2026

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SANITARY SURVEY AND SAMPLING PLAN FOR ACHILL SOUTH, CO. MAYO – FEBRUARY 2026

AN t-ÚDARÁS UM CHOSAINT IASCAIGH MHARA | SEA-FISHERIES PROTECTION AUTHORITY

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DISCLAIMER

Under EU Regulation 2019/627, which lays down uniform practical arrangements for the performance of official controls on products of animal origin intended for human consumption, a sanitary survey relevant to bivalve mollusc production in Achill South was undertaken in 2025. This will provide an appropriate hygiene classification zoning and monitoring plan based on the best available information with detailed supporting evidence. Aqualicense Limited undertook the desktop component of the work on behalf of the SFPA.

STATEMENT OF USE

This sanitary survey has been prepared by Aqualicense for the specific purpose of informing shellfish classification in accordance with regulatory requirements. The report draws on data provided by the Sea-Fisheries Protection Authority (SFPA) through the shoreline survey, as well as other publicly available sources, including state and semi-state bodies, and interprets that data within the context of this assessment.

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ABBREVIATIONS

BMPA	Bivalve Mollusc Production Area (i.e. “production area”)
COP	Code of Practice
CSO	Central Statistics Office
CFU	Colony Forming Units
DWWTS	Domestic Waste Water Treatment System
E. coli	*Escherichia coli*
ED	Electoral Division
EPA	Environmental Protection Authority
EU	European Union
GPS	Global Positioning System
GSI	Geological Survey of Ireland
GWV	Groundwater Vulnerability
IE	Industrial Emissions
IFI	Inland Fisheries Ireland
IPC	Integrated Pollution Control
I-WeBS	Irish Wetland Bird Survey
MPN	Most Probable Number
NAP	Nitrates Action Programme
NM	Nautical Miles
NPWS	National Parks and Wildlife Service
PSU	Practical Salinity Unit
Q	Volumetric Flow Rate of Water
RMP	Representative Monitoring Point
SAC	Special Area of Conservation
SFPA	Sea Fisheries Protection Authority
SPA	Special Protection Area
S-P-R	Source-Pathway-Receptor
UWWTP	Urban Waste Water Treatment Plant
WFD	Water Framework Directive
WWTP	Waste Water Treatment Plant

EXECUTIVE SUMMARY

Faecal contamination in shellfish waters poses a significant public health risk, particularly for filter-feeding bivalve molluscs such as oysters and mussels, which can accumulate harmful bacteria and increase the risk of foodborne illness. To mitigate these risks, EU Regulation 2019/627 mandates that a Sanitary Survey be conducted before classifying a shellfish production or relay area. In line with the regulation,

In line with regulatory requirements, Aqualicense has been contracted by the Sea-Fisheries Protection Authority (SFPA) to prepare this Sanitary Survey report. Its purpose is to ensure compliance with the relevant legislation, refine the delineation of the Bivalve Mollusc Production Area (BMPA), and identify appropriate Representative Monitoring Point(s) (RMP).

This report sets out the findings of the survey for Achill South, Co. Mayo, undertaken to support the classification of waters within the Achill South Bivalve Mollusc Production Area (BMPA), which currently hosts aquaculture licences for the commercial cultivation of Pacific oyster (*Magallana gigas*) and Manila clam (*Ruditapes philippinarum*).

This report encompasses the following key components:

1. A desk-based assessment of the bay's hydrodynamics and the seasonal potential for faecal contamination sources using a Source–Pathway– Receptor (S-P-R) model;
2. A field-based shoreline survey conducted by SFPA officers to confirm known risks and identify additional sources;
3. A bacteriological survey of selected inflows and runoff points;
4. A recommendation on the extent of the production area (geographic delineation) based on hydrodynamics, catchment influence, and aquaculture activity;
5. Species and location specific recommendations to support the development of appropriate sampling plans for the Representative Monitoring Points (RMPs) within the Production Area in line with EU and SFPA requirements.

The desk-based study employed a Source-Pathway-Receptor model to assess contamination risks within Achill South. This assessment was based on the defined "Contributing Catchment," encompassing the river networks and associated sub-basins draining into the bay. This approach facilitated the identification of potential pollution sources, their transport pathways, and their circulation within the Bivalve Mollusc Production Area (BMPA), considering seasonal variability and microbial loading. Each key step and findings of the S-P-R model is outlined below.

1. The first step in the desk-based study was to characterise the Bivalve Mollusc Production Area (BMPA), i.e. the receptor and the shellfish activities or planned activities within the area.

Key Finding: The BMPA spans approximately 10.18 km^2 within Achill South, Co. Mayo. At present there are 13 active shellfish licences in the area. There are 12 for Pacific oyster (*Magallana gigas*) and a single site for Pacific oyster and Manila clam (*Ruditapes philippinarum*).

2. The desk-based study examined the movement of pollutants, hydrological pathways to, and hydrodynamics within the production area. It also assessed the influence of weather patterns on hydrography and hydrodynamics.
   Key finding: The findings indicate that the primary source of freshwater inflow, and consequently potential contamination, is via Unnamed river (IE_WE_ IE_WE_33B090100 with two unnamed tributaries) it the largest fresh water inflow into the area, entering the BMPA at inflow 13.
   Areas of greatest groundwater vulnerability were identified as occurring on the coastal fringe of the contributing catchment, especially immediately landward of the shoreline and tidal inlets where thin subsoils and exposed bedrock outcrops shorten flow paths.
   The currents are predominantly tidally driven with strong exchange through the mouth of the bay and Achill Sound, likely giving rise to short residence times along the central corridor.
   Seasonal variations in surface water run-off were also noted, with heavy rainfall events from autumn through winter likely to influence microbial loads entering the bay (see *Section 2.4*).
3. An inventory of potential pollutants was compiled, identifying widespread domestic wastewater systems/septic tanks concentrated along the southern/south-eastern coastal fringe and potential agricultural run-off from predominantly sheep-grazed catchments.
   Key finding: Pressures have the potential to peak during summer grazing and tourist occupancy periods, and after periods of heavy rainfall (see *Section 2.5*).

Overall S-P-R Model Conclusion

The overall S-P-R model determined that the key sources of concern for organic pollutants to the licensed shellfish sites in Achill South are primarily associated with septic tanks (DWWTS) and agricultural activities (sheep grazing). The DWWTSs are concentrated along the eastern shoreline where elevated ground water vulnerability and multiple riverine inflows discharge directly adjacent to licenced sites creating a high potential for contamination. Agriculture, particularly sheep grazing represents a secondary but significant risk, with high livestock densities, extreme groundwater vulnerability, and runoff pathways along the shoreline contributing to potential inputs near licenced sites.

Other sources, including a single Section 4 discharge (low impact due to dilution) and wildlife inputs (seasonally variable), were deemed to possibly contribute intermittently. UWWTPs, IE/IPC licenses, urban areas, marine vessels, and recreational activities pose negligible or no risk in this catchment. Overall, the south-eastern sector emerges as the most sensitive zone, with septic tanks and agriculture as the dominant pressures on water quality in proximity to licensed shellfish sites.

Sanitary Survey and Bacteriological Results

The shoreline of the BMPA was surveyed by SFPA personnel over a 2- day period, the 1st and 10th of October. A total of 43 observations were recorded during the shoreline survey, each georeferenced and supported by photographic evidence.

All of the observed sites were sampled for bacteriological analysis. The sampling yielded variable *E. coli* levels across the BMPA, ranging from low (13 stations at <10 MPN/100mL) to very high (5 stations >2010 MPN/100mL) contamination.

Elevated concentrations (30-1450 MPN/100mL) were recorded mainly from streams and rivers along the eastern central portion of the BMPA, likely influenced by rainfall-driven runoff and upstream sources.

The highest levels (>2010 MPN/100mL) were recorded in the southern section associated with piers and drainage outflows in close proximity to existing licenced sites. This suggests concentrated point source pollution though seasonal rainfall and land use may affect contamination patterns over time.

Conclusion

The sanitary survey was undertaken in accordance with the requirements of EU Regulation 2019/627. The desk-based study, S-P-R assessment, shoreline survey, bacteriological analysis, and contamination dynamics within the Achill South BMPA were evaluated. Distinct circulation patterns and localised contamination pressures within the BMPA support maintaining separate production areas: Balfarsad and Corraun. Retention of the current two-production area structure, with species specific RMPs, is therefore recommended to ensure that classifications and management decisions remain aligned with EU regulatory requirements.

Three RMPs were established - two active and one inactive. Two active RMPs were established for Pacific oyster in each production area, and one inactive RMP was identified for Manila clam in the Corraun production area. Species-specific sampling plans were subsequently developed to support the microbiological monitoring programme for the Achill South BMPA, which will inform the annual review of the classifications.

1 INTRODUCTION

The presence of faecal contamination in the marine environment can result in the accumulation of harmful microorganisms in shellfish, posing a public health risk. Bivalve molluscs such as oysters, mussels, and clams are filter feeders, meaning they draw in and process large volumes of water, which can lead to the concentration of microbial contaminants. *Escherichia coli* (*E. coli*) is a key indicator organism used to assess faecal contamination, as its presence suggests potential pollution from human or animal waste. If such contamination includes pathogenic bacteria or viruses, it can increase the risk of foodborne illness for consumers.

To mitigate these risks, the European Union has established a regulatory framework governing the classification and monitoring of shellfish production and relaying areas. EU Regulation 2019/627 outlines the requirements for sanitary surveys. Article 56 of the Regulation mandates that competent authorities (i.e. the SFPA in an Irish context) conduct a sanitary survey before classifying a production or relaying area. This survey must include:

a) *an inventory of the sources of pollution of human or animal origin likely to be a source of contamination for the production area;*

b) *an examination of the quantities of organic pollutants released during the different periods of the year, according to the seasonal variations of human and animal populations in the catchment area, rainfall readings, waste-water treatment, etc.;*

c) *determination of the characteristics of the circulation of pollutants by virtue of current patterns, bathymetry and the tidal cycle in the production area.*

Furthermore, under the SFPA Code of Practice (SFPA, 2020), a sanitary survey may include four elements:

1. A desk-based study to identify pollution sources
2. A shoreline survey to confirm initial findings of the desk-based study
3. A bacteriological survey
4. Data assessment

In addition, ongoing monitoring is required under Article 57, ensuring that sampling programmes are informed by sanitary surveys and designed to produce representative data on water quality and potential contamination risks. Article 58 further stipulates that authorities must establish procedures to ensure that both sanitary surveys and monitoring programmes accurately reflect the conditions within shellfish production areas.

Achill South's production areas -Corraun and Balfarsad, have previously been designated as a **Class A** Bivalve Mollusc Production Area (BMPA). Therefore, this report presents the findings of the sanitary survey conducted in advance of its review of the Recommended Monitoring Points (RMPs) for bivalve production in the area. It examines all potential sources of faecal contamination, pathways, circulation and seasonal variations, with particular consideration of the area's rural. context. The report aims to inform classification decisions and provide the necessary evidence for effective monitoring in line with EU regulatory requirements.

2 DESK-BASED STUDY

2.1 INTRODUCTION TO THE GENERAL AREA

The Achill South classified production area is located on the west coast of Co. Mayo, forming a narrow tidal channel that separates Achill Island from the mainland, spanning approximately 10.18 km^2. The production area, containing two production areas (Corraun and Balfarsad), extends through the constricted marine channel of Achill Sound, from Achill Bridge East and Achill Bridge West to Bolinglanna and the southernmost point of Achill Beg
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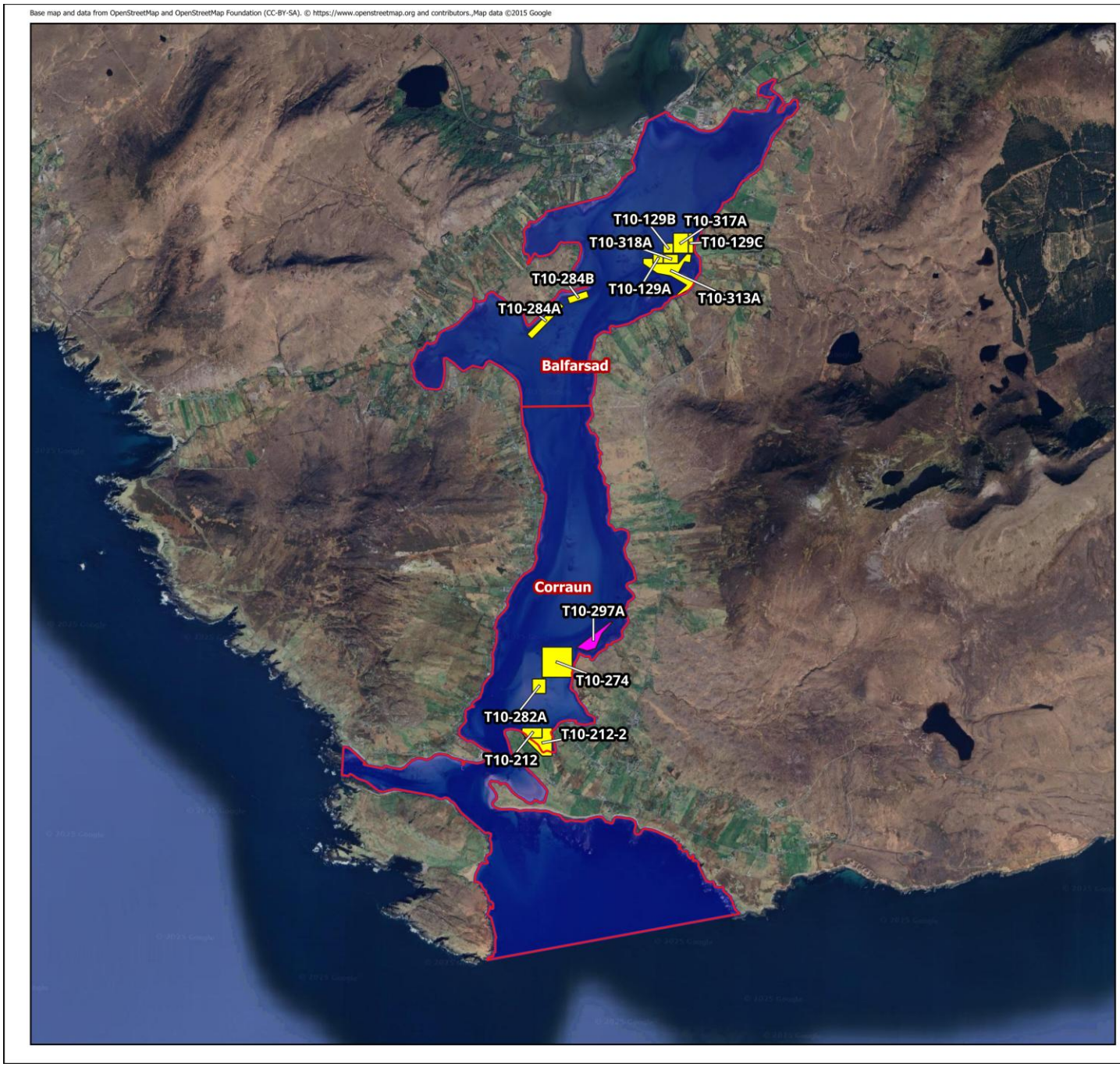

Figure 2-1).The surrounding landmass (Achill Island) covers ~14,800 hectares and is characterised by high relief uplands and deeply indented, tidal channels that controls exchange with the bay. The physiographic controls, together with the narrow tidal throat at Achill Sound, influence flushing and residence times within the production area. The site is characterised by strong tidal exchange, restricted fetch, and a generally sheltered hydrographic setting.

Licenced aquaculture sites are predominantly situated along the eastern shores of the Achill South production area though two sites are located on the norther western shores. There are 13 sites that are currently licenced occupying the tidally influenced shoreline on the Mweewillin and Glassillaun

side of the Sound covering an area of c. 39.61 ha (*Table 2-1* and *Figure 2-1*). Local bathymetry and the constricted entrance of Achill Sound provides shelter and a short fetch, supporting trestle culture on sand-mud flats.

There is a single non-bivalve aquaculture site located within the Achill North production area- for the production of Atlantic salmon (*Salmo salar*) T10-054, in the south of the production area.

Commercial inshore fishing targets shrimp (Caride asp.) and spider crab (*Maja brachydactyla*) (Marine Institute, 2025a).

2.2 Characterisation of the Production Area

Key characteristics of the production area are outlined in *Table 2-1*.

Table 2-1 – Characteristics of the Production Area

Criteria	Description
Location and extent	This Bivalve Mollusc Production Area (BMPA) is within Achill South, Co. Mayo. It covers an area of c. 10.18 km^2.
Bivalve species	Currently Pacific oyster (*Magallana gigas*), and Manila clam (*Ruditapes philippinarum*) are listed as the species being produced within Achill South.
Aquaculture or wild stocks	At present there are 13 active shellfish licences in the area all of which are listed as producing Pacific oyster with a single site with combined Manila clam and an single site for the production of Atlantic salmon (*Salmo salar*) T10-054 .The 12 for Pacific oyster are: T10-129A, T10-129B, T10-129C, T10-212-2, T10-212, T10-274, T10-282A, T10-284A, T10-284B, T10-313A, T10-317A, T10-318A. Site T10-297A lists Pacific oyster and Manila clam. (DAFM Licensed Aquaculture Sites)
Seasonality of harvest	Shellfish may be harvested year-round in accordance with market demand.
Growth and harvesting techniques	Pacific oyster: Bags and trestles
Any conservation controls (e.g. closed season)	No conservation controls are employed
Existing classification data	For Achill South's two production areas (Corraun and Balfarsad) the most recent annual classification is **Class A.**
Norovirus data	There is no historic norovirus data for Achill South

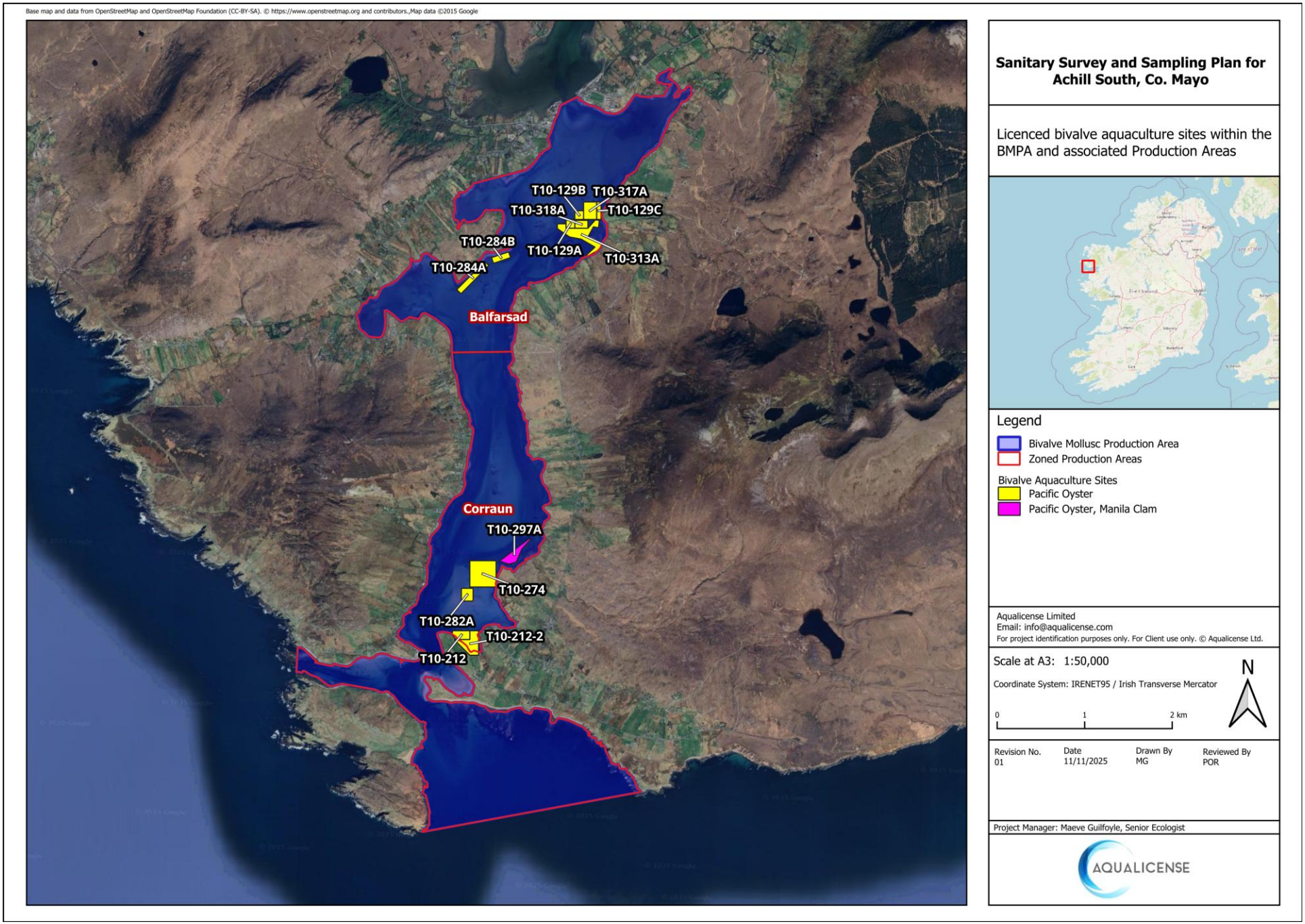

Figure 2-1 Location of bivalve aquaculture licences within the BMPA

2.2.1 Bivalve Mollusc Production Area Delineation Process

The process for defining a Bivalve Mollusc Production Area (BMPA) boundary is that the SFPA proposes the BMPA boundary by assessing the maximum area suitable for aquaculture that can be effectively covered by a localised sanitary survey. This is done in consultation with key stakeholders involved in aquaculture development and licensing, such as BIM, Inshore Fisheries Ireland, industry representatives, and the Department of Agriculture, Food and the Marine (DAFM).

