroll *et al.* 2017), the potential risk of injury to diadromous fish species from construction noise including post-construction survey is considered to be extremely remote. While it is recognised that construction noise may influence several aspects of fish behaviour, including inducing avoidance and altering swimming speed, direction and schooling behaviour, (e.g. De Robertis & Handegard 2013, Popper *et al.* 2014), such effects will be in the context of the small and temporary increment of vessel presence compared to wider shipping in the area. Given the limited and variable evidence of behavioural responses of fish to high amplitude low-frequency seismic survey noise (which are low-level and short-term), the comparatively lower amplitude source characteristics of the sources in the proposed works (e.g. rock dump, cable lay and post-construction survey, see above), in addition to the relatively short duration of the works, the risk of significant behavioural disturbance to diadromous fish is considered to be extremely low. No adverse effects on site integrity are expected with respect to the diadromous fish qualifying interests.

#### 3.2.1.4 EMF effects

Marine Institute comments with respect to the initial consultation, indicated that the impact of magnetic fields on designated fish species (salmon, lamprey) and marine mammals (bottlenose dolphin) should be considered and in response, the Applicant provided information (see Table 1.2). Further relevant information from a recent review of the topic BEIS (2022<sup>7</sup>) is provided below.

Field measurements of the EMF zone of effect associated with buried cables are very limited. Hutchison *et al.* (2018, 2020) reported measurements from two HVDC cables (Cross Sound Cable – providing power up to 330MW via a 300kV cable; Neptune Cable – providing power up to 660MW via a 500kV cable, both east coast USA) operating with a current of 345 and 1,320 A respectively; and one AC cable (sea2shore – providing power up to 30 MW) with results scaled to the maximum operating current of 502A. The DC magnetic fields measured deviated from the background magnetic field in the range of 0.4-18.7  $\mu$ T for the Cross Sound Cable and 1.3-20.7  $\mu$ T for the Neptune Cable. The observed variation along each cable route was primarily attributed to variations in burial depth of the cable. Peak values occurred almost directly above the cable location, reaching background levels at approximately 5m either side of the cable (Hutchison *et al.* 2018, 2020).



An unexpected weak AC magnetic and electric field was also measured from both HVDC cables (Cross Sound Cable – average MF 0.15  $\mu$ T, EF 0.7 mV/m; Neptune Cable – average MF 0.04  $\mu$ T, 0.4 mV/m) possibly from the AC/DC converter stations (Hutchison *et al.* 2020). The AC magnetic field reached background levels approximately 10m from the cable, while the AC electric field reached background levels on a scale of hundreds of metres from the cable.

Field enclosure studies (Hutchison *et al.* 2020) indicated that anthropogenic EMFs emitted by HVDC subsea cables were within the range of biologically relevant EMF intensities. A number of reviews and studies have sought to investigate and characterise the potential impacts of anthropogenic EMFs to magneto and electrosensitive species, these studies also highlight the significant knowledge gaps in relation to species ranges of detection and potential response impacts (Hutchison *et al.* 2018).

Salmonids which undergo long-distance migration, including Atlantic salmon (Scanlan *et al.* 2018, Minkoff *et al.* 2020), Chinook salmon (*Oncorhynchus tshawytscha*) (Naisbett-Jones *et al.* 2020, Putman *et al.* 2018); and Pacific/sockeye salmon (*Oncorhynchus nerka*) (Putman *et al.* 2013) use magnetoreception for orientation. Juvenile Chinook salmon were shown to be sensitive to the orientation of the magnetic field, laboratory experiments showed that fish exposed to a magnetic field with an inverted vertical component did not move as far upwards as fish tested in the ambient geomagnetic field (Putman *et al.* 2018) suggesting that salmon use the direction of magnetic field lines to orient vertically. A study examining a 56-year fisheries data set to determine the influence of geomagnetic field drift on the variation in spawning migration routes used by adult Pacific salmon to reach the Fraser River mouth demonstrated that field drift accounted for 16% of the variation between routes to the north or south of Vancouver Island (Putman *et al.* 2013).

