Aztec Management Consultants response to alteration recommendation to the period of Permitted Maritime Usage as outlined in Specific Condition 28 in Maritime Usage Licence LIC230013

Licence Holder: Port of Waterford Company

Prepared by Aztec Management Consultants

Aztec Management Consultants
4 The Nurseries,
Avondale Road,
Killiney, Co. Dublin A96 YR29, Ireland
E: martin@azteconsultants.ie

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Contents

1. Introduction

Dr Martin O'Farrell of Aztec Management Consultants was commissioned by Malone O'Regan Environmental ('MOR Environmental'), on behalf of the Port of Waterford Company ('the Applicant'), to prepare a response in relation to the proposed amendment to Specific Condition 28 of the Maritime Usage Licence ('MUL') LIC230013 issued by the Maritime Area Regulatory Authority ('MARA') on 30th June 2026. MUL LIC230013 was for '*Geotechnical investigation required to support the design of a proposed 250m Offshore Renewable Energy (ORE) capable quay extension in the River Suir at the Port of Waterford, Belview, Co. Kilkenny*.'

As part of the approved MUL, MARA included Specific Condition 28:

> ***"28.*** *Fish spawning and nursery grounds*
>
> *(i) The Holder shall not undertake the Permitted Maritime Usage between **1st November** and **31st January** annually, to ensure least disturbance to known fish spawning along the survey route.*
>
> *Reason: To ensure protection of the marine environment"*

As outlined in Section 6, page 19, of the Maritime Usage Licence Assessment Report, dated 29th May 2026, the inclusion of Specific Condition 28 was based on a submission issued by the Sea Fisheries Protection Authority ('SFPA') [1].

The submission by the SFPA makes specific reference to schools of spawning stocks of sprat, herring, cod and turbot that have the potential to move through the estuary, see Appendix A.

The objective of this report is to provide additional information to the findings of the Ecological Impact Assessment included in the Assessment of Impact on the Maritime Usage ('AIMU') report prepared by MOR Environmental.

This report provides further detail on the proposed methodology, duration and scale of the proposed project in the context of the total available spawning areas and timings of the subject species of concern, as outlined by the SFPA, should the works be carried out between 1st November and 31st January. It also provides details on the potential impacts of the proposed works on the subject species of concern.

The species of concern assessed in this report, as outlined by SPFA, included:

- European Sprat (*Sprattus sprattus*);
- Herring (*Clupea harengus*);
- Cod (*Gadis morhua*); and,
- Turbot (*Psetta maxima*) (formerly *Scophthalmus maximus*).

It should be noted that the subject matter of the response concerns the timing of the proposed works, as these commercial fish, as raised by the SFPA, do not spawn in the Waterford Estuary. This assessment is not related to Appropriate Assessment or the Habitats Directive or Annex IV species or Annex habitats.

1.1 Background and Experience

I, Dr. Martin O'Farrell, completed my undergraduate studies at NUI Galway (B.Sc. (Hons) in Zoology and also carried out research on the feeding ecology of fish populations in the Clare River system for my PhD degree, which was also completed at NUI Galway. I held a Post-Doctoral fellowship at the Zoology Department, Trinity College, Dublin for a three-year period during the 1980s. During this decade, I also worked as a Scientific Officer for the then Central Fisheries Board, carrying out fisheries management-related research on Atlantic salmon and sea trout on the River Erriff and other west of Ireland catchments.

I commenced my fisheries consultancy business in 1985 and during the past three decades or so have been involved in the assessment of fisheries management issues on industrial rivers fuelling hydroelectric generating stations and supplying cooling water for thermal electricity generating stations in Ireland, UK, Switzerland, France, Norway, Sweden, Russia and the USA. These issues have included assessment of turbine passage survival, assessment of fish species life stage migration patterns through the deployment of fish census technology, mitigation measures involving selected generating protocols and hatchery operations and the design and installation of fish deterrent technologies to improve upstream and downstream passage of migratory fish species life stages through and around obstacles in the path of their migrations.

I have extensive knowledge and experience of fish species in estuaries in general and in Waterford Harbour in particular. I have carried out extensive fish and fisheries research in Waterford Harbour over the years, with particular reference to portal development works and cooling water abstraction at thermal electricity generating stations. Since 2020, I have completed a total of 11 fish impingement studies at Great Island CCGT Cooling Water System on behalf of the station owners, SSE.

1.2 Proposed Works and Location

The proposed works permitted under MUL LIC230013 included geotechnical site investigation at the proposed ORE berth location at the Port of Waterford. These site investigations will consist of:

- Drilling ca. ten (10No.) boreholes ca. 200mm in diameter;
- Drilling ca. ten (10No.) coreholes ca. 200m in diameter; and,
- Associated sampling and testing.

The equipment for excavating boreholes will be a cable percussive drilling rig such as a Dando 2000/3000. The borehole is advanced through a casing, 200mm in diameter, by using a cutting tool.

Coreholes will result in the recovery of a length of rock between two and four metres in length and 150mm to 200mm in diameter. The rock will undergo a suite of laboratory tests to determine strength, fractures and other geological information. The equipment used for extracting coreholes will include a GEO 205 drill rig or similar using triple tube core drilling techniques and air-mist coolant. The corehole is advanced using a diamond drill.

All equipment that will be used for the drilling work will be placed on a barge. All drilling works will be through the river into underlying soils and rock. Access to the Site will be from Belview Port. It is anticipated that the works will take approximately three weeks to complete.

The area in which the proposed works will take place is located in an area adjacent to the shoreline within the River Suir in an area ca. 2.48 hectares (‘ha’) in size. This area is located adjacent to the active Port of Waterford, see Figure 1.