The boundary is then finalised based on the findings of the sanitary survey, ensuring it encompasses both the potential shellfish production area and the zones that may impact it through pollutant inputs. This approach ensures that the designated Representative Monitoring Point(s) (RMPs) provide reliable representation of the microbiological quality within the BMPA.

2.3 Assessment Methodology

The desk-based study will follow SFPA guidelines (COP SH01) and align with EU Regulation 627/2019, Article 56. It forms the first part of the sanitary survey, informing the shoreline and bacteriological surveys (if required).

Using a Source-Pathway-Receptor (S-P-R) model to determine and describe the flow of possible environmental pollutants from a source, through different pathways to the potential receptor, the study ensures a focused assessment by identifying contamination risks.

This assessment applies the S-P-R model to evaluate the ecological risk associated with faecal contamination within the BMPA (i.e. the receptor).

- **Source:**

  Faecal contaminants originate from identifiable inputs including but not limited to agricultural runoff, wastewater treatment plant effluents, combined sewer overflows, and diffuse urban or wildlife sources. These inputs introduce microbiological pollutants such as *E. coli*, enteric viruses, and protozoan cysts into the aquatic environment.

- **Pathway:**

  Contaminants are transported via hydrological and tidal processes, surface water flows, and stormwater conveyance systems. Transport dynamics are influenced by rainfall events, land use, catchment topography, and the retention or resuspension of faecal material in sediments. Temporal variation is considered to identify peak contamination windows.

- **Receptor:**

  Shellfish species, particularly filter feeders, accumulate faecal contaminants present in the water column. These organisms serve as biological indicators and direct receptors of microbial loading.

If any element (source, pathway, receptor) is absent, no impact occurs, allowing targeted evaluation for the production area. Key S-P-R components are indicated in *Figure 2-2*.

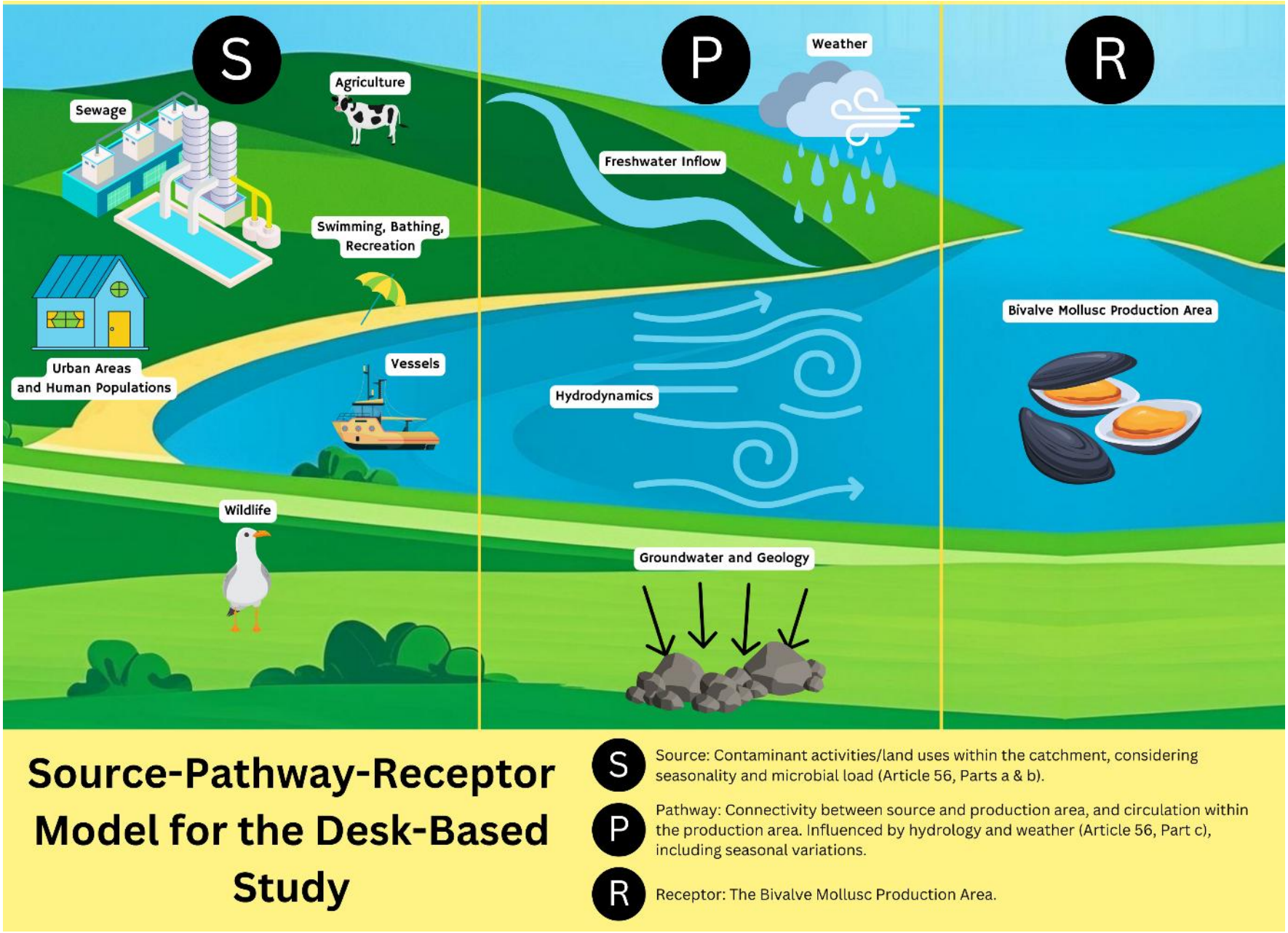

Figure 2-2 – Key elements to be considered in this Desk-Based Study under the S-P-R Model

2.3.1 CONTRIBUTING CATCHMENT

The first step in assessing sources and pathways was to define the "Contributing Catchment", the area of land from which there is a hydrological connection to the proposed production area. A catchment is broadly defined as "an area of land that drains into a river, lake or other body of water" (EPA, 2025a). While the EPA identifies catchments and sub-catchments for Water Framework Directive (WFD) monitoring, these are at too large a scale for the specific requirements of a sanitary survey.

For the purposes of this assessment, a tailored "Contributing Catchment" was delineated. This was achieved by first identifying all river networks (EPA, 2022) entering the proposed BMPA and then including the EPA-defined sub-basins (EPA, 2022) through which these rivers flow to capture the full extent of land draining into the bay.

The identified contributing catchment covers an area of 70.23 km^2 and contains the sub-basins Bunanioo_010 and Glendarary_010. The defined contributing catchment is identified in *Figure 2-3*

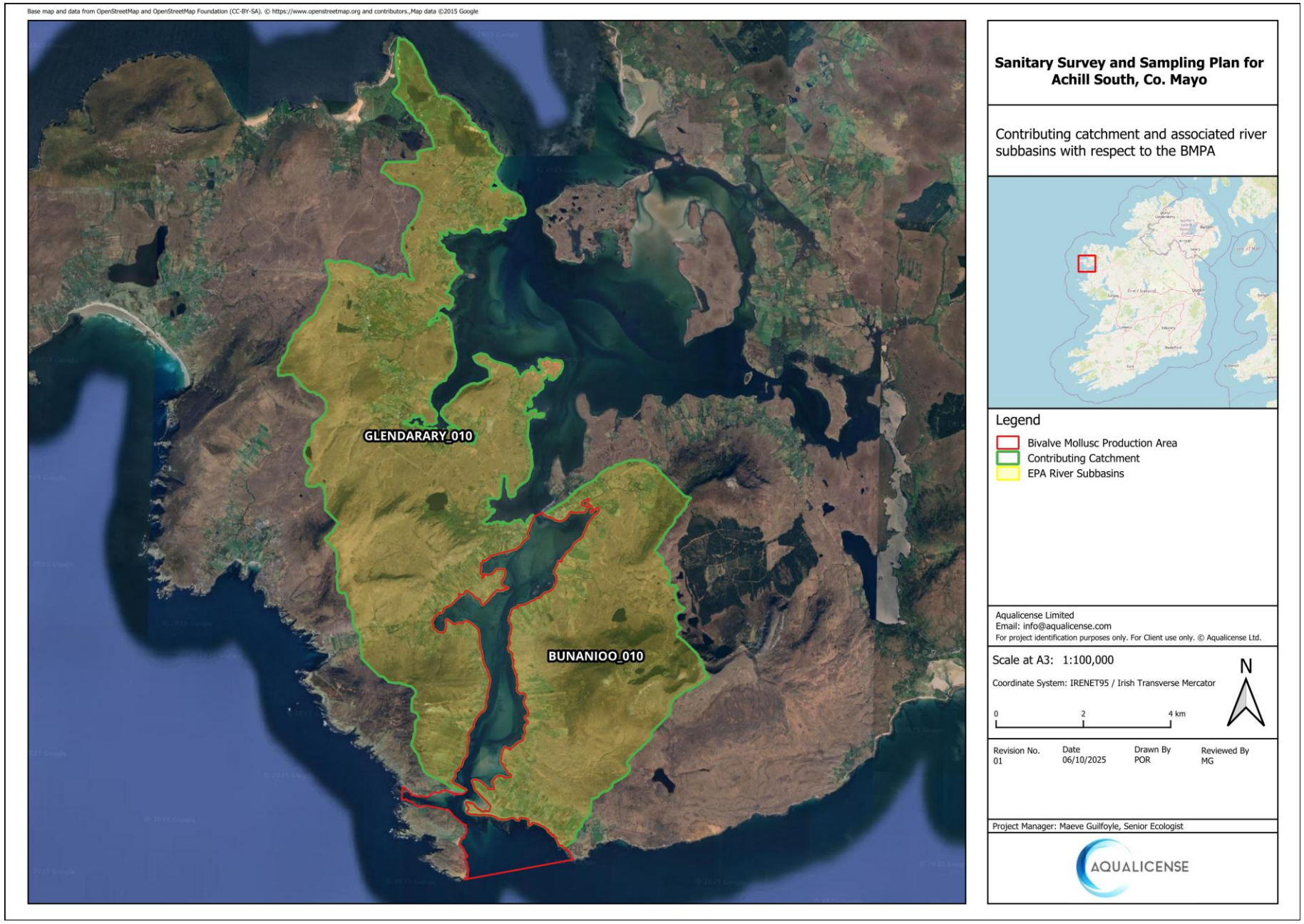

Figure 2-3 - Location of contributing catchment and EPA mapped subbasins with respect to the BMPA

2.4 Characteristics of Circulation of Pollutants

Prior to identifying pollution sources and their seasonality, an examination of pollutant circulation within the production area was conducted. This analysis provided the foundation for the detailed pathway assessments presented in subsequent sections of this desk-based study. This section describes the movement of pollutants within the bay, outlining the hydrological pathways leading to the production area and the hydrodynamic processes operating within it. It also considers the influences of weather patterns, particularly their seasonal influences on hydrography and pollutant dispersion. These insights directly inform the delineation of the production areas within the BMPA and placement of RMPs.

2.4.1 Freshwater Inflows

The contributing catchment (*Figure 2-2*) consists of the Glendarary_010 and Bunanioo_010 subbasins (see *Table 2-5* for more). These watercourses have been categorised based on their points of inflow to the production area (*Table 2-2*). Assessing these inflows is the first step in understanding the entry of pollutants and lays the foundation for further examination of pollutant circulation.

No hydrometric gauges are present within the contributing catchment. Though the unnamed river (longest within the Bunanioo_010 catchment) with connections to two small unnamed lakes in the area also discharges at inflow 13 in the upper Achill Sound area. In the absence of flow data, this is considered the largest inflow due to its greater number of tributaries (*Table 2-2*).

The Water Framework Directive (WFD) aims to protect and enhance the quality of rivers, lakes, transitional waters, coastal waters, and groundwater. WFD monitoring assesses biological, physicochemical, and hydro-morphological parameters to determine waterbody status. While not all WFD parameters are directly relevant to sanitary surveys, some, such as the assessment of nutrients (nitrogen and phosphorus) and dissolved oxygen, serve as key indicators of organic pollution, including faecal contamination. WFD monitoring also identifies pressures on water quality, such as nutrient enrichment, wastewater discharges, and diffuse pollution, which are further explored in *Section 2.5* to assess their relevance as pollutant sources.

The WFD status of the unnamed river (2016–2021) was classified as “Good”. However, given the extensive drainage area, this inflow is identified as the primary pathway for pollutant transport to the production area. While all other surface waterbodies were classified as “Good” within the Bunanioo_010 catchment and “High” within the Glendarry_010 catchment to the west during Cycle 2 of the WFD, they all drain agricultural land and thus have the potential to contribute to pollutant loads. This will be discussed in more detail in *Section 2.5* in respect of individual pollution sources.

Table 2-2 – Locations of freshwater inflow to the production area

Inflow Point	River Subbasin (EPA Code)	River Name (EPA Code)	Inflow Point WFD Status (2016-2021)
1	Glendarry_010	Unnamed river (2 unnamed tributaries) IE_WE_33G400250	High

Inflow Point	River Subbasin (EPA Code)	River Name (EPA Code)	Inflow Point WFD Status (2016-2021)
2	Glendarry_010	Unnamed river (2 unnamed tributaries) IE_WE_33G400250	High
3		Unnamed river IE_WE_33G400250	High
4		Cill Damhnait River [EPA Code 33C25] IE_WE_33G400250	High
5	Bunanioo_010	Bunanioo River [EPA Code 33B09] (2 Unnamed tributaries) IE_WE_33B090100	Good
6		Unnamed River IE_WE_33B090100	Good
7		Unnamed River (1 Unnamed tributaries) IE_WE_33B090100	Good
8		Unnamed River IE_WE_33B090100	Good
9		Unnamed River IE_WE_33B090100	Good
10		Unnamed River IE_WE_33B090100	Good
11		Unnamed River IE_WE_33B090100	Good
12		Unnamed River (1 Unnamed tributaries) IE_WE_33B090100	Good
13		Unnamed River (2 Unnamed tributaries) IE_WE_33B090100	Good
14		Unnamed River IE_WE_33B090100	Good
15		Unnamed River (2 Unnamed tributaries) IE_WE_33B090100	Good
16		Unnamed River (3 Unnamed tributaries) IE_WE_33B090100	Good

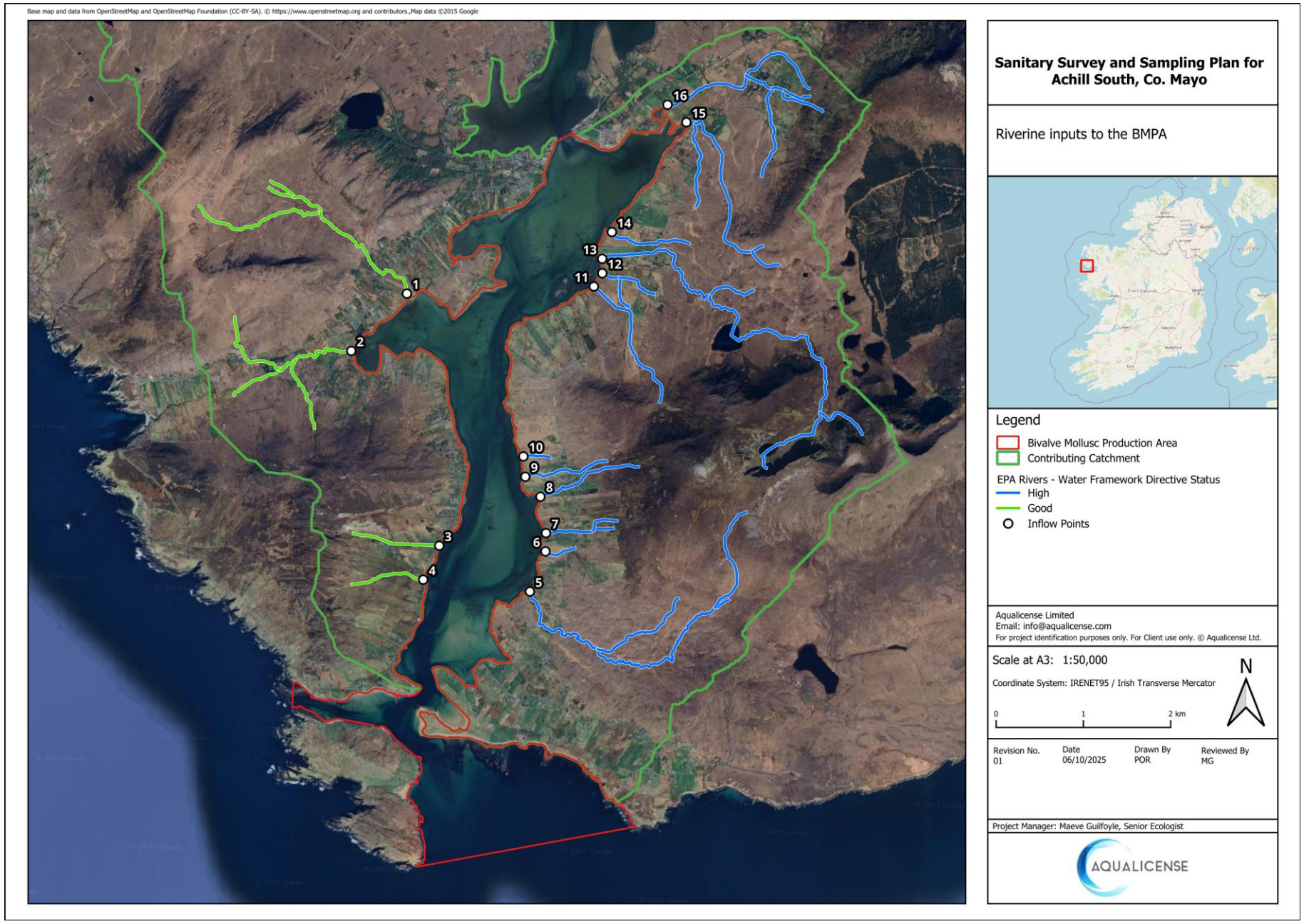

Figure 2-4 – Riverine inputs to the production area

2.4.2 GEOLOGY AND GROUNDWATER

The movement of microbial pollutants, such as *E. coli*, within a catchment is influenced by the underlying geological conditions. In particular, groundwater vulnerability- determined by factors such as the depth to the water table, subsoil permeability and the nature of the bedrock, plays a critical role in assessing the potential for contaminants to reach the groundwater and subsequently the marine environment. The EPA methodology classifies areas into vulnerability categories (e.g. low, moderate, high, extreme) based on their permeability to the groundwater table.