Few studies assess interactions of migratory species with cable EMFs. Tagging studies investigating the effect of a subsea DC power cable on migrating European eels observed that swimming speed was significantly lower as the eels passed over the cable compared to speeds either side of the cable (Westerberg & Lagenfelt 2008). A tagging study of Pacific salmon smolts during their migration through the San Francisco bay found that installation of a DC transmission cable did not significantly impact the proportion of fish that successfully migrated through the bay, but, higher proportions of fish were found to cross the bay over the cable location than crossed in that location prior to installation (Wyman *et al.* 2018). While both studies indicated behavioural changes in response to the subsea power cable, the cable did not appear to present a barrier to their normal migration route. Therefore, likely significant effects associated with EMF on the migratory fish qualifying interests of the Lower River Shannon SAC (River Lamprey, Sea Lamprey and Salmon) are not expected.

BEIS (2022) indicated that the interaction between anthropogenic EMF and marine mammals is not well understood, with the assessment of the impacts of EMF to marine mammals largely undetermined and with very little recent current research in this area. Whilst there remains the potential for marine mammals to detect EMF emissions within the immediate locale of the cable, to date there has been no evidence to indicate that the sensitivity and/or magnitude of these impacts are sufficient to significantly impact marine mammal resources and no sensitivity thresholds for marine mammals in the environment have been proposed by regulators. Given the risks to marine mammals from EMFs associated with submarine power cables are not considered to constitute a major impact (Taormina *et al.* 2020, BEIS 2022), likely significant effects on the bottlenose dolphin qualifying interest from EMF are not expected.

The Applicant noted in Table 1.2 that, in line with its strategic commitment to update the EirGrid Evidence-Based Studies, to reflect marine receptors in 2023, EirGrid commits to engage with

all relevant stakeholders, including the Marine Institute. The updates will include reviewing the evidence base for, and potential options to conduct primary research in EMF.

### 3.2.2 River Shannon and River Fergus Estuaries SPA

The applicant indicates that the site has vast expanses of intertidal flats which contain a diverse macroinvertebrate community which provides a rich food resource for the wintering birds. Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost areas for the wintering birds. Elsewhere in the site the shoreline comprises stony or shingle beaches. The applicant points to the site synopsis report for a full description of the site which is included in Appendix 1 of the Screening statement for AA and NIS. The site synopsis uses bird count information primarily covering the period 1995/96 to 1999/2000. More recent count data attained during the 2010/11 NPWS Waterbird Survey programme are provided in the Conservation Objectives supporting document (NPWS 2012).

#### 3.2.2.1 Construction noise/disturbance

The applicant indicates that of the bird qualifying interests, cormorant is the species at highest risk from significant underwater noise effects as it can remain underwater for extended periods of time while the other species are primarily intertidal species which exhibit limited or no diving behaviour.

The applicant could have noted that the reported in-air hearing sensitivity for a range of diving duck species, red-throated diver, gannet and puffin have been tested for tone bursts between frequencies of 500Hz and 6kHz. Results indicated a common region of greatest sensitivity from 1-3 kHz, with a sharp reduction in sensitivity >3-4 kHz (Crowell *et al.* 2015, Mooney *et al.* 2019). Testing on the long-tailed duck underwater showed reliable responses to high-intensity stimuli (>117 dB re 1µPa) from 500Hz-2.9 kHz (Crowell 2014). Hansen *et al.* (2017) suggested cormorant to have greatest hearing sensitivity at 2kHz, with an underwater hearing threshold of 71dB re 1µPa. It was further noted by the authors that cormorant hearing thresholds are comparable to seals and toothed whales in the 1-4kHz frequency band, suggesting the possibility that they use auditory cues for foraging and/or orientation.

No information was provided by the applicant on the level of underwater noise likely from trench excavation and cable laying activities. However, as indicated in Section 3.2.1.3, the noise is unlikely to exceed that associated with the construction vessels. As indicated in the Screening for AA report, vessel noise associated with construction activities is likely to be in the range 165-190dB re 1µPa@1m (depending on size of vessel), with the majority of energy below 1kHz. The observed region of greatest hearing sensitivity of diving birds suggests limited overlap with peak energy from vessel operations. With respect to underwater noise associated with post-construction survey activities, the frequency ranges of the potential equipment are much higher than the hearing range of cormorant.