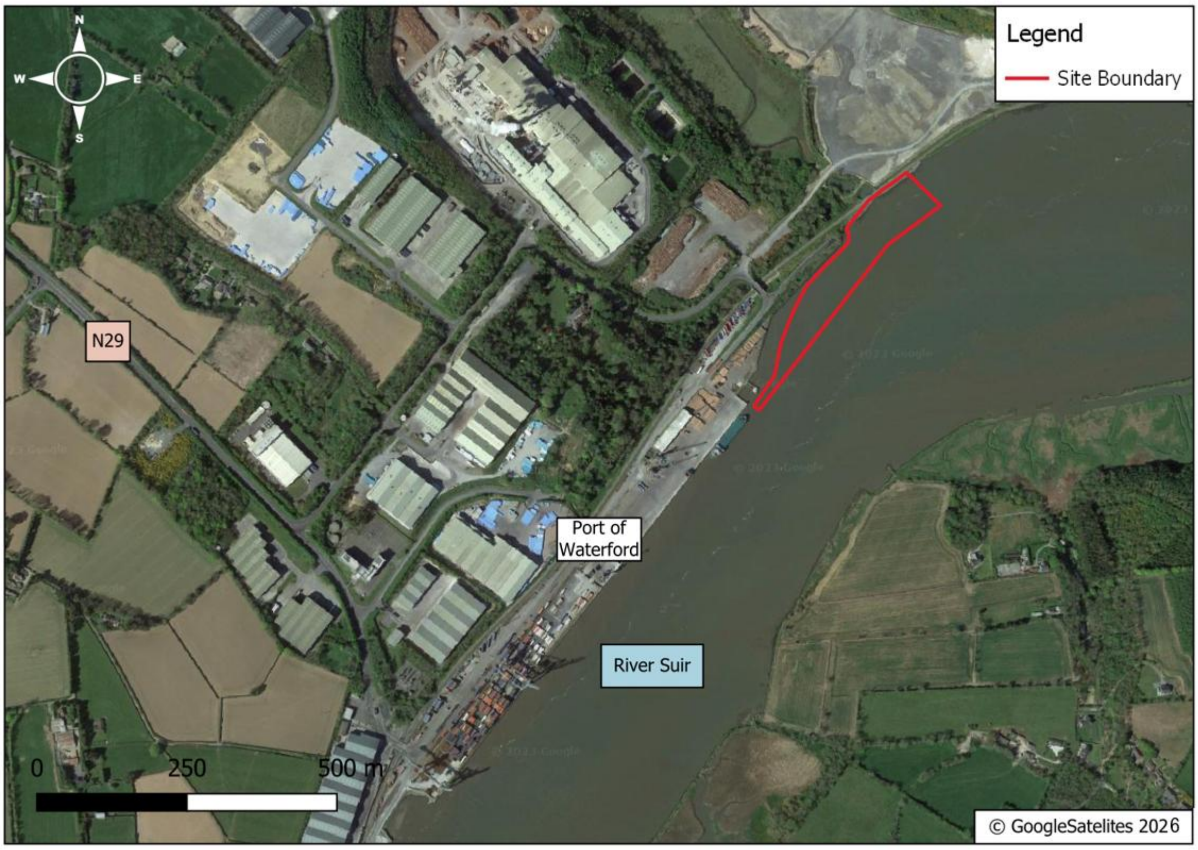

Figure 1: Site Location

2. Specific Condition 28 Background

MARA issued the '*Minded to Determine Notice*' to the Applicant on the 29th May 2026. Following a review of the conditions, the Applicant issued '*Supplementary Information in Response to Specific Conditions of the Proposed Licence*' on the 24th June 2026.

MARA undertook a review of the supplementary information and issued '*Response to Supplementary Material on a Minded to Determination*' on the 29th June 2026. Within this response, MARA stated that the Applicant's response to Condition 28 was outlined as:

> "*The Applicant requests removing Specific Condition 28 on the basis that there is no scientific evidence, either in MARAs assessment or from Sea Fisheries Protection Authority (SFPA) to support a seasonal restriction on SI activities between 1st November and 31st January. The Applicant notes that their submitted AIMU and NIS assessed the potential disturbance to fish populations, and concluded that the short-term, localised and daytime nature of the proposed MUL would not result in likely significant impacts. The Applicant highlights the NPWS conclusion that the proposed SI activities will not adversely impact fish populations*."

MARA's response to the supplementary information included:

> *"The reason for this condition is to ensure the protection of the marine environment, specifically fish spawning grounds. MARA acknowledges the Applicants concern regarding the scientific basis for the proposed seasonal restriction. While limited site-specific empirical evidence was provided by SFPA in support of the seasonal restriction, MARA notes that the suggestion restriction aligns with the precautionary principle, having regard to the potential for disturbance of commercially important spawning grounds within the estuary and wider nearshore area. MARA acknowledge*

that local SFPA officers retain significant detailed knowledge of fisheries activity and species distribution within the Waterford estuary. This local knowledge plays a crucial role in the management of fisheries, particularly where empirical data are missing, or does not provide a full picture of the receiving environment.

MARA notes that the NPWS submission relates primarily to conserving the integrity of European Sites, rather than a detailed assessment of fish spawning activity. MARA have reviewed available MI spawning and nursery datasets which indicate that the proposed MUL area does not overlap mapped spawning and nursery grounds. MARA have also reviewed MI Groundfish Survey data, which indicates the presence of sprat in offshore waters beyond the harbour entrance; however, it should be acknowledged that these surveys provide limited coverage of shallow inshore and estuarine areas and likely do not capture the full distribution of sprat in the area.

While no empirical turbot dataset was identified by MARA, the absence of records should not be interpreted as confirmation of absence, particularly given the comments of the SFPA. Considering the sensitivity of spawning fish, the limited availability of inshore fisheries data, and the potentially disruptive, albeit temporary, nature of the proposed SI activities, MARA considers that the condition should remain."

Following the issuing of the Final MUL LIC230013, I, Dr Martin O'Farrell, undertook informal engagement with SFPA to gain an understanding of their position and to share my extensive knowledge of species distribution and spawning grounds within the estuary, some of which is not publicly available.

3. General Fish in Estuaries: A Summary Account

It was deemed appropriate to prepare a summary account of fish in estuaries to provide an evidence base, by way of scientific literature, scientific textbooks, etc., for this rebuttal text to the SFPA submission.

There is extensive knowledge of the presence of fish species in Irish estuaries, including the Waterford Estuary, as surveys have been carried out over the years by Inland Fisheries Ireland ('IFI') for the classification of estuaries in the context of the EU Water Framework Directive. Results from such survey work have been summarised by Connor *et al* (2019) [2].

There are also a number of classification schemes for fish in estuaries in the scientific literature, such as:

Tweedley et al (2016) [3] reference the Estuarine Usage Functional Group (EUFG), a classification scheme that recognises that, irrespective of estuary type, the fish species can be assigned to one of four main categories, i.e. marine, estuarine, diadromous and freshwater:

- Marine species are those that spawn at sea;
- Estuarine-resident species comprise those that complete their life cycle within the estuary;
- Diadromous species constitute those that feed at sea and migrate into fresh water to spawn or undergo the reverse migration; and,
- Freshwater species are those that spawn in freshwater.

Dando (1984) [4] provides a concise summary of how fish use estuaries and states that estuaries typically exhibit rapidly fluctuating conditions, which are not ideal for egg and larval development. Many species inhabiting estuaries migrate into either freshwater or the sea to spawn. Only a few estuarine fish are true estuarine residents in that they both live and breed in estuaries. The majority of fish that breed in estuaries show some reproductive specialisation. Numerous marine species use the sheltered and nutrient-rich estuaries as nursery grounds. Post-larvae of marine spawners often enter the estuaries when only a few weeks old and concentrate, together with post-larvae from estuarine spawners, in narrow zones within the estuaries.