Pollutants can enter the marine environment via groundwater through two primary pathways. The first is via surface water, where groundwater inflow contributes to rivers, lakes, and other surface waters that eventually discharge into the marine environment. The second pathway is direct submarine groundwater discharge, where groundwater seeps directly into the sea from the seabed, including the intertidal zone (Arévalo-Martínez *et al.*, 2023). Further detail on groundwater conditions in relation to individual pollution sources is provided in *Section 2.5*.

The contributing catchment overlies 3 groundwater bodies: "Achill", "Malranny and "Belmullet". These groundwater bodies were classified as having "Good" WFD status respectively from 2016-2021 (EPA, 2023).

An analysis of groundwater vulnerability (GSI, 2021) within the contributing catchment reveals 39.83% and 13.86% of the contributing catchment as having “Rock at or near Surface or Karst” and “Extreme” vulnerability respectively (*Table 2-7*).

These areas, predominantly located along the coastal fringe of the contributing catchment draining to the BMPA, with additional clusters on thin subsoil and bedrock outcrops immediately landward of the shoreline, where short groundwater flow paths converge on the tidal inlets. These areas pose the highest risk for pollutant infiltration via groundwater, particularly where they intersect with surface water pathways.

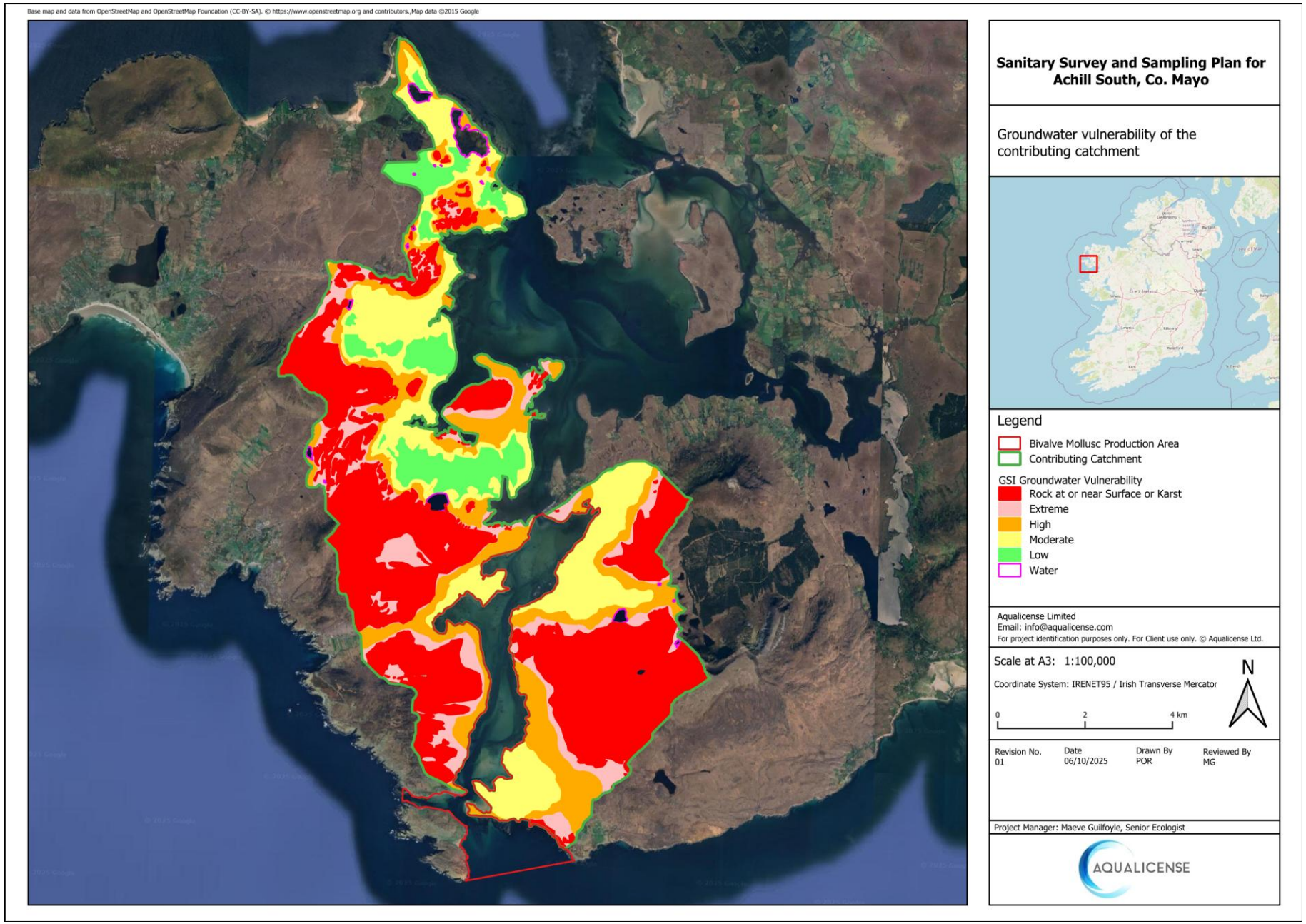

Figure 2-5– Groundwater vulnerability of the contributing catchment

2.4.3 HYDRODYNAMICS

No detailed hydrodynamic studies specific to the Achill South area is available. In the absence of a site-specific hydrodynamic study for the area, the information herein is inferred from local adjacent and regional datasets.

This constraint is restricting and challenging, and the findings should be interpreted with a high degree of caution. Additional insights have been drawn from Admiralty Chart 2667-0 (UK Hydrographic Office, 2025).

2.4.3.1 BATHYMETRY

Bathymetry was assessed through Admiralty Charts 2704-0_W (Blacksod Bay and Approaches) and 2667-0_W (Clew Bay and Approaches) (*Figure 2-6*). The area is bounded by the Achill Sound production area (Polranny Point-to Achill Bridge east to west and south out to Achill beg island), where depths in the area are generally shallow and gently graded and strongly influenced by tidal currents. Extensive intertidal area (predominantly sand and mud) are present along the shoreline, interspersed with rocky outcrops and nearshore bars.

Depths within the inner channel are typically in single digits at chart datum (CD) (0-5 m), with numerous shoals and isolated rocks before deepening gradually (~15 m) towards the central channel. The main tidal channel narrows and deepens seawards towards the southern outlet where the deeper contours are encountered more abruptly.

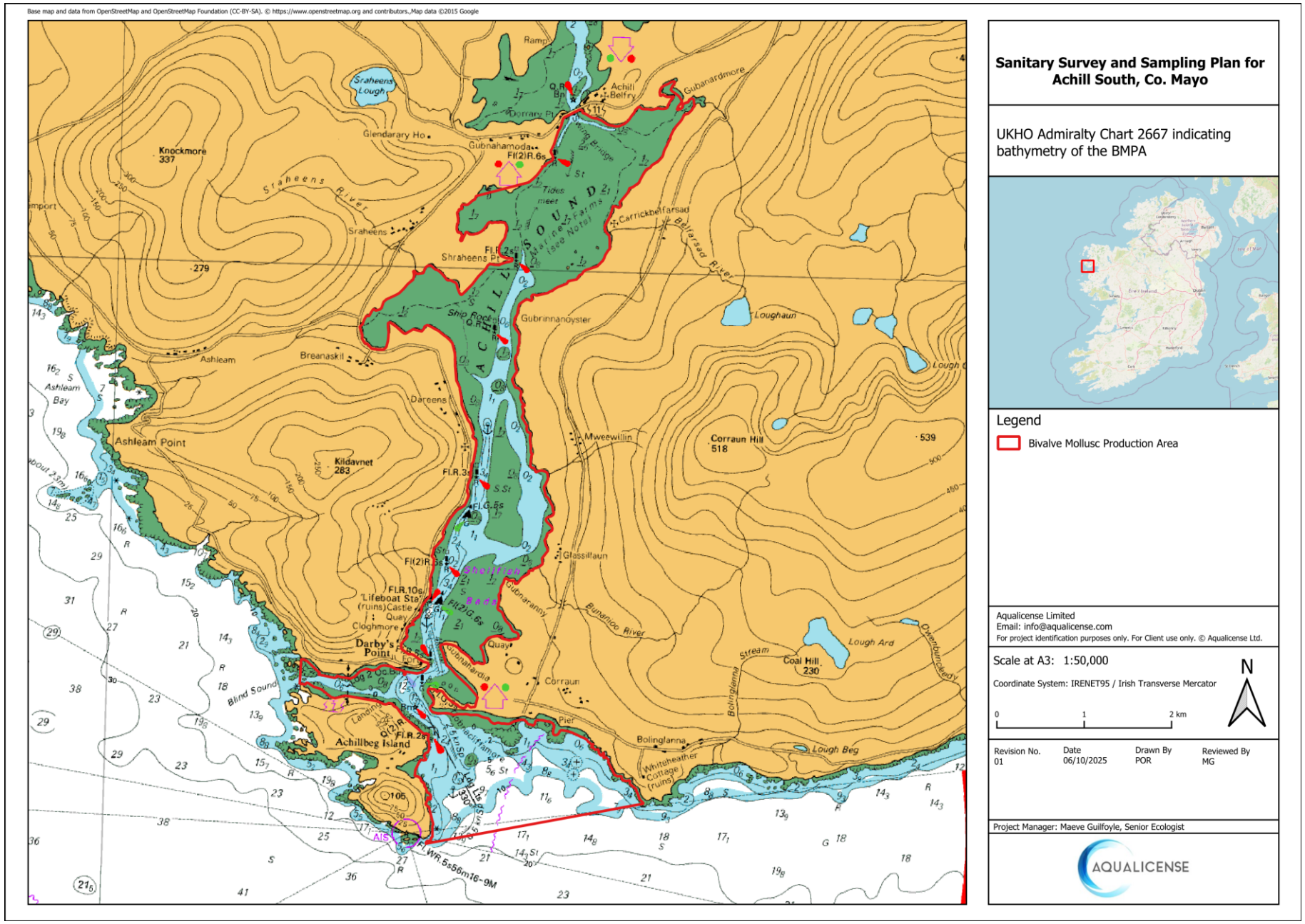

Figure 2-6– Admiralty Chart 2740-0_W and 2667-0 indicating bathymetry

2.4.3.2 TIDAL INFLUENCE

Tide predictions were sourced from INTGN harmonic analyses at nearby gauges and Marine Institute ROMS model output at non-gauge locations both providing astronomical tide levels for the area. Tide tables for the Sound experiences semi-diurnal tides with a mean tidal range of c. 3.3-3.9 m above chart datum. These tidal oscillations induce strong alternating flows through the narrow channel with peak current velocities in the narrowest sections regularly exceeding 2-3 knots. Due to the constrained cross-sectional area, the channel supports relatively high velocities during peak flood and be phases, in particular in the narrower sections where flow is constricted. Such speeds promote significant vertical mixing and inhibit stable stratification

2.4.3.3 TEMPERATURE AND SALINITY

No data is available for temperature and salinity modelling within the Achill North BMPA. However, this absence does not undermine the determinations made in this sanitary survey area there is an abundance of data on tides and currents along with studies conducted in nearby Clew Bay for temperature and salinity.

Studies for Clew bay found that in the middle section of the bay, salinity ranged from 33.5 to 34 PSU (Nagy, Mamoutos, Nolan, Wilkes, & Dabrowski, 2023). Temperature recorded during surveys in Clew Bay ranged from 14.0 – 14.5 °C- of note this data was used for the validation of the test model as such is representative of the month of September only. Temperature ranges are likely to be similar for the Achill Sound BMPA.

2.4.3.4 CURRENT PATTERNS

Current patterns on the west coast of Ireland are impacted by the North Atlantic Oscillation and low-pressure systems (Ren, et al., 2023). Average current speeds in the region have been recorded to peak in winter and are lowest in spring (Ren, et al., 2023). The Achill South BMPA occupies the relatively narrow tidal channel that separates Achill island form mainland Co. Mayo. It acts as a constricted link between internal coastal waters and the open Atlantic, forming part of the tidal exchange pathway for nearby bays and inlets.

In the Achill Sound approaches the tidal stream directions and rates are provided by UKHO Admiralty Chart 2704_0 and 2667_0, with tidal diamond A indicating the hourly set and rate through the cycle for the area (approximately north to south- south easterly direction).

2.4.4 WEATHER

Weather patterns significantly influence the transport of organic pollutants. The nearest synoptic weather station to the production area is Newport (furnace), located ~21.66km west. Data from this station from August 2015 to September 2025 inclusive (Met Éireann, 2025a, 2025b) have been used to infer weather patterns and seasonality influencing pollutant circulation within the production area.

2.4.4.1 WIND AND WAVES

Wind

The prevailing wind direction is southerly (~17.6 ms^{-1}), accounting for 27.6% of all winds *(Figure 2-7)*. The next strongest sector is south-west (SW) (accounting for 22.1%) with a maximum mean of ~16.6 ms^{-1}. There is a seasonal prevalence with winter having the strongest and most persistent flow, dominated by the west- southerly winds and higher overall mean speed (~7.5 ms^{-1}).

Autumn and spring retain the south- south westerly bias but with slightly lower wind speeds (~6.05-5.74 ms^{-1}), with south-westerly blasts more common during the summer. Summer remains southerly let yet is the gentlest wind speeds (~5.44 ms^{-1}) and displays a broader directional spread overall, including occasional westerly and north easterlies. For further details refer to *Appendix 1 – Summary Statistics for* Weather.

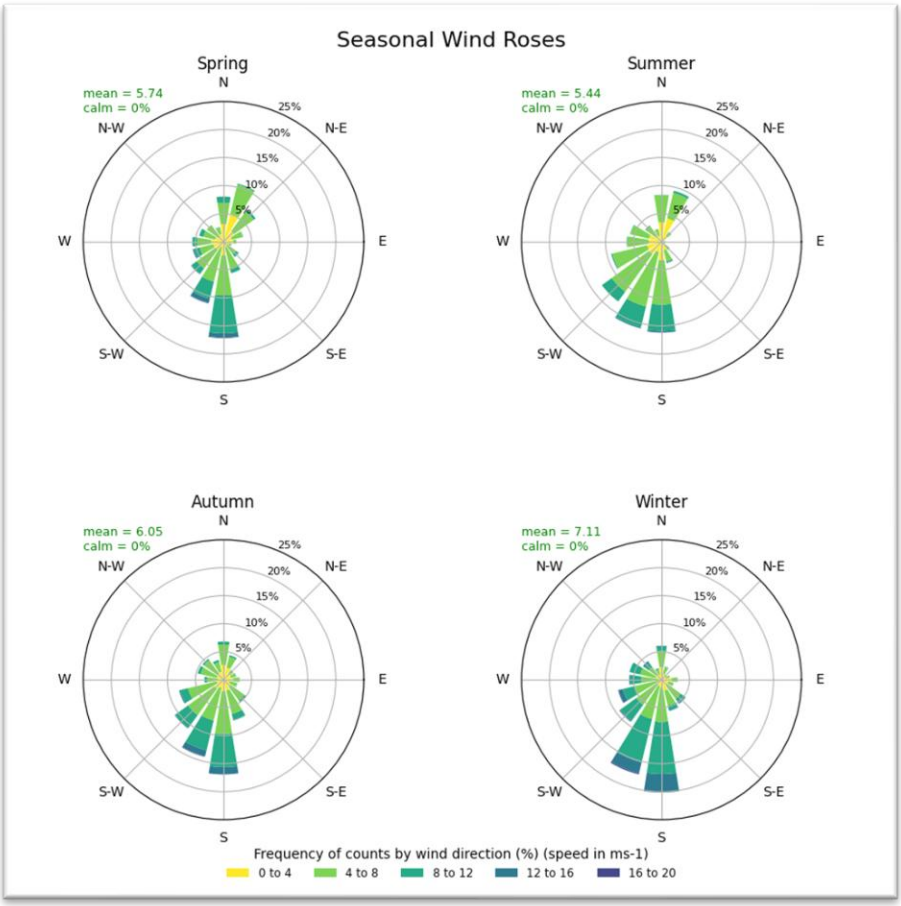

Figure 2-7. Seasonal wind roses for Newport Furnace (August 2015 to September 2025 inclusive)

Waves

Waves and currents play a crucial role in hydrographic conditions. Of particular relevance to sanitary surveys, wind-driven waves facilitate sediment resuspension and transport (Green and Coco, 2014) These waves are primarily generated by local prevailing winds and travel in the direction of those winds. Their characteristics are influenced by factors such as wind speed, duration, and fetch (the distance of open water over which the wind blows without being blocked) (Young, 1999)

Wind affects hydrodynamic conditions through producing wind-induced waves and currents. These play key roles in sediment resuspension and transport. Wind generated waves are driven by the prevailing wind strength and travel in its direction- e.g. for Achill south the prevailing wind direction is southerly producing waves that move in a northerly direction

2.4.4.2 PRECIPITATION

Heavy rainfall can lead to surface runoff, transporting organic pollutants from land-based sources, such as farms and wastewater overflows, into surface water bodies and potentially to the production area. The mean monthly rainfall is at its lowest levels during the spring period, followed by summer, with rain fall peaking in autumn and winter (*Figure 2-8*). The driest period occurs from April to July, with precipitation reaching a peak during the winter months.