Given the limited temporal and spatial nature of the construction activities and the limited sensitivity of the bird qualifying interests, underwater noise associated with the proposed excavation and cable laying activities will not have an adverse effect on the bird qualifying interests including the diving species cormorant.

The applicant noted (Table 2.12 of the Screening statement for AA and NIS) that the other bird qualifying interests feed on intertidal habitats which are not present within ca. 2km of the proposed development. Therefore, aerial construction noise/disturbance at the cable landfall or during offshore works will not have a significant effect on these species.

### 3.2.2.2 Physical disturbance to seabed and sediment resuspension from cable installation works

Table 2.12 of the applicant's Screening statement for AA and NIS indicated that bird species use wetland habitats for foraging. The structure and functionality of wetlands are influenced by the hydrological regime and sediment transport. If sediment deposition plumes generated during excavation activities overlap wetland habitats there is potential for significant direct effect to wetlands and indirect effect to bird foraging.

Section 3.2.1.1 above provides relevant information on the applicant's sediment modelling exercise (Appendix 2 of the applicant's Screening statement for AA and NIS), which indicates that sediment plumes generated could lead to deposition of sediment on Annex I habitats and constituent community types.

Relatively high sediment deposition was predicted in the intertidal area of the small bay to the south east of the project supporting the Annex I habitat Mudflats and Sandflats not covered by seawater at low tide (Figure 3.2). However, it was noted that marine life can survive rapid sediment deposition up to depths of 100mm (OSPAR 2008, 2009), five times the depth predicted by the model for the worst-case scenario. The applicant could have noted that based on the description of the community present in this small bay; intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex (Figure 3.1), which indicates that the polychaete *Hediste diversicolor* and the bivalve *Macoma balthica* may be recorded in moderate to high abundances (NPWS 2012), the community may accord with the EUNIS 2008 habitat A2.4111 *Hediste diversicolor* and *Macoma balthica* in littoral gravelly mud, considered to have a low sensitivity to smothering (of up to 5cm of fine material)<sup>8</sup>. Therefore, the proposed works will not have an adverse effect on the permanent extent of the relevant wetland habitats, which constitute an important resource for the regularly-occurring migratory waterbirds.

## 3.3 Mitigation measures

The applicant indicates that all proposed project works will be carried according to best practice guidance, including but not limited to guidance on preventing pollution from construction sites and pollution prevention guidance. The Outline CEMP included with the Planning Application defines the boundaries where construction will be undertaken. The detailed measures to be implemented for the project to avoid environmental effects occurring will be detailed in full in a CEMP that will be prepared by the appointed Contractor.

### 3.3.1 Activities associated with onshore pre-construction

Section 3.6 of the applicant's Screening statement for AA and NIS details mitigation measures for the avoidance of adverse effects to marine habitats from the release of sediment, chemicals or other waste material pollution (Section 3.6.1) or invasive plant species (Section 3.6.2).

### 3.3.2 Construction and vessel noise/disturbance

Section 3.6.3 of the applicant's NIS outlines measures to mitigate potential effects of project noise to marine mammals which include measures outlined in DAHG Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters (DAHG 2014).

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[https://www.marlin.ac.uk/habitats/detail/1175/hediste\\_diversicolor\\_and\\_macoma\\_balthica\\_in\\_littoral\\_gravelly\\_mud](https://www.marlin.ac.uk/habitats/detail/1175/hediste_diversicolor_and_macoma_balthica_in_littoral_gravelly_mud)

The appointed Contractors will adhere to DAHG (2014) guidance on including use of marine mammal observers (MMOs) to mitigate the risk to marine mammals of potential noise impacts associated with the proposed pre- and post-construction survey, trench excavation and cable laying. With respect to survey operations, Section 4.3.4(ii) of the guidance will be followed. Trench excavation and cable laying operations shall not commence until after the successful completion of pre-start visual monitoring, undertaken by MMOs as per DAHG guidance, with no marine mammals observed over the required monitoring period in the monitored zone.