Dando (1984) classified 'estuarine' fish into six groupings:

- Diadromous fish passing through estuaries - anadromous species such as *Salmo salar* L., *Salmo trutta* L., *Lampetra fluviatilis* L. and catadromous species such as *Anguilla anguilla (L.).*
- Freshwater species which, often seasonally, penetrate into low salinities for feeding. Many may be displaced into the estuary by river spates, e.g. dace (*Leuciscus leuciscus L*.). Some of these, such as the dace, are known to form permanent populations in the tidal freshwater regions of long estuaries.
- Marine species which penetrate the mouth or lower reaches of an estuary as opportunist feeders. They frequently enter and leave with the tide. Examples include conger eel (*Conger conger)* and mackerel (*Scomber scombrus).*
- Estuarine fish are those that spend most or all of their lives in euryhaline conditions. The "true" estuarine fish are considered to be those that spend their entire life cycle in the estuary. Examples of these are the common goby (*Pomatoschistus microps).* Other estuarine fish leave the estuaries for the open sea for short periods, usually for breeding, e.g. the flounder (*Platichthys flesus).*
- Marine species which use estuaries as nursery grounds. These species are often the dominant members of Atlantic estuaries. They include members of many major groups such as the Clupeidae - herring and sprat, and Serranidae - sea bass (*Dicentrarchus labrax).*
- Freshwater and marine species which enter estuaries as adults to breed. Many of the marine species ascend into fresh water to spawn, but their post-larvae or young juveniles have estuarine nursery grounds, e.g. Twaite shad (*Alosa fallax L.*) and European smelt (*Osmerus eperlanus L.).* Some fishery workers reference these two species as 'diadromous'.

Due to the fact that estuarine conditions are considered to be hostile to egg and larval development, many estuarine fish breed elsewhere. For example, in the Tamar estuary, England, only six of the seventy-six recorded species spend their entire lifecycle in the estuary.

As outlined by Dando, P.R. in Reproduction in Estuarine Fish:

> "*Many marine species that use estuaries as nursery grounds also ascend into freshwater to spawn, e.g. smelt, Osmenis eperlanus (Lillelund, 1961), shads, Alosa spp. (Kennedy, 1969; Dovel, 1971) and sturgeons, Acipenser spp. (Vladykov and Greeley, 1963). This enables the eggs to develop in clean well-oxygenated water. Typically these fish produce demersal, and frequently adhesive eggs, and the larvae possess large yolk-sacs. During the larval period, and egg stage in shads (Mansueti, 1962), they are carried downstream and feeding commences in the productive oligohaline or mesohaline zones of the estuary (Dovel, 1971). One of the requirements of a spawning site is that it should be far enough upstream so that there is a sufficient transport distance to allow the eggs and larvae to develop before they are carried too far down the estuary*."

Additionally, the young of many other marine spawners migrate up-estuary to near the freshwater-saltwater interface. Most of these young fish are considered to utilise the net upstream flow of the saline current along the estuary bottom.

In a study of fish larvae and post-larvae in an estuary, it was observed that 97% had hatched from demersal eggs [5]. Estuary spawning by species producing pelagic eggs is uncommon, which is not surprising since pelagic larvae can be rapidly flushed out of the estuary and dispersed by the net seaward transport of the surface layers, which can occur for all estuarine larvae [4]. Some fish species have partly overcome this dispersion problem by spawning in midsummer, when water temperatures (and hence development rates) are at a maximum. The post-larvae rapidly ascend the estuary, possibly transported by the salt-wedge, to the nursery grounds at the saltwater-freshwater interface, from where there is a rapid up-estuary migration to the low salinity nursery grounds [4].

The true estuarine residents, together with the few marine and freshwater species that enter estuaries to spawn, exhibit various adaptations for spawning under estuarine conditions, and most deposit demersal eggs or non-buoyant eggs [4]. Studies have suggested that demersal eggs evolved in species living in areas with rapid currents [4]. However, in silt-laden water, demersal eggs suffer from the disadvantage that they may be buried and deprived of oxygen and may be coated with bacteria, fungi and protozoa. Therefore, a tactic used by some species to prevent silting and poor oxygenation of demersal eggs is parental care [4].

Many gobies breed in estuaries, depositing their eggs in shells, on the undersides of stones, in depressions in the ground, or in burrows in the sand or mud. The eggs are attached to the substratum by means of a special disc fringed by elongated filaments. The male guards the eggs and aerates them with his pectoral fins until they hatch. Gobies appear to be particularly successful estuarine breeders, since their larvae and post-larvae dominate the ichthyoplankton in many estuaries [4].

Overall, larvae and post-larvae from species spawning in freshwater, the estuary and the sea converge in two main estuarine regions:

- The highest concentrations of post-larvae are normally found in the highly productive region, below the freshwater interface in the 1-15% salinity region of the estuary [4].
- The second region is the productive shallow areas of the estuary with marginal vegetation [4]. Examples of these are salt marsh areas and the Zostera beds, which are favoured by mullet and many goby species.

4. Species of Concern - Baseline

The following has been prepared to assess the species of concern raised by the SFPA in their submission on the original MUL LIC230013 application.

4.1 European Sprat (*Sprattus sprattus*)

European sprat is a pelagic schooling fish usually found inshore, with juveniles sometimes found in estuaries. The species is widely distributed from Morocco to southern Norway, and four distinct stocks are identified in European waters. The International Council for the Exploration of the SEAS (‘ICES’) has considered sprat in the Celtic Seas Ecoregion (ICES subareas 6 and 7, excluding divisions 7.d & 7.e) to be one stock since 2011. European sprat is an important species in the trophic web as it links zooplankton and top predators (fish, birds and marine mammals).

Sprat perform seasonal migrations between winter feeding and summer spawning grounds as well as diel vertical migrations. Spawning occurs in shallow waters (10–20 m) along the Irish coastline, and egg production ranges from 6,000 to 14,000 eggs per female. While spawning, eggs are released directly into the water column. There is currently no evidence of spawning site fidelity (homing). A review of the ‘Species Spawning and Nursery Areas’ published by the Marine Institute and revised on the 10th July 2026 [6], confirms that there are no known spawning areas, spawning grounds, nursery areas or spawning beds for sprat within the proposed site investigation nor within 5km of the proposed site investigation area.

According to the Marine Institute's Stock Book (2025), ICES cannot assess the stock and exploitation status relative to maximum sustainable yield ('MSY') and precautionary approach ('PA') reference points because information to define reference points is not available [7]. Also, currently, there is no Total Allowable Catch ('TAC') for sprat in Irish waters.

Henderson (2014) states that sprat batch spawn up to 10 times in spring and summer, producing pelagic eggs and larvae [8]. Following metamorphosis, the juveniles often enter estuaries, marshes and other shallow waters to feed. Sprats live for a maximum of about 6 years and can reach maturity in about 1 year or less. Adult sprat enter estuaries in large numbers during winter.

The nursery areas for sprat in Irish waters have not been mapped by the Marine Institute, and no mapping is available on the SFPA or IFI websites. However, sprat spawning grounds have previously been recorded around the coastline of Ireland and the UK, see Figure 2 below [9]. The known spawning grounds are located ca. 8.1km downstream of the proposed works area.