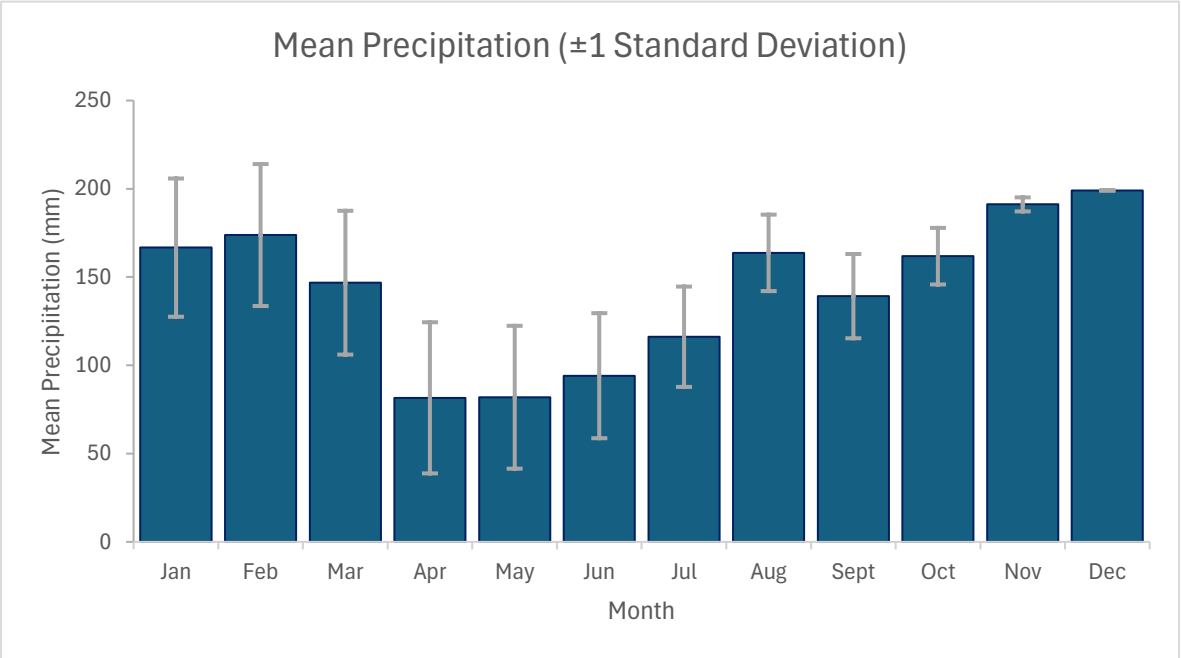

Figure 2-8. Mean monthly precipitation (± 1 standard deviation) at Newport Furnace (August 2015 to September 2025 inclusive)

Mean monthly rainfall levels are highest in December (199.09 mm), although heavy rainfall events occur throughout the year, with the exception of the months of April and may where precipitation levels drop to less than 82 mm per month.

Heavy rainfall during the spring and summer can result in increased faecal loadings, largely due to higher livestock stocking densities and the accumulation of faecal matter over the summer

months. Therefore, the influence of precipitation on circulation of pollutants will be further discussed in *Section 2.5* as relevant for each source of contamination.

2.4.5 Summary of the Characteristics of Circulation of Pollutants

For clarity at this stage of the Sanitary Survey, a brief overview of the findings of this section of the report will be provided. Key characteristics identified include:

- **Freshwater Inflows:** Unnamed river (IE_WE_ IE_WE_33B090100 with two unnamed tributaries) it the largest fresh water inflow into the area, entering the BMPA at inflow 13 This is considered to be the primary inflow of freshwater to the Sound.
- **Groundwater:** Groundwater vulnerability is high in areas on the coastal fringe of the contributing catchment. These are the regions at greatest risk in terms of groundwater infiltration.
- **Hydrodynamics:** Current and tidal patterns indicate that the semi diurnal tides, the bathymetry of the bay, and current speeds indicate that the flushing times within the sound are relatively rapid, indicating that there will be relatively good flushing for the area.
- **Weather:** Sediment resuspension and movement of contaminants (within surface waters) may occur during the stronger south/south-westerly winds. Heavy rainfall may influence the seasonality of the surface water run-off particularly during the summer and winter seasons.

These factors collectively affect the entry, movement, and dispersion of pollutants in the production area, with further details on individual pollution sources to be discussed in subsequent sections.

2.5 Inventory of Pollution Sources and Seasonal Variations of Pollutants

An inventory will be compiled detailing potential pollution sources of human and animal origin, focusing solely on those containing faecal matter. All identified sources within the contributing catchment (*Figure 2-3*) will be assessed, considering seasonal variations where relevant. This assessment complies with Part 1a and 1b of Article 56 of Commission Implementing Regulation (EU) 2019/627 (see *Section 1* for details).

2.5.1 Sewage Discharges

This section examines sewage discharges from human sources, primarily Urban Wastewater Treatment Plants (UWWTPs) and septic tanks. Contamination risk is influenced by factors such as location, size, treatment level, and discharge frequency. The following sections will provide a detailed analysis of all identified discharges within the contributing catchment.

2.5.1.1 Urban Waste Water Treatment Plants

UWWTPs are linked to various discharges, primarily the continuous release of treated and untreated sewage. They also produce intermittent discharges, including rainfall-dependent releases via combined sewer overflows (CSOs) and stormwater overflows, as well as emergency discharges under exceptional circumstances.

Following examination of EPA data (EPA, 2025b), no Urban Waste Water Treatment Plants are present within the contributing catchment. However, a UWWTP situated just outside the catchment, within Achill Sound North, lies in close proximity to the BMPA and may have hydrodynamic connectivity under certain tidal conditions (e.g. spring ebb tide).

2.5.1.2 Septic Tanks and Other Sewerage Types

Ireland has nearly half a million Domestic Waste Water Treatment Systems (DWWTSs), primarily septic tanks (EPA, 2021). In 2023, 45% of these systems failed inspection, posing risks to household drinking water and the wider environment, including surface and groundwater. The EPA categorises DWWTS risk zones as follows:

- Zone 1: Higher risk to surface waters.
- Zone 2: Higher risk to household wells.
- Zone 3: Lower risk areas.

Currently, no comprehensive database exists for DWWTS locations. Therefore, this section relies on Census 2022 small-area statistics (CSO, 2023c). *Table 2-3* and *Figure 2-9* present the percentage of each small area overlapping the contributing catchment and its population density.

Table 2-3 Statistics for Small Areas overlapping the contributing catchment and corresponding population density (CSO, 2023c)

Small Area Code	Contributing Catchment Overlap	Population Density (People per km^2)
A157001001	91.7%	35
A157001002	94.3%	17

Small Area Code	Contributing Catchment Overlap	Population Density (People per km^2)
A157001003	>99%	26
A157001004/A157001005	53.7%	0
A157001006	40.4%	12
A157060003	28.0%	5
A157060004	62.9%	20
A157060005	51.7%	8
A157074001/A157074002	3.7%	0
A157074003/A157074005/A157074006/A157074004	57.2%	0
A157074008/A157074007	95.9%	0
A157139002	<1%	15

Sewerage type estimates were also obtained from Census 2022 data (CSO, 2023c). These figures are presented as percentages for entire small areas, as individual data for overlapping catchments would not be representative (small areas do not directly align with the contributing catchment, see *Table 2-3*. *Figure 2-9* highlights the extent of reliance on septic tanks within the catchment.

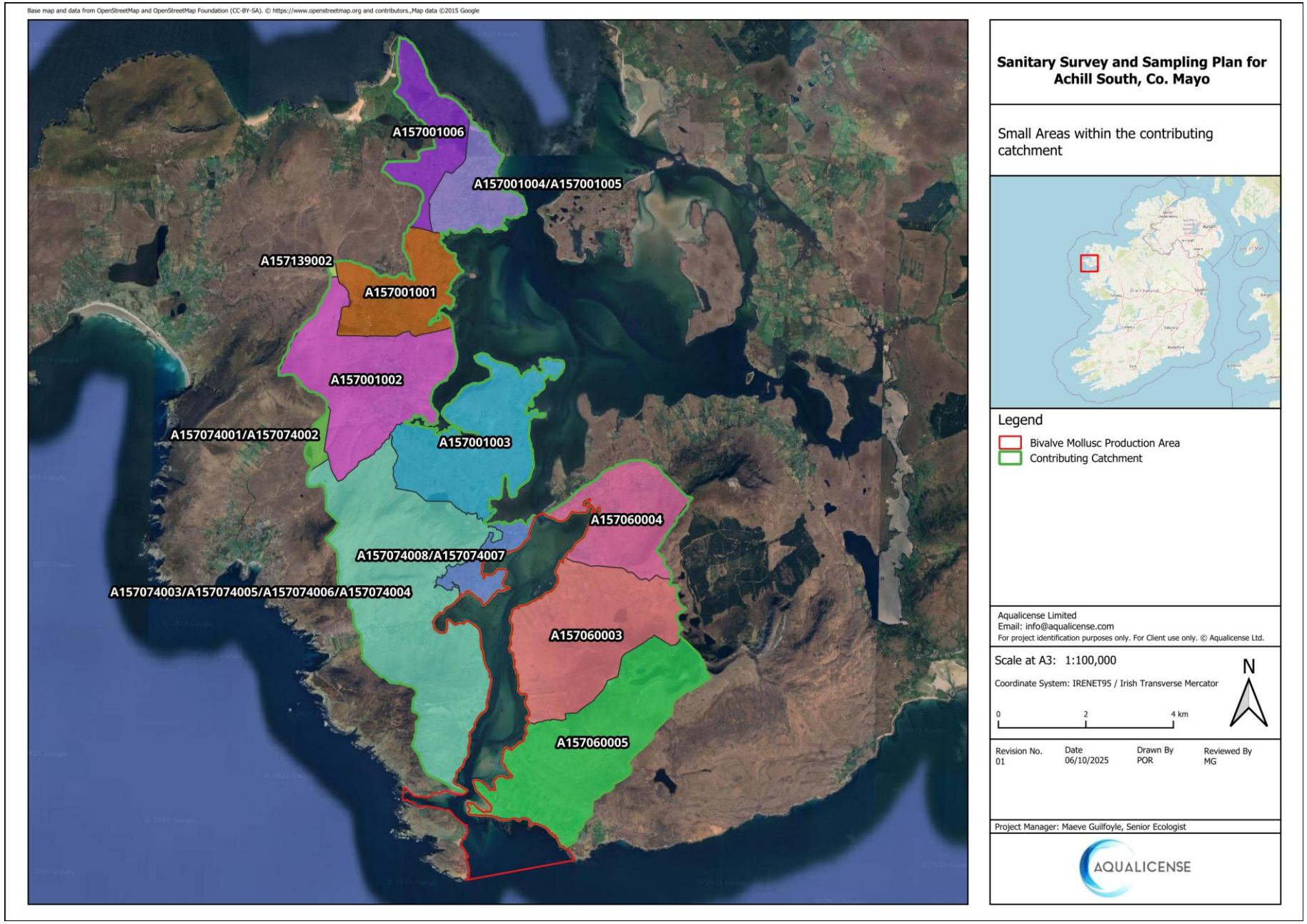

Figure 2-9– Small areas overlapping the contributing catchment

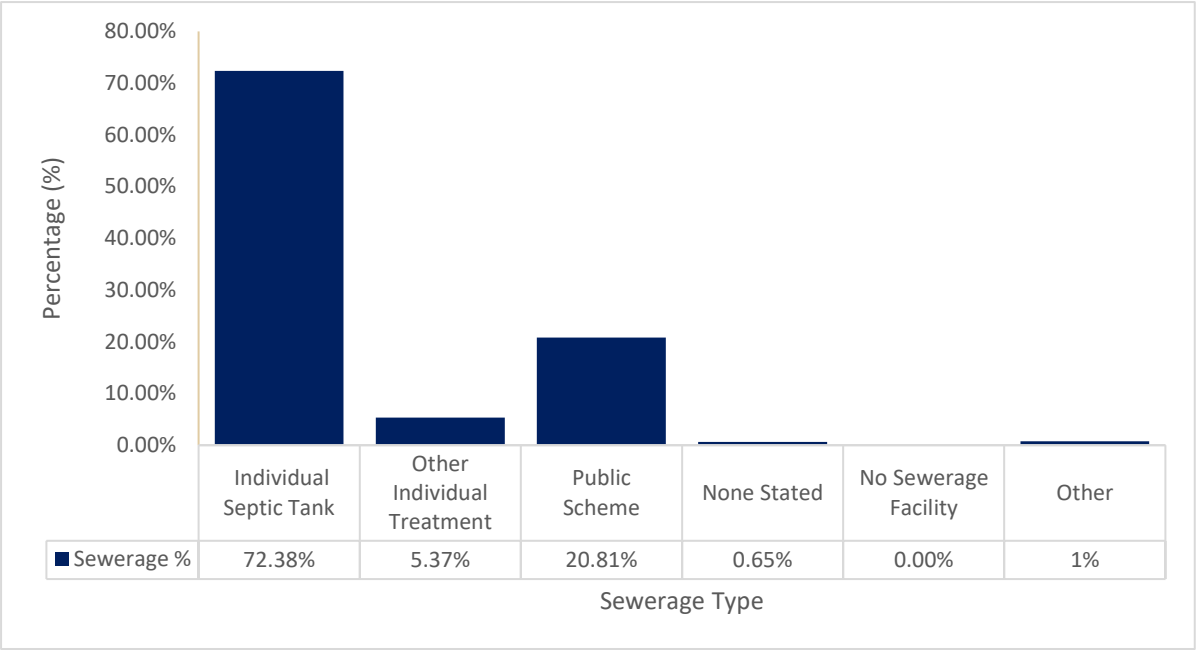

Figure 2-10 – Percentage estimates of sewerage types for permanent private households according to the 2022 census

No areas within the contributing catchment are designated as Zone 1 (high environmental risk). The majority of the contributing catchment falls within Zone 3 Low (EPA, 2021). There are large pockets that fall into Zone 2 (potential risk to human health) on both the eastern and western sections of the catchment, however these are not located within close proximity to the BMPA (*Figure 2-11*). The exception to this is Achillbeg Island where it runs directly adjacent to the outer boundary to the south of the BMPA.

While these risk zones indicate potential contamination, other factors must be considered when assessing susceptibility to DWWTS failure or non-compliance. Given the widespread reliance on septic tanks, population density and hydrography provide valuable insights into the potential risk to the BMPA.

Although the population densities within Zone 2 are relatively modest (20-35 people per km^2 in A157060004, A157001003 and A157001001; see *Table 2-3),* the per-household DDWTS loads can elevate risk. By comparison, the larger Zone 3 areas are sparsely populated (0-10 people per km^2), would contribute little to the loading , with the inland zones having thicker subsoils which would provide greater dilution and pathogen die-off before reaching the BMPA (Gill, Johnston, Misstear, & Ó Súilleabháin, 2004).

Surface water hydrology also plays a crucial role in contamination risk. Groundwater-fed streams and drainage ditches that outfall to the BMPA's tidal inlet can act as efficient conduits from adjacent risk areas. Where these outflows traverse high vulnerability coastal zones, any septic-related contamination is less attenuated and more likely to reach the intertidal zone. Longer inflow flow paths through lower-vulnerability terrain tend to provide greater dilution and filtration.

Therefore, considering groundwater vulnerability, surface water flows, and population density, the coastal fringe immediately south-southeast of the BMPA, along the tidal inlets draining the A157074003/A157074005/A157074006/A157074004, A157074008/A157074007, A157060005, and A157001003 sub-catchments where Zone 2 pockets intersect thin subsoils and short groundwater flow paths, are the most likely locations for sewerage contaminated discharges from DWWTS.

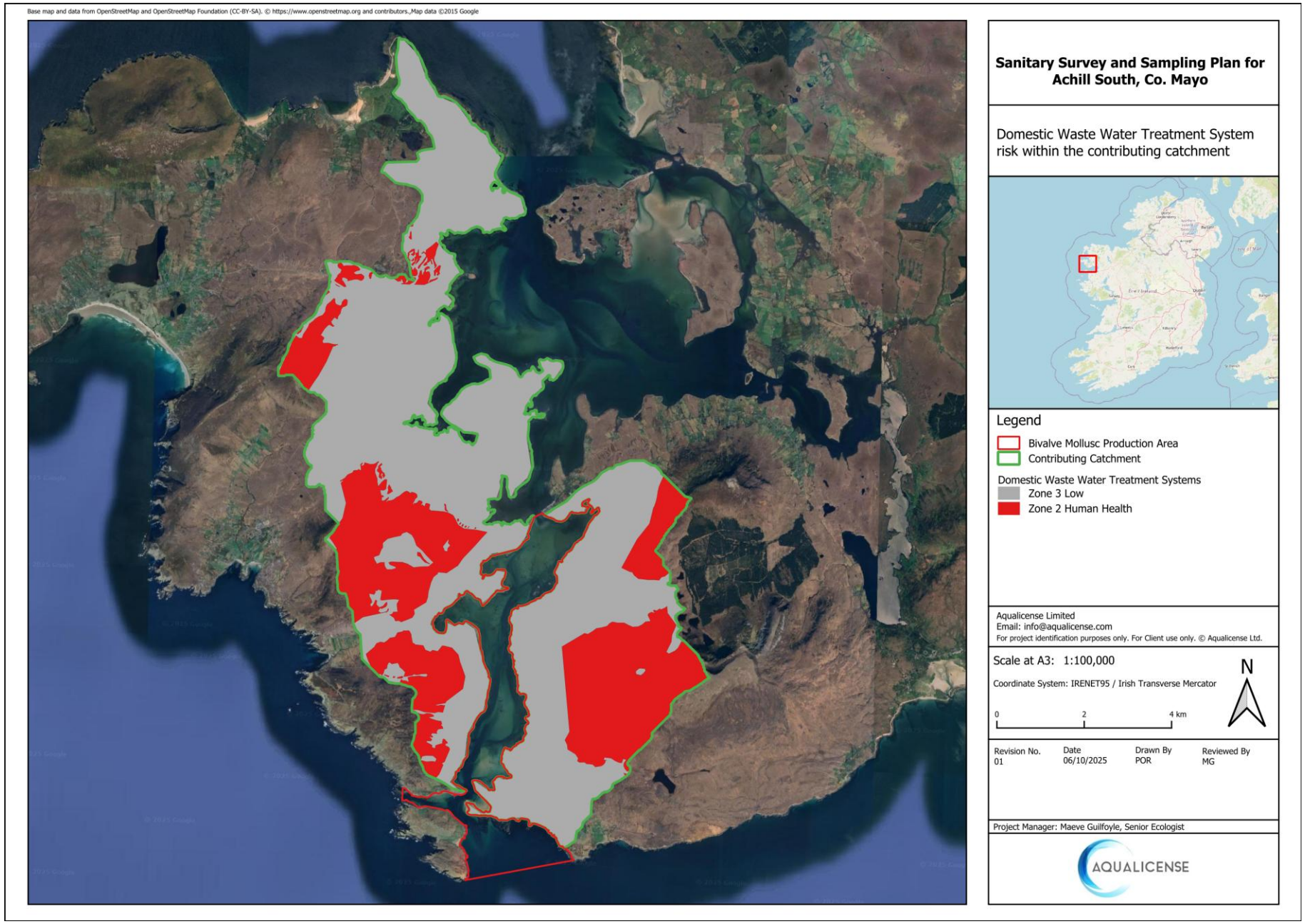

Figure 2-11– Domestic Waste Water Treatment System Risk Zones (EPA, 2021)

2.5.2 Industrial Emissions

2.5.2.1 IE and IPC Licences

The EPA regulates specific industrial and agricultural activities in Ireland through Industrial Emissions (IE) licences and Integrated Pollution Control (IPC) licences. While these cover a broad range of activities, only those relevant to potential faecal contamination from human or animal sources are considered in this desk-based study. The key categories assessed include:

- Food and Drink
- Waste
- Intensive Agriculture (Poultry and Pigs)
- Other Activities (including wastewater treatment)

There are no IE/IPC/Waste licenses granted within the contributing catchment (EPA, 2024a), therefore emissions from such facilities will not be further considered in this desk-based study.