Once pre-start monitoring requirements have been achieved, operations can be commenced. To further mitigate potential risk of adverse effects occurring, the subsea cable installation operations will be carried out outside of peak bottlenose dolphin calving season (August). Prior to undertaking the project, the MMO will consult with the NPWS on the full scope of measures required to be implemented. The MMO will consult with IWDG, prior to, during and after completion of the works, unless otherwise agreed with the IWDG.

### 3.4 In-combination effects

The applicant's AA Screening noted the potential for in-combination noise effects with the Moneypoint Synchronous Condenser development as well as the proposed Shannon Technology and Energy Park<sup>9</sup>, if the projects were constructed simultaneously with the proposed works. Construction of the Synchronous Condenser development appears to be well progressed (e.g. see<sup>10</sup>), with commissioning of the new plant planned for mid-2022 and commercial operation in October 2022<sup>11</sup>. Therefore the potential for construction noise effects to coincide with the proposed works is considered minimal.

Subject to planning consent and other approvals, a construction start date of January 2023 was provided for the proposed Shannon Technology and Energy Park<sup>12</sup>, with construction anticipated to take 32 months. Noise modelling (Vysus 2021, Appendix 4 of STEP NIS<sup>13</sup>) and an ecological impact assessment (LGL 2021, Appendix 5 of STEP NIS) for the STEP project concluded that pile driving was the only source of noise that had the potential to cause a permanent threshold shift (PTS) for dolphins. Sources of continuous non-impulsive sounds (such as vessel noise) had no potential for PTS. The report concluded that the potential disturbance exposures would have no more than a minor impact, such as localised short-term avoidance of the area around the activities by individual animals, with no effect on the population. Based on these findings, the applicant of the proposed cable-installation works concluded that the temporary presence and additional noise emitted from the cable laying vessel would only have a minor effect and an insignificant effect on the noise climate. Given the implementation of relevant mitigation measures (Section 3.3.2) and the very limited chance of simultaneous construction, the potential for in-combination noise effects from the proposed works and the STEP project to have an adverse effect on the site integrity of the Lower River Shannon SAC is considered minimal.

### 3.5 Transboundary effects

No transboundary effects were identified.

<sup>9</sup> <https://www.pleanala.ie/en-ie/case/311233>

<sup>10</sup> <https://www.dieselgasturbine.com/news/siemens-world-s-largest-flywheel-shipped/8019928.article>

<sup>11</sup> <https://www.clareecho.ie/irelands-first-synchronous-compensator-to-be-in-operation-at-moneypoint-next-october/>

<sup>12</sup> <https://www.pleanala.ie/publicaccess/EIAR-NIS/311233/Natura%20Impact%20Statement/STEP%20NIS.pdf?r=996306509653>

<sup>13</sup> <https://www.pleanala.ie/publicaccess/EIAR-NIS/311233/Natura%20Impact%20Statement/STEP%20NIS.pdf?r=403617700280>



### 3.7 Appropriate Assessment Conclusion

Supporting information
The applicant provides sufficient ecological baseline information and details of the Conservation Objectives for each of the Natura 2000 sites assessed (Section 3.3 of the NIS). In general this information is objective, scientifically grounded and sufficient to inform the assessment.
Consideration of impacts
The applicant provides adequate information of sufficient quality to assess the potential for direct and indirect effects on the Conservation Objectives of the relevant sites. Where more recent information is available this has been highlighted but this information does not change the outcome of the applicant's consideration of impacts.
Mitigation measures
The mitigation measures described in Section 3.3 of this report are sufficient to avoid significant impacts on the relevant sites.
In-combination effects
Section 3.4 of this report provides an adequate assessment of other activities that could potentially have in-combination effects with the proposed works. No significant in-combination effects are expected.
Transboundary effects
No transboundary effects were identified or are considered likely.
Appropriate Assessment conclusion
<p>The applicant's NIS provides sufficient data and information on the proposed works, the relevant sites and analysis of potential effects on those sites, to allow the Competent Authority to complete an AA.</p> <p>The applicant has shown that the operations will not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion.</p>

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