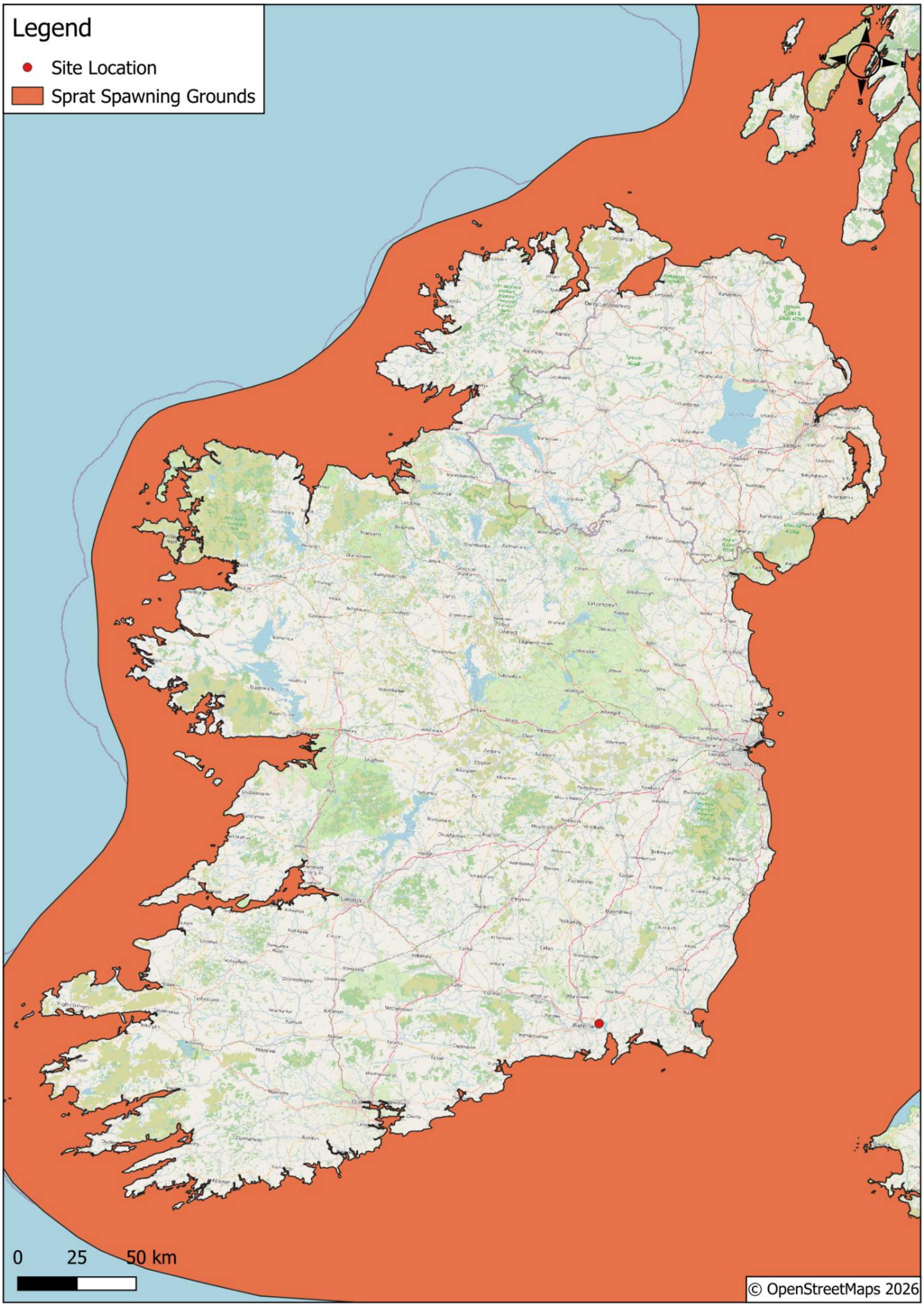

Figure 2: Sprat spawning areas in Irish Waters [9]

4.2 Herring (Clupea harengus)

Herring is a pelagic schooling fish that is found in the midwater column or close to the bottom [7]. Herring migrate to distant feeding grounds and are often found in mixed aggregations with other herring stocks. The diet of herring consists largely of zooplankton, mainly copepods. Herring are important prey for marine mammals, birds and many predatory fish.

Herring, unlike most marine fish, deposit eggs on the bottom in discrete gravel beds. In the Irish waters, the main spawning grounds for herring are off the Donegal and Mayo coasts, and inshore along the south and west coast, including Dunmore East and Cork Harbour (Figure 3 below).

According to Henderson (2014), herring in British coastal waters are divided into a number of different stocks [8]. Populations may spawn in spring or late summer-autumn. The smaller inshore populations tend to be spring spawning. The eggs are released near gravel or shell-covered seabed and become attached to the substrate, often forming a mass several eggs deep. Eggs hatch in about 3 weeks, depending on temperature. The young fish form large schools and are particularly common inshore during their first year.