2.5.2.2 Section 4 Discharges

Section 4 Discharge licences, issued under Section 4 of the Local Government (Water Pollution) Act 1977 (as amended in 1990), regulate the discharge of trade and sewage effluent into surface water and groundwater. These licences set conditions to ensure effluent is treated and controlled to protect the receiving environment.

A total of 2 Section 4 discharge is present within the contributing catchment (EPA, 2024b), which will be characterised and discussed in further detail below (*Table 2-4* and *Figure 2-12*).

Table 2-4. Characterisation of the Section 4 Discharges within the contributing catchment.

Reference	Name	Facility Address	Latitude (WGS 84)	Longitude (WGS 84)	Potential Pathway to the BMPA	Discharge Type
WP(W)20	Clare island Sea Farms Ltd	Cloughmore, Achill, Co. Mayo	53.876072	-9.944518	Positioned on the south western shore of the BMPA c. 460.3 m from the closest site T10-212.	Not specified
WP(W)52(a)	Eisc Riaga Teoronta, c/o Mr Michael Burke	Shellfish Processing Facility, Currane, Achill, Co. Mayo	53.878660	-9.932791	Positioned on the eastern shore c. 155 m to the north of the closest site T10-212-2	Not specified

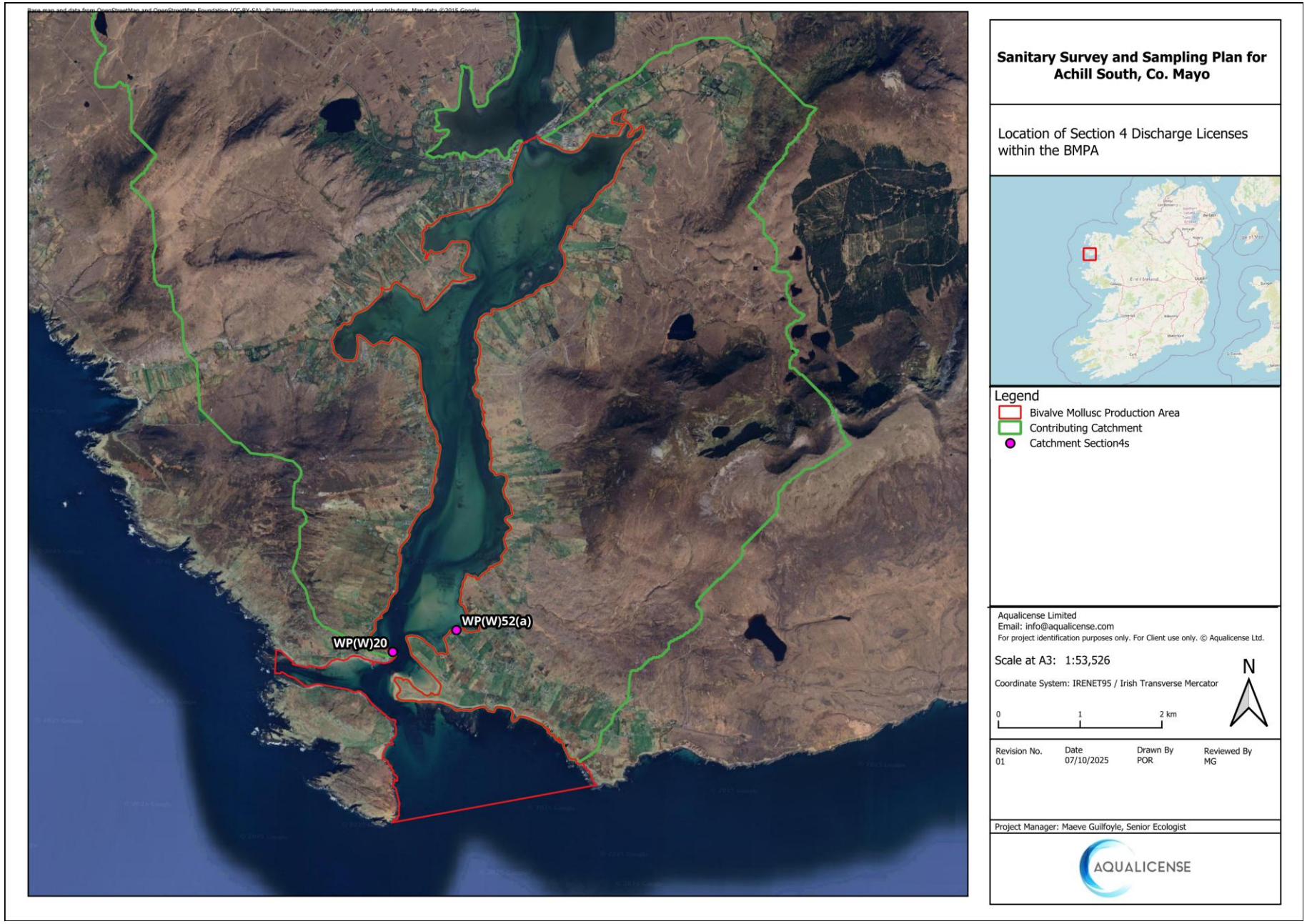

Figure 2-12 – Section 4 discharges within the Contributing Catchment

2.5.3 LAND USE

According to Corine (2018), land cover within the contributing catchment is dominated by Peat bogs (45.2 km^2, 64.4%) (*Figure 2-13*). Land principally occupied by agriculture, with significant areas of natural vegetation is the next most dominant land cover type (14.9 km^2, 21.3%). Other land use types within the contributing catchment are: Moors and heathland (5.5 km^2, 7.8%); Pastures (1.7 km^2, 2.4%) and Sparsely vegetated areas (1.0 km^2, 1.5%). Several land cover types each account for areas of less than 1%, namely: Sea and ocean; Discontinuous urban fabric; Bare rocks; Beaches, dunes, sands and Intertidal flats.

Of the above land cover types, land principally occupied by agriculture is the most likely to give rise to faecal contamination in the contributing catchment.

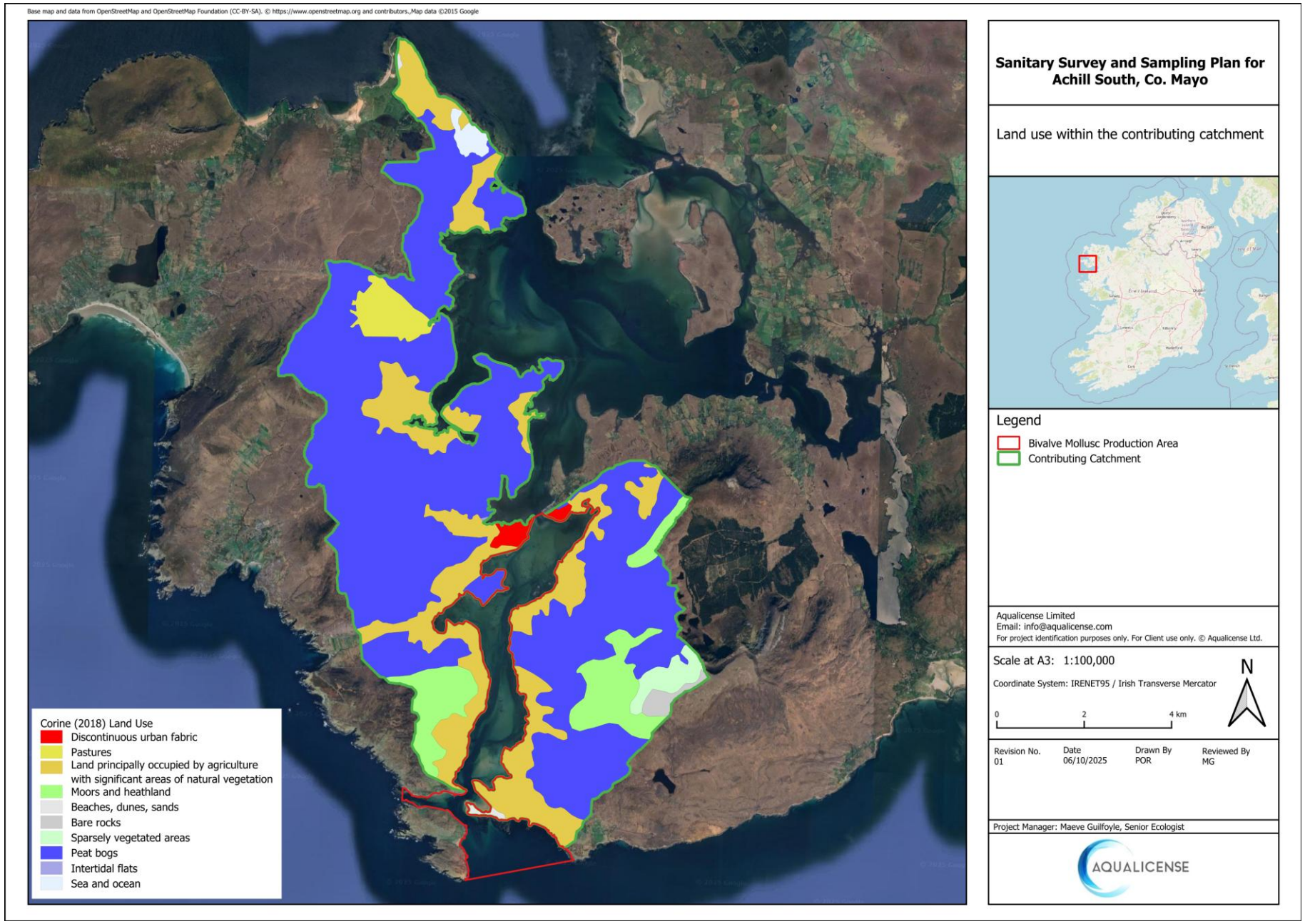

Figure 2-13 – Land Use within the Contributing Catchment

2.5.3.1 AGRICULTURE

Animals

Faecal production and *E. coli* loads from domestic animals are often comparable to or greater than those from humans (*Table 2-5*). Sheep have the highest daily *E. coli* load, followed by pigs, cows, humans, and chickens. Contamination can occur through direct deposition into watercourses or run-off following rainfall, with seasonal patterns influencing agricultural contamination (see *Section 2.4.4.2)*. Stocking densities also play a role, with higher faecal contamination typically observed during summer months (Hunter et al., 1999).

Table 2-5 – Estimated faecal production and *E. coli* loadings of selected domestic animals in comparison with humans (Jones and White, 1982 as read in Taylor (2003))

SOURCE	FAECAL PRODUCTION (G/DAY)	AVERAGE NUMBER (*E. COLI*/G)	DAILY LOAD (*E. COLI*)
Man	150	13 x 106	1.9 x 109
Cow	23600	0.23 x 106	5.4 x 109
Sheep	1130	16 x 106	18.1 x 109
Chicken	182	1.3 x 106	0.24 x 109
Pig	2700	3.3 x 106	8.9 x 109

The most comprehensive agricultural data available is derived from 2020 Census of Agriculture (CSO, 2020) with the smallest reporting unit being the Electoral Division (ED). While data are not provided on chickens or pigs, intensive poultry farms (>40,000 places[1]) and pig farms requiring licences (>750 sows or >3,000 production pigs) that fall under EPA licensing control are discussed in *Section 2.5.2.1*.

A total of 4 Electoral Divisions (EDs) overlap with the contributing catchment (*Table 2-6 and Figure 2-14)*. However, these EDs do not directly correspond to the contributing catchment boundary, requiring an estimation of the proportion of each ED that overlaps with (i.e. not 100% within) the contributing catchment as a percentage overlap. *Table 2-6* therefore reports both the total grazing animal census data per ED and corrected totals (calculated from the percentage overlap of the relevant ED, shown in *Table 2-6* in brackets), which represents the estimated number of animals within the contributing catchment based on an assumed even distribution across each ED.

In this context, livestock includes all domesticated animals raised for agricultural purposes which includes cattle, sheep, goats, pigs, horses, and poultry. Where relevant, specific animal groups such as cattle and sheep are reported separately to provide more detailed information.

[1] Refers to places for birds e.g. broilers, layers, etc.

Table 2-6 – Statistics from the Census of Agriculture 2020 relating to grazing farm animals within the Electoral Divisions overlapping the contributing catchment]

Electoral Division	Percentage Overlap of Contributing Catchment	Total (Corrected) Dairy Cows	Total (Corrected) Livestock	Total (Corrected) Other Cows	Total (Corrected) Cattle	Total (Corrected) Sheep
Achill	74.2%	0 (0)	565 (419)	91 (68)	197 (146)	4319 (3205)
Corraun Achill	32.7%	0 (0)	1124 (368)	62 (20)	160 (52)	10134 (3314)
Dooega	43.5%	0 (0)	427 (185)	0 (0)	0 (0)	4204 (1827)
Slievemore	<1%	0 (0)	1249 (3)	67 (0)	144 (0)	11442 (28)

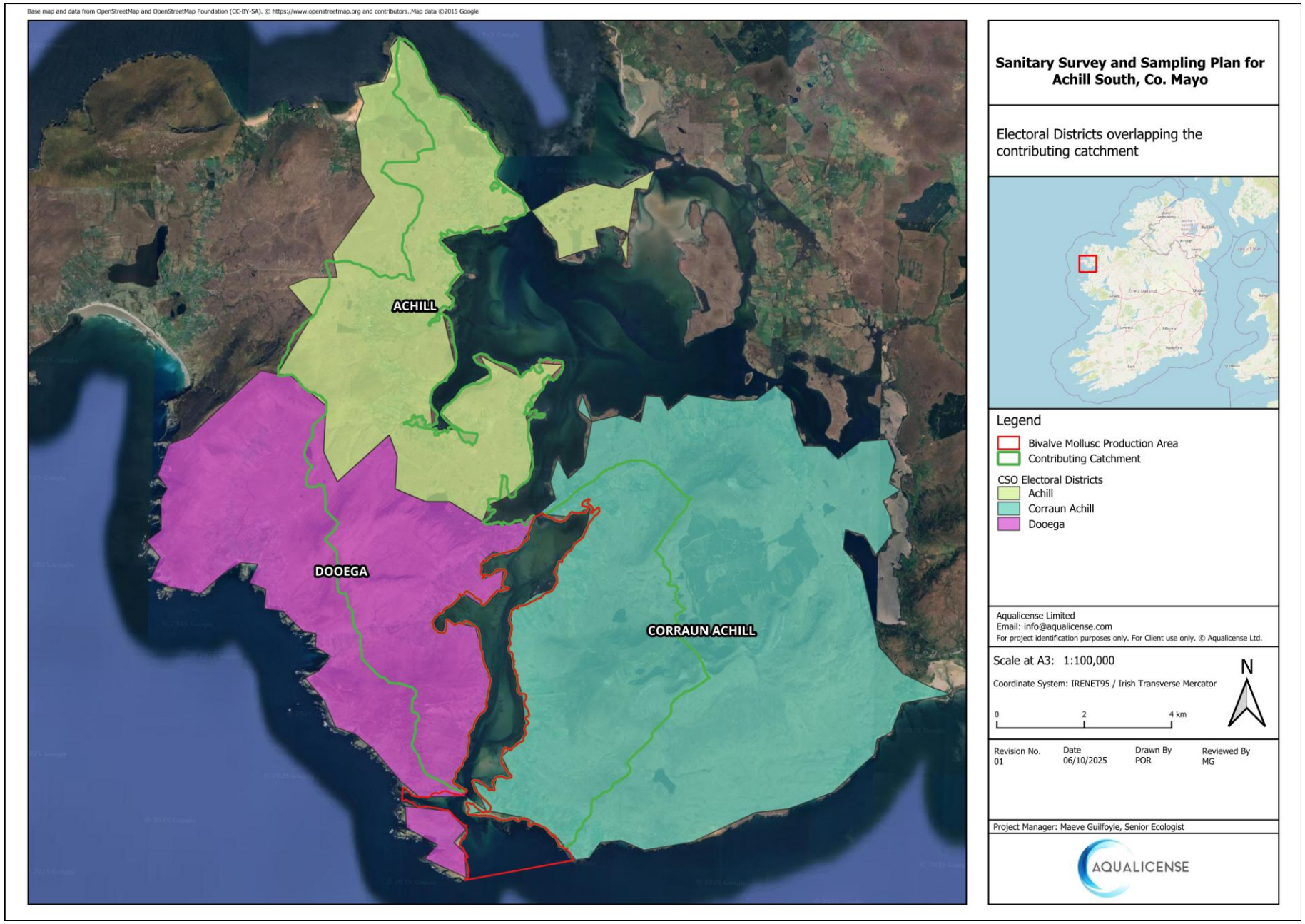

Figure 2-14 – Electoral Divisions overlapping the Contributing Catchment

Under Ireland's Water Framework Directive (WFD) monitoring programme, waterbodies classified as "At Risk" of failing to meet their water quality objectives undergo assessment for significant pressures that must be addressed. Of particular relevance to this section are pressures from agriculture[2]. As part of the third WFD cycle, 3 groundwater bodies (GWB) underlying the contributing catchment (GWB Achill, GWB Malranny and GWB Belmullet) The GWBs Achill, Malranny and Belmullet are not considered "At Risk" and therefore have not been classified for agricultural pressures.

Although none of the groundwater bodies underlying the contributing catchment are currently classified as "At Risk" under the WFD, surface waters draining agricultural areas particularly those with high stocking densities, pose a contamination risk to the BMPA. This is of particular importance during heavy rainfall events that promote faecal run-off.

Census data (*Table 2-6*) indicates that sheep dominates the livestock numbers within the catchment with Corraun Achill (3,314), Achill (3,205), and Dooega (1,827) having the highest corrected counts. These Eds align with small areas of very low human population density suggesting animal sources are the primary pressures rather than domestic waste.

Critically, many of these areas coincide with coastal zones of "Extreme" or "Rock at/near Surface or Karst" groundwater vulnerability (GSI, 2021), where thin subsoils and shallow flow paths would limit natural attenuation, while being in close proximity to the BMPA boundary.

Agricultural pressures are seasonally driven, with increased faecal loading expected during summer grazing periods and after heavy rainfall, which promotes run-off and increased shallow subsurface flow. Surface water pathways, particularly in the western and southern sections (see *Figure 2-14*), where areas of "extreme" groundwater vulnerability overlap with areas of agricultural activity and poor riverine quality act as direct conduits to the BMPA.

Therefore, considering grazing animal densities, groundwater vulnerability, and surface water inflows, the western areas of the catchment (Bunanioo_010) are the most likely locations for pollution discharges from agriculture. The potential for contamination from combined factors such as high animal loading, limited attenuation and direct discharge routes, indicate that these zones are key for potential high load contamination zones, that are likely to be greatest during the summer months and following periods of high precipitation.

Land

In addition to the direct source of organic pollution from animals, agricultural land use contributes to organic pollution through the spreading of slurry and soiled water. To provide a clearer understanding of agricultural land use, the 2020 Census of Agriculture (CSO, 2020) can again be consulted, with a correction to account for the percentage overlap of each ED in the contributing catchment (*Table 2-7*). The largest assumed area of farmed land is in the Achill (c. 579.5 ha), followed by Corraun, Achill (c. 387.4 ha). Cereal farming is absent across all EDs, and

[2] Not all parameters from WFD apply, please refer to Section 3

all recorded farmland is grassland, indicating a landscape used for grazing rather than arable farming.

Under the 5th Nitrates Action Programme (Government of Ireland, 2022), the contributing catchment is designated Zone B. In this zone, slurry spreading is prohibited from 1st October to 15th January inclusive, while the spreading of soiled water is also prohibited throughout December. Therefore, the greatest risk to the BMPA primarily exists outside this period, assuming the regulations are adhered to. Additional restrictions on spreading of soiled water apply in areas designated as "*Extreme Vulnerability Areas on Karst Limestone Aquifers*" under S.I. No. 113/2022. The contributing catchment itself does not overlie a karst limestone aquifer (GSI, 2023) however, a portion of the catchment coincides with zones of "extreme" groundwater vulnerability- where bedrock is at or near the surface (*Figure 2-13*)-suggesting potential karst vulnerability.

Considering the 2020 Agriculture Census, c. 16.42% of the contributing catchment is farmed. As there are no refined spatial data available for the Census, Corine mapping has been used to calculate areas of higher groundwater vulnerability overlapping agricultural land. Approximately 100.00% (c. 450.43 ha) of agricultural land overlaps areas classified as having "extreme" or "rock-at-surface" groundwater vulnerability (GSI, 2021). Additionally, 16 EPA-mapped rivers (*Figure* 2-3) in the contributing catchment flow through agricultural land before entering the BMPA.

Therefore, considering the agricultural land use and groundwater vulnerability, in addition to all riverine inputs, to the east of the BMPA are the most likely locations for pollution discharges from spreading of slurry and soiled water. Considering the regulatory restrictions in place, this risk is likely to be greatest from mid-January to September inclusive.

Table 2-7 – Statistics from Census of Agriculture 2020 relating to land utilisation within the Electoral Divisions overlapping the contributing catchment]

Electoral Division	Percentage Overlap of Contributing Catchment	Total (Corrected) Number of Holdings	Average Size of Holdings	Total (Corrected) Area Farmed (Hectares)	Total (Corrected) Cereals	Total (Corrected) Grassland
Achill	74.2%	98 (73)	8	781.1 (579.5)	0.0 (0.0)	780.0 (578.7)
Corraun Achill	32.7%	121 (40)	9.8	1184.7 (387.4)	0.0 (0.0)	1184.7 (387.4)
Dooega	43.5%	62 (27)	6.8	422.5 (183.6)	0.0 (0.0)	422.5 (183.6)
Slievemore	<1%	141 (0)	6.2	878.7 (2.2)	0.0 (0.0)	867.2 (2.1)

2.5.3.2 URBAN AREAS AND HUMAN POPULATIONS

Human populations contribute to contamination from sewerage, as previously discussed in *Section 2.5.1*. However, examining urban areas and population dynamics can provide further insight into pollution sources and the seasonality of contamination.

Gob an Choire is the only urban area present within the contributing catchment ()(Tailte Éireann, 2023)[3]. It is located in the north western section of the BMPA in close proximity to sites T10-284B and T10-284A. Though for the catchment area the highest population density is recorded in Small Area A157001001 (*Table 2-3 and Figure 2-9*). This density is below the national average of 73 persons/km^2 (CSO, 2023b). During the most recent census (3rd April 2022), 18.74% of houses within the contributing catchment were identified as unoccupied holiday homes (CSO, 2023a). This represents a relatively high proportion compared with both the national share of unoccupied holiday homes (~3.2% of dwellings nationally) and the Co. Mayo average (~8.8% of dwellings in 2022). This indicates a marked seasonal occupancy pattern and associated seasonal increases in organic loading/wastewater generation during the summer months. For further information refer to *Section 2.5.1.2* relating to septic tanks.

In addition to domestic and urban wastewater treatment, facilities such as nursing homes, schools, hospitals, and other large developments can be sources of pollution. A search of the Environmental Impact Assessment (EIA) database did not identify developments requiring EIA in the contributing catchment since 2017 (Department of Housing, 2024). A search of Google Maps (search conducted 02/10/2025) for relevant facilities (e.g. schools, universities, nursing homes, hospitals, barracks, and prisons) also yielded no relevant results.

Tourist facilities can contribute to organic pollution, particularly in peak seasons. The contributing catchment lies within a low-density area of accommodation providers, including hotels, B&Bs, and campsites (Fáilte Ireland, 2018). While hotels and B&Bs typically use domestic or urban wastewater treatment, campsites and caravan parks may pose additional pollution risks. A Google Maps search (accessed 02/10/2025) identified the following facilities:

- Achill Sound Hotel and Connaughton's bar;
- Anvil House;
- Bar an Uisce (B&B);
- Breasal (B&B); and
- Greystone house

[3] The CSO classifies urban areas based on the following "Buildings in Urban Areas are within a group of at least 100 buildings and buildings need to be within 65 meters of another building. Building groups of 100 buildings or more must be within 500 meters of each other." (Tailte Éireann, 2023).

2.5.4 Other Pollution Sources

2.5.4.1 Marine Vessels

Marine vessels, including ferries, cargo ships, fishing boats, and recreational craft, may contribute to faecal contamination, depending on passenger volume, waste management practices, onboard treatment, and regulatory compliance.

Under S.I. No. 492/2012 (which transposes Annex IV of the MARPOL Annex IV), treated sewage can be discharged at a minimum of 3 nautical miles from shore, while untreated sewage must be released no closer than 12 nautical miles. Since sewage is typically discharged at sea or stored onboard for disposal, vessels are unlikely to be a major source of organic contamination.

However, for this desk-based study, the greatest risk is in areas where vessels converge, given the potential for accidental spillages and compliance variations.

No commercial ports lie within the BMPA (Marine institute, 2010). Following the Marine Institute and Marine Atlas there is one small fishing port listed within the boundary, with (ref *Figure 2-15*). Admiralty chart (2667-0_W) records two safe anchorage points in the south and middle of Achill Sound (in the deepest section of Achill Sound channel), within a natural narrow channel recorded as 3.5 m deep chart datum *(Figure 2-6)*. Ship density data at 1x1 km grid square per month resolution for 2019 - 2024 (EMODnet, 2025) shows that the marine traffic (cargo tanker vessel) primarily transits to the north and west (around Achill Island), though the lower section of the BMPA receives a high density of passenger vessels on a monthly basis (*Figure 2-15)*.

A review of Google satellite imagery was conducted on the 03rd of October 2025 to identify additional slips, piers, or jetties within the contributing catchment *(Figure 2-15),* with 2 additional piers and 6 slips located around the BMPA. However, given the scale of operations and expected compliance with S.I. No. 492/2012, the risk of contamination from vessels is relatively low. Instead, discharges from land are more likely to pose a more significant source of contamination.

2.5.4.2 Swimming, Bathing and Recreation

The recreational use of beaches and shorelines acts as a source of faecal contamination. Bathers are a non-point source of faecal bacteria, including *E. coli*, due to the shedding of microbes from skin (Elmir *et al.*, 2007). Dog walking is also a contamination source in recreational waters may contribute up to 20% of faecal indicator bacteria in urban Irish areas (Martin *et al.*, 2024). Such contamination is expected to peak during the summer months in association with warmer weather.

Following review of Google satellite imagery (search date: 03rd October 2025) was used to identify beaches and coastal walks within the BMPA. No Beaches or coastal walks were noted *(Figure 2-15)*. No Blue Flag-listed beaches or designated bathing waters are present within the BMPA or catchment area; therefore, no data are available regarding swimmer numbers or bacteriological quality. As such are not considered further in this report.

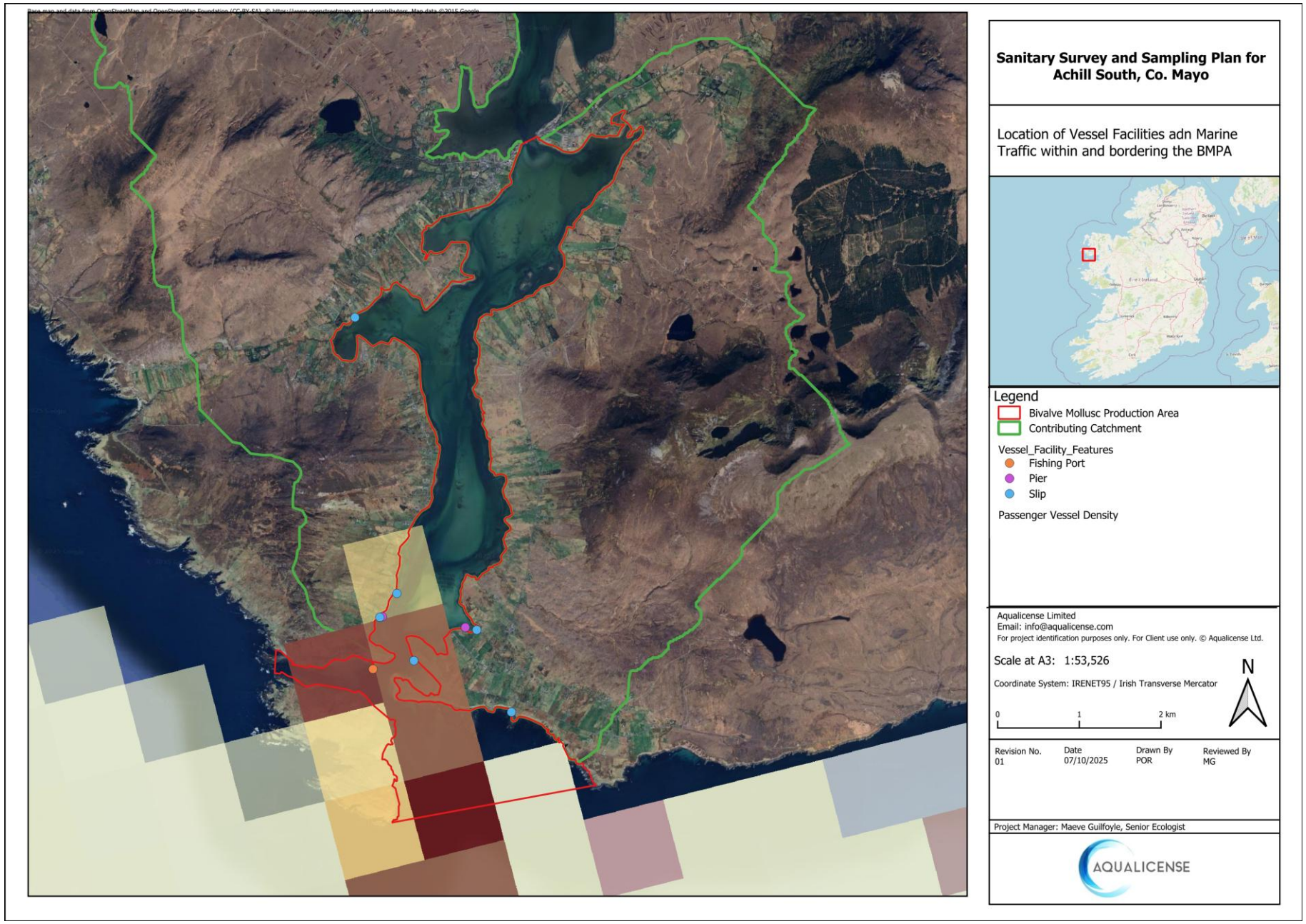

Figure 2-15 – Location of vessel facilities and shipping densities bordering the BMPA

2.5.4.3 WILDLIFE

Wildlife, including birds and aquatic animals, has been shown to act as a source of faecal contamination in the marine environment (Alderisio and Deluca, 1999; Godino Sanchez *et al.*, 2024).

To identify key areas of wildlife-related faecal contamination, a search was conducted for locations with potentially high densities of animals in proximity to the BMPA (*Table 2-8 and Figure 2-16)*. This search included Special Areas of Conservation (SACs), Special Protection Areas (SPAs), and Irish Wetland Bird Survey (I-WeBS) sites (Birdwatch Ireland, 2025; NPWS, 2025). Following review of the sites in the area, there are no SPAs SACs or I-WeBS sites that overlap directly with the BMPA though there are a number that are overlapping with the contributing catchment or within close proximity.

Only SACs where mobile fauna are listed as a qualifying interest (QI) were examined further, therefore the following SACs have been excluded from further consideration: Doogort Machair/Lough Doo SAC (001497), Croaghaun/Slievemore SAC (001955), Achill Head SAC (002268), Keel Machair/Menaun Cliffs SAC (1220), Lough Gall Bog SAC (000522), Bellacragher Saltmarsh SAC (002005), Corraun Plateau SAC (000485) and Clare Island Cliffs SAC (002243).

Two SACs are within relatively close proximity to the BMPA, namely West Connacht Coast SAC (NPWS, 2025); and Clew Bay Complex SAC (NPWS, 2011). There are several Annex II fauna listed as qualifying interests, including bottlenose dolphin (*Tursiops truncatus*), harbour porpoise (*Phocoena phocoena*), harbour seal (*Phoca vitulina*), and otter (*Lutra lutra*). Annex II species are protected under the 1992 Habitats Directive and every six years European Union member states must report on their conservation status (Morris & Duck, 2019). Their potential contributions to faecal contamination to the BMPA are outlined below.

A coastal bottlenose dolphin population of 189 individuals has been estimated for the Connemara-Mayo-Donegal area with 5% of individuals being observed across all of the survey zones, indicating movements over distances up to 215 km (Berrow, Daly, Levesque, Regan, & O'Brien, 2021). Bottlenose dolphins are known to travel hundreds to thousands of kilometres and frequently use shallow sheltered waters for foraging, socialising, resting and nursing (NPWS, 2015; Nykanen, Ingram, & Rogan, 2015; NPWS, 2024). Given this mobility and habitat use, their presence within the BMPA is plausible.

Aerial surveys in the West Connacht Coast SAC and its adjacent waters estimated harbour porpoise abundance at 4,989 individuals, albeit with broad confidence intervals (NPWS, 2024). The harbour porpoise are typically recorded in shallow coastal shelf waters (<200 m) and may travel distances spanning hundreds to thousands of kilometres (NPWS, 2024). Population size, mobility and habitat preference indicates a high likelihood of harbour porpoises entering the BMPA.

Harbour seals are a qualifying interest for Clew Bay Complex SAC, located < 1km south of the BMPA. A national aerial thermal-imaging survey recorded 4,007 harbour seals 41% of which were recorded in the west of the country (Morris & Duck, 2019). Adult harbour seals can travel as far as 50km to feed (Martin B. , 2017) and typically use sheltered areas as their haul-out sites

(Morris & Duck, 2019). Consequently, harbour seals from the SAC may enter the BMPA, posing a potential contamination risk.

No site-specific otter population estimates are available for the Clew Bay Complex SAC. However, the national population is estimated at 6,416 adult females (95% CI: 4,537 – 9,724) (Marnell, O Neill, & Lynn, 2011). Given that otter territories can extend up to 5 – 15 km in length, their presence within the BMPA is considered possible and they may therefore contribute to faecal inputs (Bailey & Rochford, 2006).

Three SPAs are located within c. 10 km of the BMPA; Doogort Machair SPA (NPWS, 2025), Owenduff/Nephin Complex SPA (NPWS, 2025) and Clare Island SPA (NPWS, Conservation Objectives: Clare island SPA 004136, 2014). Doogort Machair SPA supports low bird numbers, with only four dunlins (*Calidris alpina*) (a single pair with two young recorded in 2024 (NPWS, 2025)). Owenduff/Nephin Complex SPA likewise supports small bird populations, (e.g. two Merlin's (*Falco columbarius*) recorded at the site in 2018; five breeding pairs of golden plover (*Pluvialis apricaria*) in 2019 (NPWS, 2025). Clare Island SPA is one of Irelands most important seabird colonies, supporting nationally significant populations of seven species, including the largest population of Fulmars (*Fulmarus glacialis*) (4,029 pairs c, 10% of the national total). Other key species recorded included Shag (*Phalacrocorax aristotelis*), Common Gull (*Larus canus*), Kittiwake (*Rissa tridactyla*), Guillemot (*Uria aalge*), Razorbill (*Alca torda*), and Chough (*Pyrrhocorax pyrrhocorax*) (16 pairs in 202/03).

More distant SPAs can nevertheless influence the BMPA. For example, Bills Rocks SPA (NPWS, Conservation Objectives: Bills Rocks SPA 004177, 2015), support large seabird populations with extensive foraging ranges, including the storm petrel (*Hydrobates pelagicus*), which can forage over distances >226km (Wilkinson, 2021). As a result, such sites cannot be ruled out as potential sources, particularly during breeding season.

In summary, several large mobile species with extensive foraging ranges or territories occur near the BMPA. The BMPA area offers small areas of potential haul-out sites and hunting and foraging grounds, that may attract marine mammals in particular may be attracted to the area for resting, feeding and social behaviours. In addition, SPAs with large breeding populations are located in the vicinity of the BMPA. The presence of these animals presents a potential source of faecal contamination at the site.