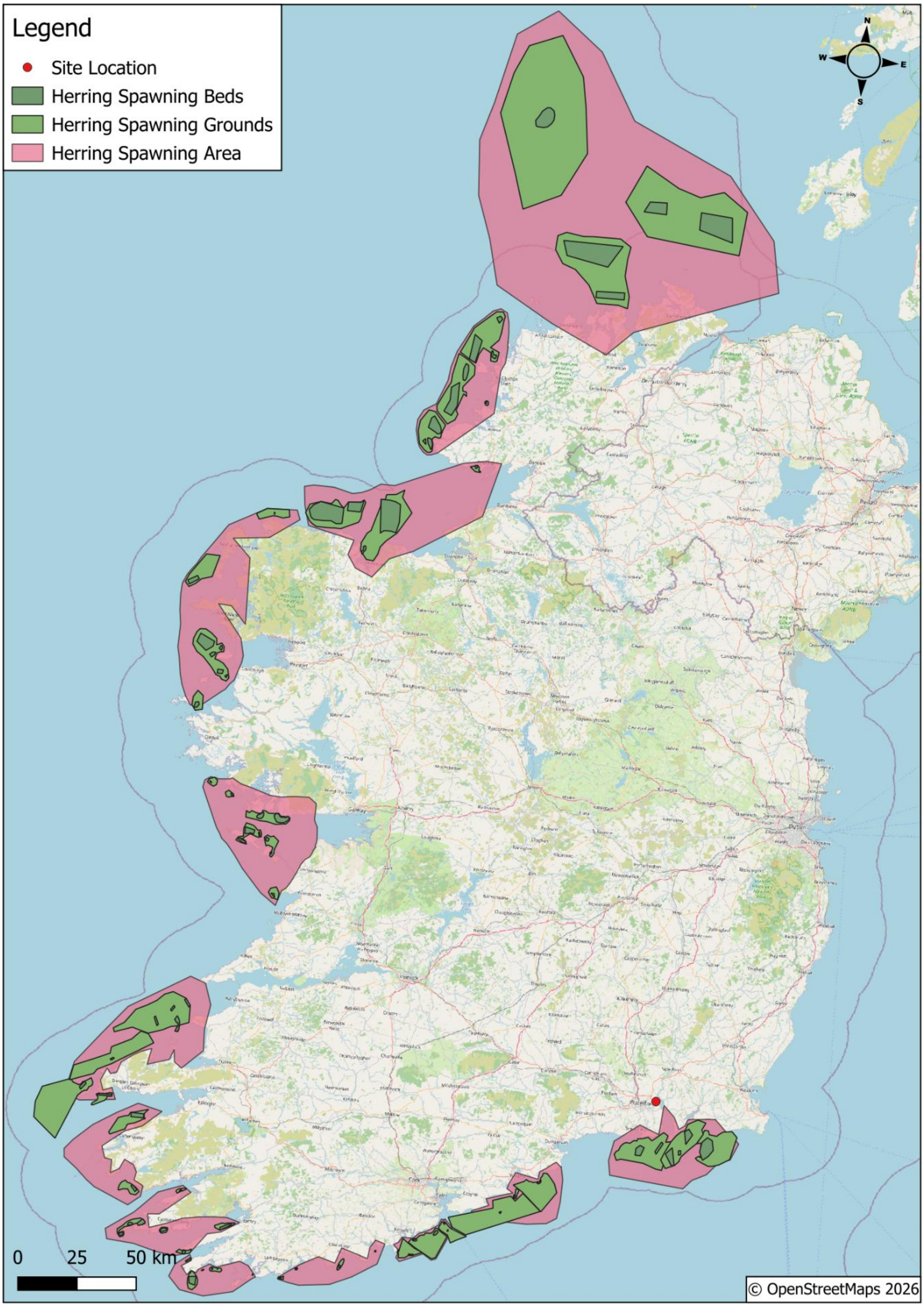

Figure 3: Herring spawning areas, grounds and beds in Irish Waters [6]

The Stock Book (2025) presents a map of herring spawning boxes off the south coast of Ireland (Figure 4) and separates areas where herring spawn during the autumn, autumn and winter and winter months. The spawning box off the Wexford and Waterford coasts are designated as winter spawning areas.

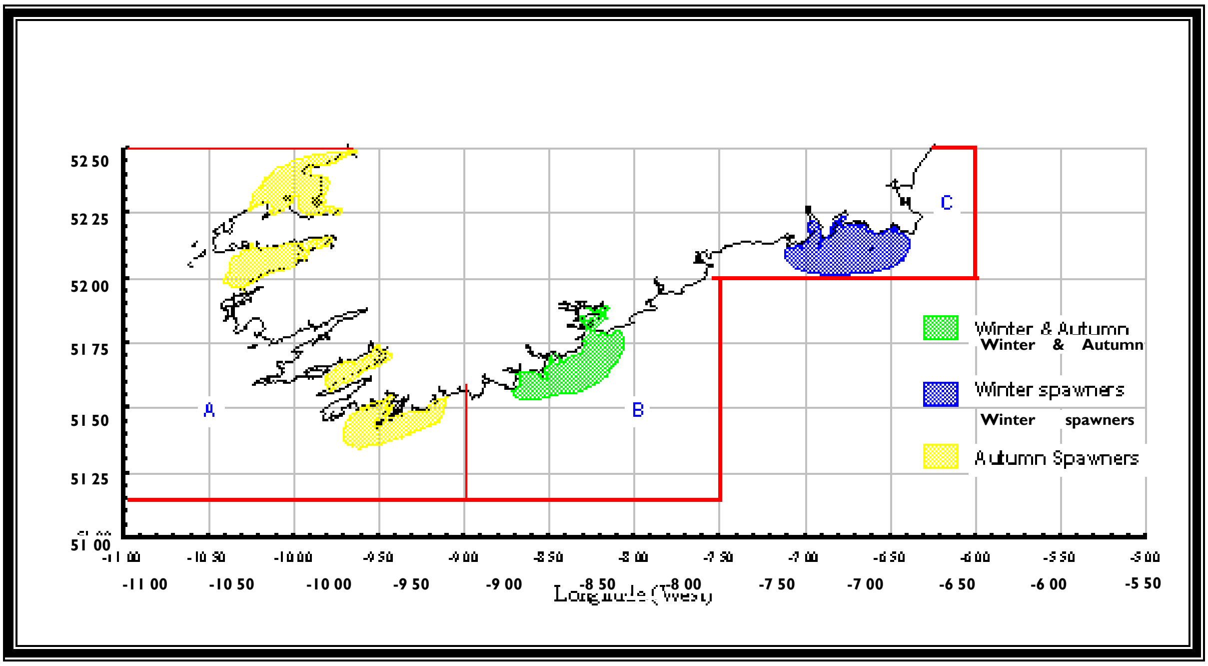

Figure 4: Herring spawning boxes off the south coast of Ireland – extract from The Stock Book [7]

With regard to Waterford Harbour, there is a known herring spawning area south of the mouth of the estuary. However, the proposed works area is not located within any known spawning areas, grounds or beds; the nearest spawning area is located ca. 6.2km downstream of the proposed works area.

4.3 Cod (Gadus morhua)

Cod around Ireland are very fast-growing and attain lengths in excess of 35cm in the first year and over 90cm as adults. About 50% of individuals are mature at 2 years, and virtually 100% are mature by 3 years of age. Juveniles are most commonly found at depths from 30 to 80m, mainly on rocky bottoms. Their diet consists of benthic animals, crustaceans and small fish. Once mature, an adult female can produce over 2 million eggs.

According to Henderson (2014), cod are migratory fish moving between nursery, feeding and spawning grounds. A widely-distributed fish recorded from all British coastal waters, from shallow upper estuarine waters used by juveniles to depths of 600m. The juveniles enter estuaries in June and may remain within the estuary over the following winter.

Spawning occurs on the European continental shelf to a depth of 200m between February and April. There are known spawning areas in the Celtic Sea (see Figure 4). The eggs are pelagic and widely dispersed. The larvae initially feed on copepods and gradually switch to larger crustaceans as they grow. Cod typically then enter estuarine habitats in June, when about 4 months old, at a length of 60mm. By their first winter, they have reached 160mm or longer. By their third year they may be 55cm in length.

Cod nursery areas are known to be located within the Waterford Estuary (Figure 5). However, the proposed works area is not located within any known nursery areas; the nearest nursery area is located ca. 6.8km downstream of the proposed works area.