Table 2-8 – Wildlife areas within or bordering the BMPA

Type	Name (Code)	Species	Location
SAC	West Connacht Coast SAC (002998)	Common Bottlenose Dolphin (*Tursiops truncatus*) [1349], Harbour Porpoise (*Phocoena phocoena*) [1351]	Located 5.83 km to the south of the BMPA
	Clew Bay Complex SAC (001482)	Otter *(Lutra lutra*) [1355], Harbour Seal *(Phoca vitulina*) [1365]	Located 10.76 km to the south east of the BMPA

Type	Name (Code)	Species	Location
SPA	Doogort Machair SPA (004235)	Dunlin (*Calidris alpina schinzii*) [A466]	Overlapping with the catchment area though located 10.11 km north of the BMPA.
	Owenduff/Nephin Complex SPA (004098)	Merlin (*Falco columbarius*) [A098]; Golden Plover (*Pluvialis apricaria*) [A140]	Located 7.59 km to the east of the BMPA
	Clare Island SPA (002243)	Fulmar (*Fulmarus glacialis*) [A009]; Shag (*Phalacrocorax aristotelis*) [A018]; Common Gull (*Larus canus*) [A182]; Kittiwake (*Rissa tridactyla*) [A188]; Guillemot (*Uria aalge*) [A199]; Razorbill (*Alca torda*) [A200]; Chough (*Pyrrhocorax pyrrhocorax*) [A346]	Located 3.86 km south of the BMPA
iWeBS*	North Clew/Malranny-Raigh	Site Summary Table	Located 8.82 km west of the BMPA
	Newport Bay/Rockfleet bay – Castleaffy Strand	Site Summary Table	Located 17.23 km west of the BMPA
	Westport Bay/Rosmoney Quay	Site Summary Table	Located 17.21 km south-west of the BMPA
	South Clew/Old Head -Bartraw	Site Summary Table	Located 11.85 km south west of the BMPA

**I-WeBS hyperlinks to the data sets have been provided for the sites listed due to repetition of species where they support the relevant SPAs.*

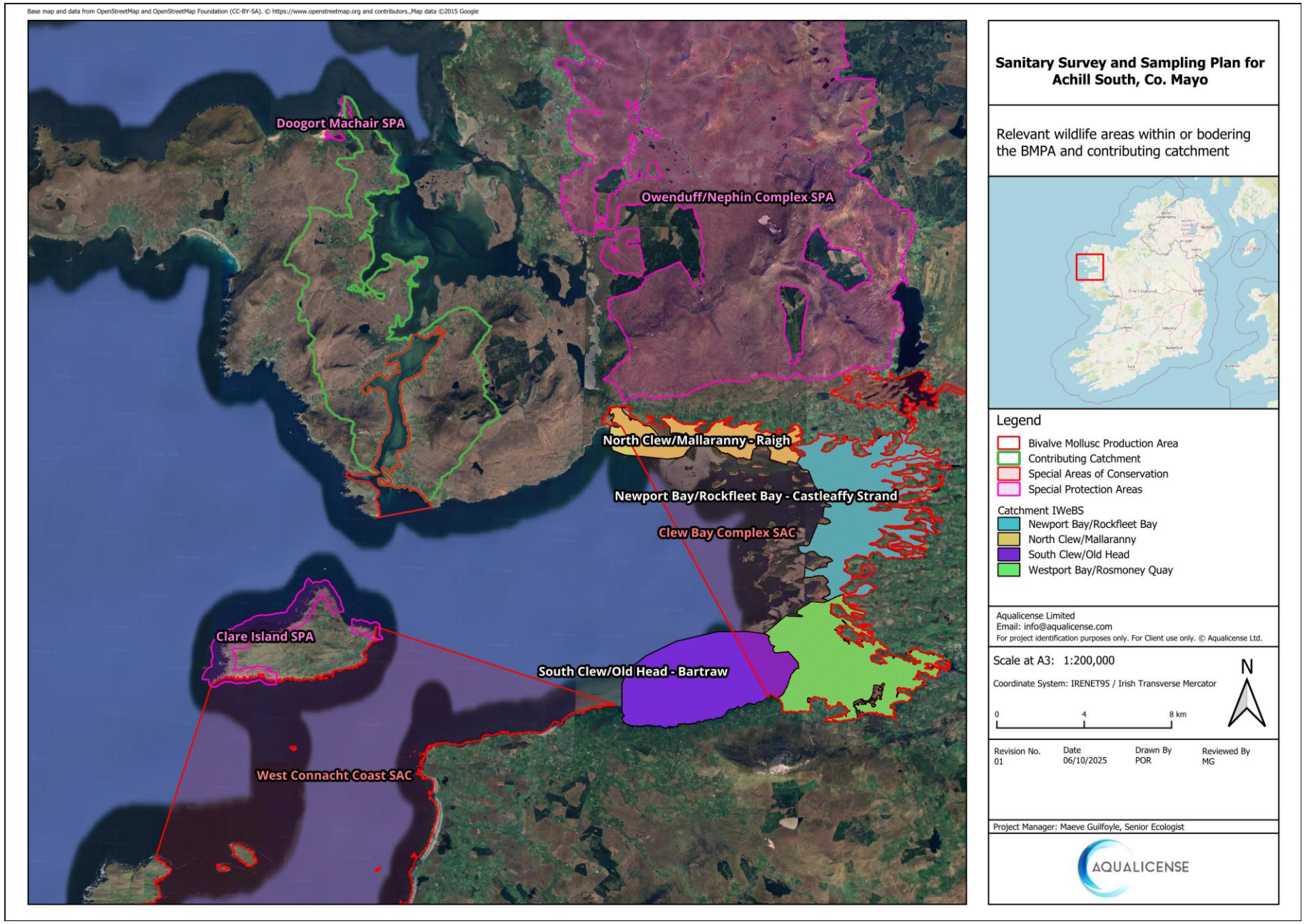

Figure 2-16– Key areas for wildlife within contributing catchment and within or bordering the BMPA

2.5.5 Summary of Pollution Sources and Seasonal Variations of Pollutants via S-P-R

Considering the details in the above section, the Source-Pathway-Receptor (S-P-R) model was used to assess the relative risk of faecal contamination in Achill South by identifying potential contamination sources and transport pathways to the receiving environment, and determining the likely impact on licensed shellfish sites (*Table 2-9*). Each source was assessed qualitatively based on potential loading, the existence and strength of transport pathways (surface water, groundwater, or direct discharge), and known seasonal variability associated with agricultural pressure, human activity and wildlife presence.

The S-P-R model integrates the desk-based assessment and contributing catchment characterisation. Seasonal factors were included to reflect the higher agricultural runoff and DWWTS loading during wetter winter months, and increased human and wildlife inputs during summer and migratory periods. The resulting impacts identified represent the likelihood of each source contributing contamination to the BMPA and the licenced sites under typical conditions.

Table 2-9 – Source-Pathway-Receptor Model and Relative Risk to the Production Area and Licensed Sites

SOURCE	SOURCE DESCRIPTION	PATHWAY TO PRODUCTION AREA	PATHWAY TO LICENSED SITES*	IMPACT
UWWTPs	No UWWTPs are present within the contributing catchment. Though a discharge point is known to the 1.4 km north within the Achill Sound North area, which has the potential to be "pushed" through to the south into the Achill South BMPA and Balfarsad production area on the ebb tide.	Possible pathway from the Achill North UWWTP discharge pipe to the north of the contributing catchment area.	There is a low potential that the discharge from the UWWTP to the north could be carried on the ebb tide towards and over the active sites south of the discharge pipe within the Balfarsad production area in particular.	**Yes.** Though low, there is a risk of exposure to faecal contamination from the discharge pipe from the UWWTP in Achill Sound North on the ebb tide.
Septic Tanks and Other Sewerage Types	DWWTSs, primarily septic tanks, are the main sources of human sewage discharges. There are areas along the coastal fringe to the immediate south and southeast of the BMPA where there is potential risk of sewage-contaminated discharges from DWWTSs.	Surface water via the Bunanioo, and several unnamed rivers. Elevated groundwater vulnerability along the coastal fringe in the area immediately south of the BMPA.	The areas of concern are predominantly along the eastern shores of the BMPA where the Bunanioo river and several other unnamed rivers and streams which discharge directly adjacent to several active aquaculture sites.	**Yes**. The high dependence on septic tanks, presence of discharge points and overlap with areas of high groundwater vulnerability all contribute to a possibility of risk. Sewage discharges are likely to be highest in the southern and southeast region of the BMPA, in proximity to the areas of concern (these have 'Extreme' or 'High' groundwater vulnerability and are designated Zone 2: Human Health). Contaminants from these areas have the potential to flow into the south of the BMPA in proximity to all of the licensed sites.
IE and IPC Licenses	There are no IE or IPC licences within the contributing catchment area.	Not Applicable.	Not Applicable.	**No**. Not Applicable.

Source	Source Description	Pathway to Production Area	Pathway to Licensed Sites*	Impact
Section 4 Discharges	LA Reference WP(W)52(a) a shellfish processing facility in the southern section of Achill Sound. In addition, the WP(W)20 on the western shore of the BMPA.	Pathway to the BMPA via direct discharge.	The discharge point for WP(W)52(a) is to the west of the BMPA is located c.210 m to the northwest of licenced site T10-212. WP(W)20 is positioned on the southwestern shore of the BMPA c. 460.3 m south and on the opposite bank from the closest site T10-212.	**Yes.** the section 4 discharge point for WP(W)52(a) is in close proximity to licenced site T10-212. While the presence of a single discharge point from this source (WP(W)20) does contribute to a possibility of risk, its position to the south on the opposing side, proximity to the mouth of the bay and resultant dilution factor would reduce this impact to negligible levels.
Agriculture	Sheep, which have the highest *E. coli* loading of assessed grazing animals, are the dominant livestock in the catchment. The EDs in the western areas of the catchment (in particular Glendarary_010), have the highest number of sheep and are the most likely locations for pollution discharges from agriculture.	Numerous pathways to the production area via surface runoff (EDs borders the BMPA), areas of extreme groundwater vulnerability in the eastern and western sides, with multiple unnamed riverine inputs.	Numerous riverine inputs that are directly adjacent or in close proximity (c. 170 m) to the various licenced sites on the eastern side of the BMPA.	**Yes**, the presence of grazing livestock (sheep)s, known surface water runoff, and significant numbers of inflow points all contribute to the possibility of risk.
Urban Areas and Human Populations	The highest population density in the catchment is in small area A157001001 Contamination mainly via septic systems (as described above). Potential for tourism-related discharges.	There are no direct pathways (ground or surface waters) from the most densely populated area to the BMPA	Not applicable as there is no viable pathway to the production site	**No**. Not applicable
Marine Vessels	No large commercial ports though there is one small fishing port, two Piers and 4 small slips within the BMPA. There are two Anchorages noted within Achill Sound.	Ship sewage entering Achill South, with subsequent circulation.	The closest sites to the small slips and piers around the BMPA is T10-2-2 which is 506.5 m from the closest slip and over ~940.5m from the small commercial fishing port.	**No** potential impact from this source, refer to *Section 2.5.4.1* for further details. Given the small scale of operations in this region and regulatory controls, the risk of contamination posed by marine vessels is considered minimal. Additionally, MARPOL dictates that no blackwater or greywater discharges be allowed within 3 nm of the shore.

SOURCE	SOURCE DESCRIPTION	PATHWAY TO PRODUCTION AREA	PATHWAY TO LICENSED SITES*	IMPACT
Swimming, Bathing and Recreation	No Blue flag beaches, swimming waters or coastal paths within the BMPA and or the catchment area	Not Applicable	Not Applicable	**No**. Not Applicable
Wildlife	West Connacht Coast SAC, with common bottlenose dolphins and harbour porpoises. Clew Bay Complex SAC, with otters and harbour seals. Doogort Machair SPA, with dunlins. Owenduff/Nephin Complex SPA, with merlins and golden plovers. Clare island SPA with Fulmar, Shag, Common Gull, Kittiwake, Guillemot, Razorbill, and Chough	Direct input from wildlife into BMPA waters.	While none of the SAC's or SPAs overlap directly with the BMPA the sites listed *Table 2-8* are in close proximity to the active licenced areas.	**Yes**, the presence of large mobile marine animals with extensive foraging ranges or territories presents a risk of contamination. Considering the ephemeral nature of marine life, and the large aggregations of birds in some of the surrounding SPAs outside the BMPA, seasonal increases in contamination may occur during the winter along with contamination potentially being input in vicinity of all of the licensed sites.

2.6 Conclusions of the Desk-Based Survey

This desk-based component of the sanitary survey employed the S-P-R model to assess the principal potential impacts from the possible sources of faecal contamination identified during the desktop study *(Sections: 2.4.1 –2.5.4),* the mechanisms by which these contaminants are transported, and their circulation dynamics within the production area.

The analysis identified the unnamed River (2 Unnamed tributaries) IE_WE_33B090100- the longest within the Bunanioo_010 catchment as the largest contributor for the freshwater inflows (inflow 13), with additional smaller contributions from smaller streams and areas of run off distributed throughout the sound (Figure 2-4).

S-P-R

The S-P-R model was applied to identify potential faecal contamination sources, assess the viability of transport pathways to the Achill South BMPA and evaluate the likelihood of impact on licensed shellfish sites. Each source was assessed qualitatively based on potential loading, the existence and strength of surface water, groundwater, or marine pathways and seasonal variations in both contamination pressure and transport conditions.

The S-P-R assessment indicates that DWWTSs and agricultural activity represent the principal potential sources of faecal contamination to the BMPA, supported by the prevalence of septic systems, areas of high groundwater vulnerability, and multiple riverine inflow points adjacent to active sites. Wildlife also presents a credible risk with direct inputs from mobile marine species and potential seasonal increases from bird aggregations associated with nearby SPAs.

A low but identifiable risk arises from the Achill Sound North UWWTP, where ebb-tide transport could convey effluent through the northern portion of the Balfarsad production areas and, potentially, towards licensed sites. Section 4 discharges contribute a localised risk where outfalls that lie in close proximity to licensed sites, though the influence of more distal outfalls is substantially reduced by dilution and position relative to tidal flow patterns.

Other assessed sources - including urban areas without direct hydrological pathways, marine vessels operating under regulatory controls, and recreational use - present negligible to no meaningful risk to the BMPA due to the absence of viable transport routes or minimal contamination loading.

Circulation and Seasonal Influence

The predominant sources of faecal pollution were attributed to the widespread use of domestic septic tank systems and the extensive agricultural activity in the catchment, particularly livestock farming. Seasonal dynamics are expected to significantly influence contaminant loading, with elevated faecal inputs during summer months driven by increased animal stocking densities. Furthermore, extended dry periods followed by rainfall events may exacerbate pollutant runoff through the "first flush" effect.

Seasonal variations are anticipated to play a significant role, particularly during the summer months when increased stocking densities may lead to higher faecal loads. Additionally, dry land conditions in summer can increase the likelihood of pollutant runoff during rainfall events. Conversely, winter rainfall increases hydraulic loading on septic tanks and promotes localised pollutant mobilisation potential.

Further validation and refinement of these findings will be undertaken upon completion of the shoreline survey, which will provide data on the presence and severity of faecal pollution sources, thereby enhancing the resolution and accuracy of the overall risk assessment..

3 SHORELINE SURVEY

This section of the sanitary survey relates to the shoreline survey, which has been undertaken by the SFPA following receipt of the desk-based study conducted by Aqualicense. The purpose of this shoreline survey is to confirm the findings of the desk-based study and identify any sources of contamination previously unidentified.

3.1 SHORELINE SURVEY METHODOLOGY

The SFPA Code of Practice for the Classification and Microbiological Monitoring of Bivalve Mollusc Production Areas (version: 8.0) identifies the methodology for carrying out shoreline surveys under Appendix 9.1 (SFPA, 2017 as amended 2022). Any identified pollution risks were clearly documented, including GPS coordinates, photographs, and detailed descriptions. Photographs were also obtained for all identified risk locations.

Evidence of faecal contamination, such as odours, discolouration, or algae growth, were documented. Surveyors recorded observations even in situations where there was uncertainty regarding potential contamination. Where faecal contamination of an inflow, waterbody, or discharge location was suspected, bacteriological samples were obtained in accordance with the COP.

3.1.1 SURVEY RESULTS

Due to logistical reasons the entire shoreline of the BMPA was surveyed by SFPA personnel over a 2-day period, on 1st of October and the 10th of October 2025. Weather conditions during the survey on the 1st of October were mixed overcast with sporadic bouts of heavy/moderate rainfall, on the 10th conditions were overcast though dry and calm. The preceding day had 0.2mm of rainfall, facilitating observations of runoff and discharge points. Surveys commenced two hours before low tides on both days.

Table 3-1 and *Figure 3-1* present all observations recorded during the shoreline survey. Photographs for each observation have been provided in *Appendix 3 - Shoreline Survey Photographs*.

Table 3-1 – Locations and Details of Observations made during the Shoreline Survey for Achill South BMPA in October 2025

Date	Low Tide		High Tide		ID	Latitude*	Longitude*	Feature	Comment
	Time	Height (m)	Time	Height (m)		(WGS84)	(WGS84)		
01/10/2025	07:20 20:34	1.9 1.7	01:11 13:37	3.0 3.1	1	53.93226	-9.91722	Stream	Surface water stream run off flowing into bay
					1+	53.9318	-9.91575	Surface water runoff	Surface water run off
					2	53.93323	-9.9106	Stream	
					3	53.93546	-9.90259	River	
					4	53.93228	-9.89493	River	
					5	53.92125	-9.90651	River	
					6	53.92055	-9.91459	River	
					7	53.9145	-9.9145	Stream	
					8	53.91767	-9.91569	River	
					9	53.91507	-9.90941	River	
					10	53.91095	-9.9261	Stream	
					11	53.9037	-9.92143	Stream	
					12	53.90161	-9.92106	Stream	
					13	53.9007	-9.92029	Small stream.	Surface water
					14	53.89953	-9.91978	Stream	
					15	53.89718	-9.91785	River	
					16	53.89135	-9.91794	Stream	
					17	53.8818	-9.92146	River	
					18	53.88427	-9.92906	Stream	
					19	53.87866	-9.93142	Stream	
					20	53.87889	-9.92826	Pier	side surface water
					21	53.87613	-9.93434	Stream	
					24	53.87607	-9.93592	Stream	
					25	53.87544	-9.94047	Slip	at pier/surface water
					27	53.87532	-9.93996	Pier	surface water

Date	Low Tide		High Tide		ID	Latitude*	Longitude*	Feature	Comment
	Time	Height (m)	Time	Height (m)		(WGS84)	(WGS84)		
01/10/2025	07:20 20:34	1.9 1.7	01:11 13:37	3.0 3.1	28	53.87017	-9.92129	Slipway	surface water
					31	53.87551	-9.96394	Beach	Pebble beach with low number of sheep with access to the shore. Two dwellings in the vicinity of sample site.
10/10/2025	02:31 14:48	0.6 0.8	08:38 20:59	4.0 4.0	33	53.8746	-9.94828	Pier	Main Pier on Achill Island. Fish carrier and three trawlers tied alongside.
					35	53.87511	-9.94508	Pipe	Loose pipe work coming from fish farm building
					36	53.88079	-9.94531	Pier	Fishing Pier
					37	53.88255	-9.94377	Slipway	Slipway at Coast Guard building
					38	53.88692	-9.94401	River	Stream flowing into the bay, small number of dwellings in the vicinity.
					39	53.88981	-9.94171	Stream	Stream flowing into the bay, dwelling close to the stream
					40	53.8907	-9.94161	River	Stream flowing into the bay, small number of dwellings in the vicinity.
					41	53.89354	-9.93814	Stream	Stream flowing into the bay
					42	53.90331	-9.94161	Stream	Stream flowing into bay, small number of dwellings nearby. No access to shore, sample taken at bridge.
					43	53.90997	-9.95063	Surface water	Surface water taken. Cemetery nearby shore.
					44	53.90787	-9.95567	Stream	Surface water collected, diffuse stream / leachate flowing into the bay
					45	53.91014	-9.95773	River	
					46	53.91185	-9.95625	Stream	Stream straddling dwelling flowing into the bay

Date	Low Tide		High Tide		ID	Latitude*	Longitude*	Feature	Comment
	Time	Height (m)	Time	Height (m)		(WGS84)	(WGS84)		
10/10/2025	02:31 14:48	0.6 0.8	08:38 20:59	4.0 4.0	47	53.91861	-9.95123	River	Big stream flowing into the bay. Sample taken at bridge, no access to shore. Tarmac ramp going to the stream.
					48	53.91921	-9.94025	Stream	Slow flowing stream going into the bay. Abandoned dwelling nearby.
					49	53.92883	-9.92431	Stream	Diffuse stream / leachate flowing into the bay.
					50	53.93226	-9.91722	Stream	Stream flowing into bay