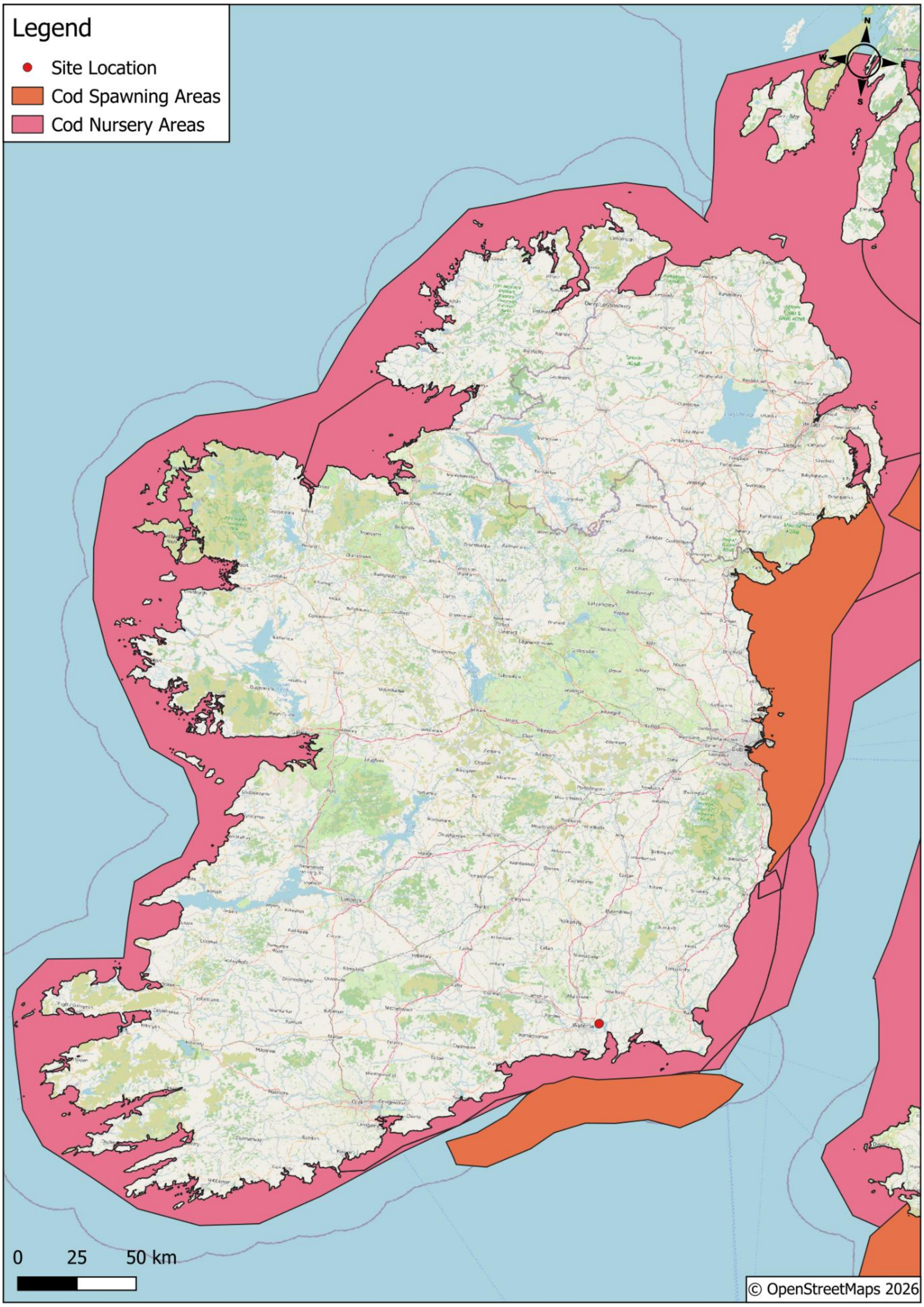

Figure 5: Cod spawning and nursery areas in Irish Waters [6]

4.4 Turbot (Psetta maxima)

The exact locations of turbot spawning areas and nurseries are not known in Ireland, but some have been identified in the west coast of Ireland [10]. According to Henderson (2014) turbot spawn between April and September, the exact timing varying with locality [8]. An adult may release as many as 15 million eggs. Turbot are known to spawn in shallow waters, and the eggs and larvae are pelagic [10]. At metamorphosis, the juveniles move into shallow waters and become bottom-living.

Turbot are widely distributed in Ireland but are common in southern waters. It is a shallow-water flatfish and is most abundant at depths between 20 and 80m, primarily over sand or mud. The juveniles settle in remarkably shallow water and can be caught in the surf zone of sandy beaches.

4.5 Spawning Periods

Waterford Estuary supports commercially important fish species, but this support relates primarily to the juvenile and / or young adult life stages. During the winter months, local fishermen target codling / whiting with various nets (trammel / gill) and supply local outlets.

For the species of concern raised in the SFPA submission, the spawning periods in marine habitats can be summarised as follows.

Table 1: Peak Spawning Periods

Species	Spring	Summer	Autumn	Winter
Herring			+	+
Sprat	+	+		
Cod	+			
Turbot	+	+	+	

5. Assessment of Potential Effects

An assessment of potential effects on the species of concern raised by SFPA was undertaken. The potential effects identified included:

- Potential habitat loss of spawning and nursery areas;
- Potential barrier to the movement of spawning fish;
- Potential noise effects; and,
- Potential effects associated with water quality impairment.

These potential effects are assessed below and mitigation measures, if required, are outlined in Section 6.

5.1 Potential Habitat Loss of Spawning and Nursery Areas

The proposed works will consist of 10 boreholes (ca. 200mm in diameter) and 10 coreholes (ca. 200mm in diameter). Therefore, each borehole and corehole will cover an area of ca. 0.03m^2. Therefore, although the works will take place within an area of ca. 2.48ha, in total, the boreholes and coreholes will only directly disturb an area of ca. 0.6m^2 of the substrate.

The Site is located within the Lower Suir Estuary (Little Island – Cheekpoint) waterbody, and the wider Waterford Estuary is part of the Barrow Suir Nore Estuary waterbody. The Lower Suir Estuary (Little Island – Cheekpoint) waterbody is ca. 5.59km^2 [11] and the Barrow Suir Nore Estuary waterbody is ca. 28.21km^2 [12]. Therefore, these waterbodies cover a total area of ca. 33.8km^2. Therefore, the area of the proposed works will be negligible compared to the total area of the waterbodies. As such, it can be concluded that the proposed works will not result in significant effects on the nursery grounds of the fish species of concern, and the proposed works will not materially alter the viability of these fish populations.

5.2 Potential Barrier to the Movement of Fish

The drilling works will not act as a barrier to any fish movements upstream and downstream, as the works will not be carried out at night. Therefore, the works will also leave significant downtime for fish to pass the proposed works area, should this species be migrating through the area. Additionally, the works will be short-term, taking ca. 3 weeks in total.

Furthermore, there will be downtime between the drilling of individual boreholes, coreholes and dynamic probes, which will also provide an opportunity for fish to pass the Site, and the proposed works will not result in any physical impediment / barrier to passage through the estuary for any fish species.

5.3 Potential Underwater Noise

Sound propagates at 1500m/s in water as opposed to 330 m/s in air. Therefore, sound propagates much faster in water. Underwater noise moves from its source, i.e., the hull of a ship, through the water column as a pressure change known as particle motion. This movement is dependent on several factors, including temperature, salinity, and pressure. Noise can also move through the water column and seabed as a result of vibrations, which can be detected considerable distances from the noise source.

The noise generated from the proposed drilling was difficult to predict as it will be influenced by a variety of factors, such as the nature of the riverbed, i.e., whether drilling will be sediment or bedrock. Drilling is defined as a non-pulse sound type [14]. Drilling is generally acknowledged to be less impactful on the aquatic environment, but is understood to produce moderate levels of continuous omnidirectional sound at low frequency (several tens of Hz to several thousand Hz and up to ca. 10 kHz) [14].

Nevertheless, potential risks to fish species from continuous noise (which are applicable for drilling, shipping and vessel movements), are low for mortality and injury; however, potential effects may include temporary threshold shift, masking and behavioural effects (refer to Table 2 below) [15].

It should be noted that specific data on the potential impacts of noise generated by drilling methods, such as those proposed for the site investigation works, is limited. Therefore, for the purposes of this assessment, data relating to pile driving in water was utilised to inform the assessment. For fish, guidelines set out criteria for injury due to different sources of noise and the criterion for piling noise is outlined in Table 2 below; however, please note that no piling will be required for the proposed works.

Table 2: Suggested criteria for proposed mortality, potential injury, temporary threshold shift (TTS), masking and behavioural effects for fish due to impulsive sound. Relative risk (High, Moderate, Low) is given for animals at three distances from the source, defined in relative terms: N - near; I - intermediate; F - far [16]

Type of Animal	Parameter	Mortality & Potential Mortal Injury	Impairment			Behavioural Effects
			Recoverable Injury	TTS	Masking	
Fish with no swim bladder (particle motion detection)	SEL, dB re 1 µPa^{2}s	>219	>216	>>219	(N) Moderate (I) Low (F) Low	(N) High (I) Moderate (F) Low
	Peak, dB re 1 µPa	>213	>213	-		
Fish: where swim bladder is not involved in hearing (particle motion detection)	SEL, dB re 1 µPa^{2}s	210	203	>186	(N) Moderate (I) Low (F) Low	(N) High (I) Moderate (F) Low
	Peak, dB re 1 µPa	>207	>207	-		
Fish: where swim bladder is involved in hearing (primarily pressure detection)	SEL, dB re 1 µPa^{2}s	207	203	186	(N) High (I) High (F) Moderate	(N) High (I) High (F) Moderate
	Peak, dB re 1 µPa	>207	>207	-		
Eggs and larvae	SEL, dB re 1 µPa^{2}s	>210	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Low (F) Low
	Peak, dB re 1 µPa	>207				

Source sound pressure levels have generally been reported to lie within the 145-190 dB re: 1 µPa range [14]. For a standard vessel-mounted drilling configuration, Huang et al. (2023) report a broadband source level of 155.9 dB re 1 µPa SPL_{RMS} at 1 m, while Erbe and McPherson (2017) [17], as cited in Huang et al. (2023) [18], report source levels of 142–145 dB re 1 µPa SPL_{RMS} at 1 m (30–2000 Hz). A worst-case source level of 155.9 dB re 1 µPa SPL_{RMS} at 1 m is adopted for this assessment.

In addition, Nedwell and Howell (2004) described the transmission of drilling sound in water as consisting of either ground-borne or structure-borne [19]. Ground-borne vibration is created at the drill-rock interface by the movement of the drill head, which then radiates outwards as compressional and shear waves. The mechanical vibrations that are generated may also be transmitted to the water via the drill shaft. These transmission mechanisms relate to the drilling of wind turbine pile foundations, but they are expected to also apply to smaller-scale drilling, such as that proposed for the investigation works.

At the levels described above, it would not be anticipated that significant injuries to fish would be sustained, as expected levels are well below the interim criteria presented in Table 2. Additionally, the works will be short-term in nature, only taking ca. 3 weeks in total, and therefore, there will be no long-term noise effects on any fish.

In addition, the works will be located in the immediate vicinity of the active Belview Port. As such, it is predicted that fish species in the area have already been exposed to anthropogenic noise sources due to port activities, and it is not anticipated that the additional noise generated from the proposed works will significantly contribute to this. Based on this and the expected noise level from the drilling equipment, it is not expected that there will be significant impacts on any fish species as a result of the proposed works.

5.4 Potential Effects Associated with Water Quality Impairment

All of the proposed works will comply with all relevant legislation and best practice to reduce potential environmental impacts of the works. Furthermore, the proposed works will be highly localised.

However, should run-off of potential pollutants enter into the River Suir, this could adversely affect the water quality within the river and could affect fish species within the locality. It is highly unlikely that any potential pollutants would result in effects to any known nursery areas given the distance separating these areas from the proposed works area and the dilution factor within the Waterford Estuary.

However, taking a precautionary principle, mitigation measures will be put in place to ensure that water quality will be protected, and no effects occur to any fish species.

6. Mitigation Measures

In order to ensure no effects to water quality occur, mitigation measures will be implemented as part of the works. These mitigation measures remain the same as those outlined in the original MUL LIC230013 Application and are outlined below.

- *All plant and machinery will be serviced before being mobilised to the Site;*
- *Preventative maintenance and relevant maintenance logs will be kept for all onsite plant and equipment;*
- *Prior to any works commencing, all equipment will be checked to ensure that they are mechanically sound, to avoid leaks of oil, fuel, hydraulic fluids and grease;*
- *Adequate spill kits including absorbent booms and other absorbent material will be maintained onsite;*
- *All contractor workers will be appropriately trained in the use of spill kits;*
- *Emergency response procedures will be put in place;*
- *Chemicals used will be biodegradable where possible;*
- *Measures will be implemented to minimise waste and ensure correct handling, storage and disposal of waste;*
- *The use of drip trays for the collection of spills/leaks from drilling equipment will be implemented;*
- *All refuelling of equipment and the barge should take place away from the water's edge, where possible;*
- *The Appointed Contractor will put in place a specific, step-by-step refuelling procedure which will be communicated to all relevant employees onsite;*
- *Only designated trained operators will be authorised to refuel plant onsite;*
- *All fuel should be stored in appropriately bunded containers;*
- *All bunds will have the capacity of the largest tank volume plus 10 percent, at a minimum, with additional capacity to hold 30mm of rainfall;*
- *All drainage from bund areas will be directed to secure containment prior to suitable disposal;*
- *Fuels, lubricants and hydraulic fluids for equipment used onsite will be carefully handled to avoid spillage, properly secured against unauthorised access or*

vandalism, and provided with spill containment according to current best practice; and,

- *Vehicle or equipment maintenance work will be carried out in a designated area on the Site*.

No new or additional mitigation measures were deemed necessary to ensure the protection of fish.

7. Conclusion

This assessment has been prepared in relation to the removal of Specific Condition 28 from MUL LIC230013, which was implemented following a submission by SFPA. The response is in relation to the timing of works within commercial fish spawning areas and is not related to Appropriate Assessment or the Habitats Directive or Annex IV species or Annex habitats.

The proposed works, if carried out between November and January, fall outside many commercial fish spawning periods. Additionally, the works will take place outside the known spawning areas for commercial fish species.

As outlined in this assessment, there will be no potential effects associated with habitat loss, barriers to movement, underwater noise or water quality impairment that would materially alter the viability of these fish populations should the works be carried out between November and January. As such, there is absolutely no scientific basis for any temporal restriction on the proposed works.

8. References

[1] C. O'Toole, "Maritime Usage Licensing and Planning Advisory Directorate - Maritime Usage Licence Assessment Report (LIC230013)," 2026.

[2] L. Connor, D. Ryan, R. Feeney, W. Roche, S. Shephard and F. Kelly, "Biogeography and fish community structure in Irish estuaries," *Regional Studies in Marine Science,* vol. 32, no. 100836, pp. 1-15, 2019.

[3] J. Tweedley, R. Warwick and I. Potter, "The Contrasting Ecology of Temperate Macrotidal and Microtidal Estuaries," in *Oceanography and Marine Biology: An Annual Review*, CRC Press, 2016, pp. 73-171.

[4] P. Dando, "Reproduction in Estuarine Fish," in *Fish Reproduction: Strategies and Tactics*, London, Academic Press, 1984, pp. 155-170.

[5] W. Pearcy and S. Richards, "Distribution and ecology of fishes of the Mystic River estuary, Connecticut," *Ecology,* vol. 43, pp. 248-259, 1962.

[6] Marine Institute, "Species Spawning and Nursery Areas," 10 07 2026. [Online]. Available: https://data.gov.ie/dataset/species-spawning-and-nursery-areas. [Accessed 2026].

[7] Fisheries Ecosystems Advisory Services - Marine Institute, "The Stock Book 2025: Annual Review of Fish Stocks in 2025 with Management Advice for 2026," 2025.

[8] P. Henderson, Identification guide to the inshore fish of the British Isles, Pisces Conservation Ltd, 2014.

[9] K. Coull, R. Johnstone and S. Rogers, Fisheries Sensitivity Maps in British Waters, 1998.

[10] P. Haynes, D. Brophy and D. McGrath, "The early life history of turbot (Psetta maxima L.) on nursery grounds along the west coast of Ireland: 2007–2009, as described by otolith microstructure," *Fisheries Research,* vol. 110, no. 3, pp. 478-482, 2011.

[11] EPA, "Waterbody: Lower Suir Estuary (Little Island - Cheekpoint)," Catchments.ie, 2026. [Online]. Available: https://www.catchments.ie/data/#/waterbody/IE_SE_100_0500?_k=oxvhdc. [Accessed 2026].

[12] EPA, "Waterbody: Barrow Suir Nore Estuary," Catchments.ie, 2026. [Online]. Available: https://www.catchments.ie/data/#/waterbody/IE_SE_100_0100?_k=w3kim8. [Accessed 2026].

[13] C. Simpson, "Diel spawning behaviour in populations of plaice, dab, sprat and pilchard," *J. Cons. perm. int. Explor. Mer.,* vol. 34, pp. 58-64, 1971.

[14] Department of Arts, Heritage and the Gaeltacht, "Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters," 2014.

[15] A. Popper, A. Hawkins, R. Fay, D. Mann, S. Bartol, T. Carlson, S. Commbs, W. Ellison, R. Gentry, M. Halvorsen, S. Lokkeborg, P. Rogers, B. Southall, D. Zeddies and W. Tavolga, “ASA S3/SC1.4 TR-2014, Sound Exposure Guidelines for Fishes and Sea Turtles,” 2014.

[16] A. Popper and A. Hawkins, “An overview of fish bioacoustics and the impacts of anthropogenic sounds on fishes,” *Journal of Fish Biology,* 2019.

[17] C. Erbe and C. McPherson, “Underwater noise from geotechnical drilling and standard penetration testing,” *Journal of the Acoustical Society of America,* vol. 142, no. 3, 2017.

[18] L.-F. Huang, X.-M. Xu, L.-L. Yang, S.-Q. Huang, X.-H. Zhang and Y.-L. Zhou, “Underwater noise characteristics of offshore exploratory drilling and its impact on marine mammals,” *Frontiers in Marine Science,* vol. 10, p. 1097701, 2023.

[19] J. Nedwell and D. Howell, “A review of offshore windfarm related underwater noise sources,” Collaborative Offshore Wind Energy Reserach into the Environment (COWIE), 2004.

APPENDIX A

SFPA Observations on Marine Usage Licence Applications

Applicant Name & Area: Port of Waterford Company	**Application No:** LIC230013
Application Category	
☐ Shellfish Aquaculture Licence ☐ Renewal of Shellfish Aquaculture Licence ☐ Fin Fish Aquaculture Licence ☐ Renewal of Fin Fish Aquaculture Licence ☒ Foreshore Licence	☐ Dumping at Sea ☐ Water discharge ☒ Harbour Developments ☐ Marine Renewables ☒ Cables/ Fiber Optics/ Site investigations

Sea Fisheries Protection Officer Observations

1. *Possible impacts, if any, on existing wild fisheries in the area, with an emphasis on the possible implications for the SFPA in conducting official controls and possible non-compliance issues that could arise.*

This project comprises of site feasibility studies/investigations to extend the pier in Bellview. Coring and drilling onsite to the extent of Drilling ca. ten (10No.) boreholes ca. 200mm in diameter, drilling ca. ten (10No.) coreholes ca. 200m in diameter; and associated sampling and testing. There is expected to be a local noise impact over the course of 3 week period when project does commence, however, the SFPA advises this project avoid commencement between (Nov-Jan) which is a crucial period for spawning stocks of commercially important species that come in the estuary to spawn. Schools of spawning stocks of Sprat, Herring, Cod and Turbot typically move up and down the estuary on tidal patterns during this time. Planktonic eggs remain in the estuary thereafter for a period of their larval development before moving out to sea. The project should avoid this time frame to reduce the likelihood of impact of noise disruption preventing these stocks from fully utilizing this habitat with an associated negative impact on stock recruitment. Therefore, I advise that THIS PROJECT COMMENCE AFTER 31/1/2026

2. *Possible impacts, if any, on adjacent or nearby shellfish production areas adjacent, including possible implications for the SFPA in conducting official controls and possible non-compliance issues that could arise.*

The potential associated impacts may have a negligible effect on adjacent shellfish production areas.

3. *Possible impacts, if any, on seafood safety, with an emphasis on the implications for the SFPA in conducting official controls and possible non-compliance issues that could arise.*

It is not considered that this project will have any impact on seafood safety in the local environment.

Sea-Fisheries Protection Authority Dunmore East	**Date:** 5/11/25