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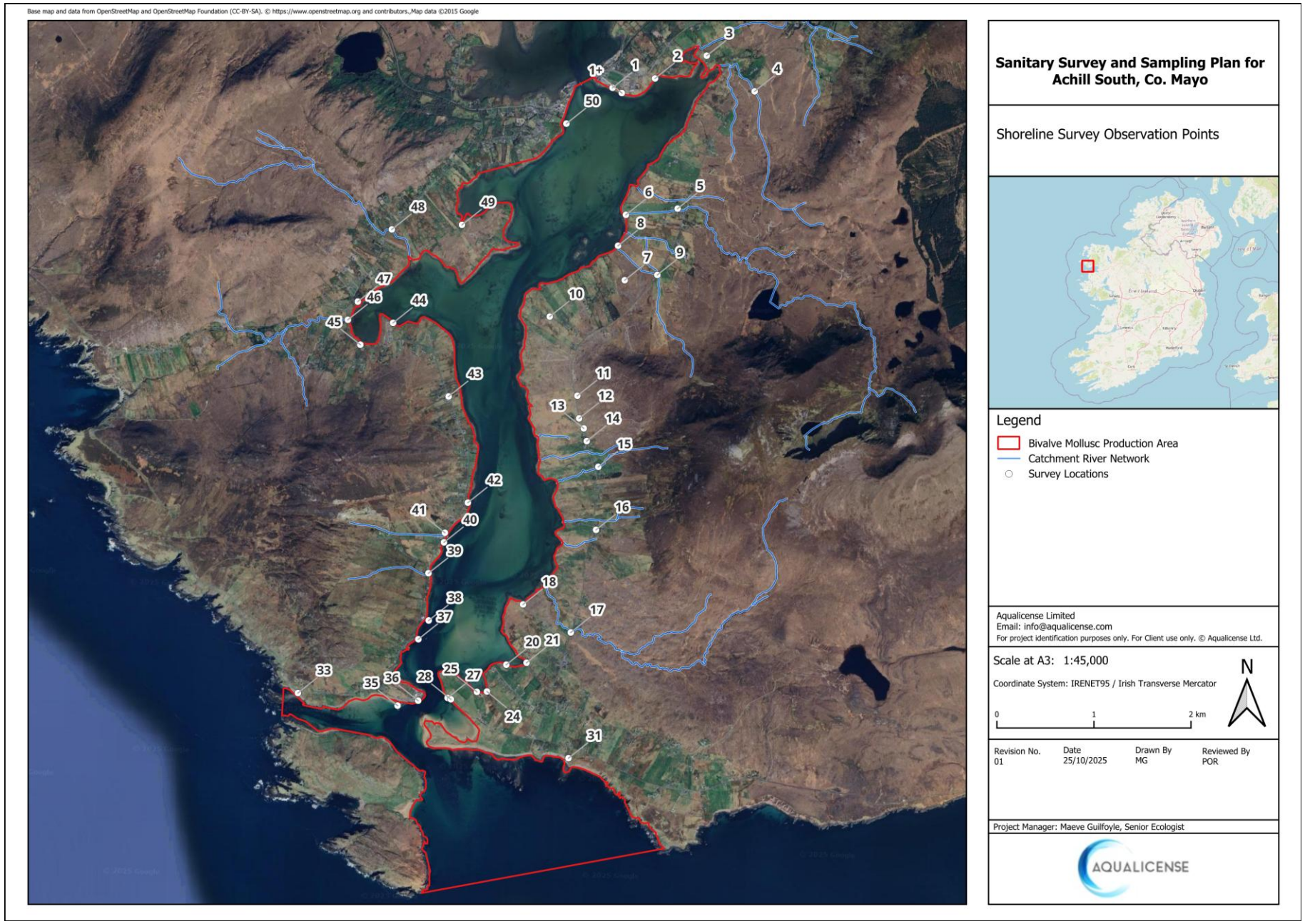

Figure 3-1 – Location of Observations made during the Shoreline Survey for Achill South in October 2025

A total of 43 observations were recorded during the shoreline survey, each georeferenced and supported by photographic evidence. All of the 43 observation sites were sampled for bacteriological analysis, the results of which are further detailed in *Section 4*. The survey captured a comprehensive overview of all visible freshwater and surface water inputs to the coastal system. These features (*Table 3-1*) were distributed throughout the BMPA and represented both natural watercourses and potential anthropogenic discharge points. During the survey access issues (lack of a safe pathway to proposed survey/inflow points) necessitated moving sampling locations to the nearest representative point.

It should be noted that during the survey period the weather conditions were notably mixed initial survey day had sporadic moderate to heavy rainfall throughout the day, with the second being dry though rain on the preceding day, which may have mobilised faecal loadings or resulted in elevated results at the time of sampling.

The discharge points around Achill south generally corresponded with the EPA mapped rivers (*Figure 2-4*). Numerous streams, rivers and leachate type flows were noted draining directly into the sound, forming the primary conduits for freshwater and potential contaminant transport. Surface water and diffuse runoff were also noted near piers and slipways, indicating areas where anthropogenic activity and marine infrastructure coincide with possible pollutant inputs.

A summary of each observation, its contamination risk level and sampling location is included in *Table 3-2*. These findings informed both the delineation of the BMPA and the selection of the most appropriate RMPs.

Table 3-2 Summary of inflows, observations, contamination levels and bacteriological sample locations

Inflow ID	Survey ID	Latitude (WGS84)	Longitude (WGS84)	Feature	Bacteriological Sample Taken (Y/N)
N/a	1	53.93226	-9.91722	Stream	Y
N/a	1+	53.9318	-9.91575	Surface water runoff	Y
N/a	2	53.93323	-9.9106	Stream	Y
16	3	53.93546	-9.90259	River	Y
15	4	53.93228	-9.89493	River	Y
13	5	53.92125	-9.90651	River	Y
13	6	53.92055	-9.91459	River	Y
N/a	7	53.9145	-9.9145	Stream	Y
11	8	53.91767	-9.91569	River	Y
11	9	53.91507	-9.90941	River	Y
N/a	10	53.91095	-9.9261	Stream	Y
N/a	11	53.9037	-9.92143	Stream	Y
N/a	12	53.90161	-9.92106	Stream	Y
N/a	13	53.9007	-9.92029	Small stream.	Y
N/a	14	53.89953	-9.91978	Stream	Y

Inflow ID	Survey ID	Latitude (WGS84)	Longitude (WGS84)	Feature	Bacteriological Sample Taken (Y/N)
8	15	53.89718	-9.91785	River	Y
N/a	16	53.89135	-9.91794	Stream	Y
5	17	53.8818	-9.92146	River	Y
N/a	18	53.88427	-9.92906	Stream	Y
N/a	20	53.87866	-9.93142	Stream	Y
N/a	21	53.87889	-9.92826	Pier	Y
N/a	24	53.87613	-9.93434	Stream	Y
N/a	25	53.87607	-9.93592	Stream	Y
N/a	27	53.87544	-9.94047	Slip	Y
N/a	28	53.87532	-9.93996	Pier	Y
N/a	31	53.87017	-9.92129	Slipway	Y
N/a	33	53.87551	-9.96394	Beach	Y
N/a	35	53.8746	-9.94828	Pier	Y
N/a	36	53.87511	-9.94508	Pipe	Y
N/a	37	53.88079	-9.94531	Pier	Y
N/a	38	53.88255	-9.94377	Slipway	Y
4	39	53.88692	-9.94401	River	Y
N/a	40	53.88981	-9.94171	Stream	Y
3	41	53.8907	-9.94161	River	Y
N/a	42	53.89354	-9.93814	Stream	Y
N/a	43	53.90331	-9.94161	Stream	Y
N/a	44	53.90997	-9.95063	Surface water	Y
N/a	45	53.90787	-9.95567	Stream	Y
2	46	53.91014	-9.95773	River	Y
N/a	47	53.91185	-9.95625	Stream	Y
1	48	53.91861	-9.95123	River	Y
N/a	49	53.91921	-9.94025	Stream	Y
N/a	50	53.92883	-9.92431	Stream	Y

4 BACTERIOLOGICAL SURVEY

Where possible, the COP (SFPA, 2020) recommends that water samples for *E. coli* should be taken from inflows or watercourses discharging near the shellfish harvesting areas. Shellfish sampling may also be conducted if uncertainty regarding RMPs remains following the desk-based survey and shoreline survey.

For the purposes of this sanitary survey, bacteriological surveys and analysis are the responsibility of the SFPA, with Aqualicense relaying the relevant results within the report.

4.1 BACTERIOLOGICAL SURVEY METHODOLOGY

To complement shoreline observations and better understand contamination risks under current conditions, a bacteriological survey was carried out by SFPA at 26 targeted locations where faecal contamination was suspected. The sampling was undertaken at low tide using protocols outlined in Appendix 9.2 of the SFPA Code of Practice (2020). The COP recommends collecting samples under worst-case conditions, such as after heavy rainfall, to provide a more representative assessment of contamination levels. Each sample is assigned a clear identification code, with location codes following the format SS1, SS2, etc., to designate them as sanitary survey shellfish samples.

Samples are gathered in sterile plastic bottles. All samples are transferred to the testing laboratory within 48 hours of collection and are maintained at a temperature below 15ºC during transport to ensure sample integrity.

4.2 BACTERIOLOGICAL SURVEY RESULTS

A total of 43 water samples were obtained at areas where faecal contamination was suspected. Samples were obtained in dry conditions. While it is recommended within the COP to obtain samples under worst-case environmental conditions, samples were obtained during three separate sampling efforts for logistical reasons. Sampling results are presented in *Table 4-1*.

Table 4-1 Results of water sampling for *E. coli* in Achill South BMPA. ID corresponds with observations from the shoreline survey.

ID	OBSERVATION	MPN/ 100ML*	DATE	LATITUDE (WGS84)	LONGITUDE (WGS84)
1	Stream flowing into bay	830	01/10/2025	53.93226	-9.91722
1+	Surface water runoff	120	01/10/2025	53.9318	-9.91575
2	Stream	30	01/10/2025	53.93323	-9.9106
3	River	530	01/10/2025	53.93546	-9.90259
4	River	240	01/10/2025	53.93228	-9.89493
5	River	1180	01/10/2025	53.92125	-9.90651
6	River	1010	01/10/2025	53.92055	-9.91459
7	Stream	1450	01/10/2025	53.9145	-9.9145
8	River	1010	01/10/2025	53.91767	-9.91569
9	River	950	01/10/2025	53.91507	-9.90941

ID	Observation	MPN/ 100ml*	Date	Latitude (WGS84)	Longitude (WGS84)
10	Stream	>2010	01/10/2025	53.91095	-9.9261
11	Stream	450	01/10/2025	53.9037	-9.92143
12	Stream	30	01/10/2025	53.90161	-9.92106
13	Surface water / small stream.	890	01/10/2025	53.9007	-9.92029
14	Stream	270	01/10/2025	53.89953	-9.91978
15	River	740	01/10/2025	53.89718	-9.91785
16	Stream	450	01/10/2025	53.89135	-9.91794
17	River	830	01/10/2025	53.8818	-9.92146
18	Stream	1300	01/10/2025	53.88427	-9.92906
20	Stream	560	01/10/2025	53.87866	-9.93142
21	Pier side surface water	>2010	01/10/2025	53.87889	-9.92826
24	Stream	2010	01/10/2025	53.87613	-9.93434
25	Stream	2010	01/10/2025	53.87607	-9.93592
27	Slip at pier/surface water	60	01/10/2025	53.87544	-9.94047
28	Pier surface water	50	01/10/2025	53.87532	-9.93996
31	Slipway	380	01/10/2025	53.87017	-9.92129
33	Pebble beach with low number of sheep with access to the shore. Two dwellings in the vicinity of sample site.	<10	10/10/2025	53.87551	-9.96394
35	Main Pier on Achill Island. Fish carrier and three trawlers tied alongside.	<10	10/10/2025	53.8746	-9.94828
36	Loose pipe work coming from fish farm building	<10	10/10/2025	53.87511	-9.94508
37	Fishing Pier	<10	10/10/2025	53.88079	-9.94531
38	Slipway at Coast Guard building	<10	10/10/2025	53.88255	-9.94377
39	River flowing into the bay, small number of dwellings in the vicinity.	30	10/10/2025	53.88692	-9.94401
40	Stream flowing into the bay, dwelling close to the stream.	>2010	10/10/2025	53.88981	-9.94171
41	River flowing into the bay, small number of dwellings in the vicinity.	180	10/10/2025	53.8907	-9.94161
42	Stream flowing into the bay	<10	10/10/2025	53.89354	-9.93814
43	Stream flowing into bay, small number of dwellings nearby. No access to shore, sample taken at bridge.	<10	10/10/2025	53.90331	-9.94161

ID	Observation	MPN/ 100ml*	Date	Latitude (WGS84)	Longitude (WGS84)
44	Surface water taken. Cemetery nearby shore.	<10	10/10/2025	53.90997	-9.95063
45	Surface water collected, diffuse stream / leachate flowing into the bay	<10	10/10/2025	53.90787	-9.95567
46	River	<10	10/10/2025	53.91014	-9.95773
47	Stream straddling dwelling flowing into the bay	410	10/10/2025	53.91185	-9.95625
48	River flowing into the bay. Sample taken at bridge, no access to shore. Tarmac ramp going to the stream.	90	10/10/2025	53.91861	-9.95123
49	Slow flowing stream going into the bay. Abandoned dwelling nearby.	<10	10/10/2025	53.91921	-9.94025
50	Diffuse stream / leachate flowing into the bay.	80	10/10/2025	53.92883	-9.92431

Bacteriological water sampling results across the surveyed area demonstrated varying levels of contamination, with *E. coli* concentrations measured at all 43 locations.

Low contamination levels were identified at 13 stations (<10 MPN/100mL), indicating minimal faecal contamination. These included samples: 33,35,36,37,38,42,43,44,45,46 and 49 (all from the 10/10/2025), along with samples 2 and 12 (30 MPN/100mL). These sites covered mainly streams, rivers, and surface waters across the northern and western BMPA, showed limited bacterial input under dry conditions. Even at locations with human activity, such as the main pier (station 35) and an outlet near a fish farm (station 36), concentrations remained low, suggesting effective waste management or minimal contamination sources.

Elevated concentrations between 740 and 145 MPN/100mL were recorded at 8 sampling stations including samples: 3 (530), 5(1180), 6(1010), 7 (1450), 8 (1010), 9 (950), 13 (890), 15 (740) 17 (830) and 18 (1300). These elevated values were generally associated with streams and rivers flowing into the bay, particularly along the central portion of BMPA. The distribution of these results suggests that multiple upstream sources potentially contribute to the increased bacterial loading. The heavy to moderate rainfall likely mobilised matter, resulting in the high variability of reading between nearby stations. This could imply localised faecal contamination sources or intermittent discharges influencing water quality.

The highest recorded concentrations of *E. coli* (>2010 MPN/100mL) occurred at four sampling locations: 10, 21,24 and 40. With two additional sites (samples 24 and 25) recording 2010 MPN/100mL. These sites (mainly streams and surface waters entering the bay near pier and drainage outflows) in the southern and eastern BMPA. These points coincide with areas of known surface water drainage and pier activity indicating concentrated point-source pollution potentially from faecal inputs or land runoff during the intermittent rainfall prior to and during sampling.

However, it is noted that seasonal factors, including variations in rainfall, river flow, and agricultural activity, may influence contamination patterns over time. Such seasonal variations in such sources should be considered when devising a suitable sampling plan.

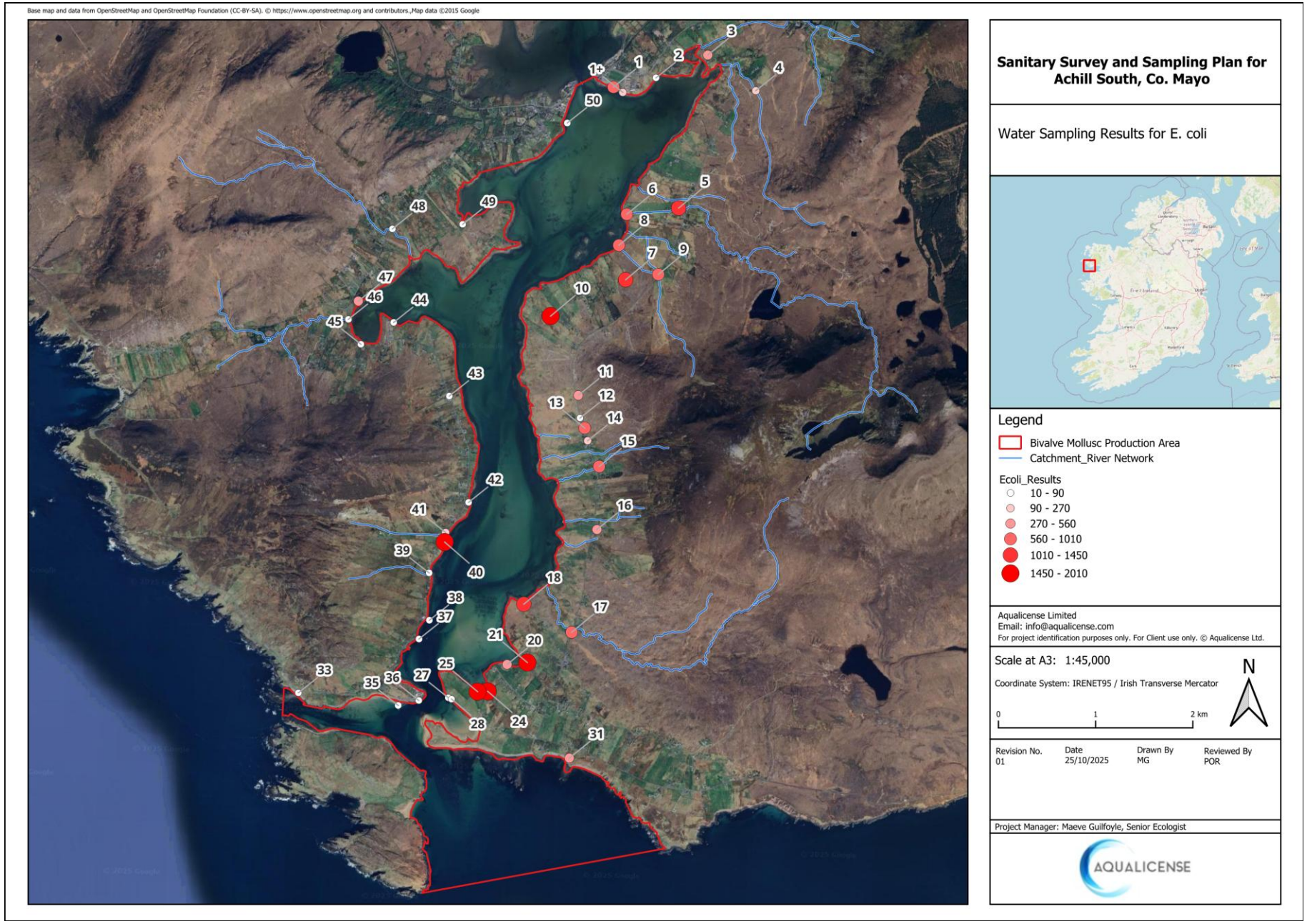

Figure 4-1- Water Sampling Results for *E. coli*

5 SANITARY SURVEY CONCLUSION

The sanitary survey findings were synthesised through the integration of three primary data sources: a desk-based study using the Source–Pathway–Receptor (S–P–R) model, on-site shoreline inspections, targeted bacteriological analysis, and comparative statistics. Each component contributed distinct and complementary insights to the overall assessment of contamination risks.

The desk-based study attributed the predominant sources of faecal pollution to the widespread use of domestic septic tank systems and the extensive agricultural activity in the catchment, particularly livestock farming. These preliminary conclusions were substantiated by field-based shoreline surveys and bacteriological sampling, both of which confirmed the presence of faecal contamination at identified discharge points and freshwater inflows.

All of the 43 survey observations were sampled for further analysis for bacteriological concentrations. Elevated *E. coli* levels were detected in areas associated with agricultural run-off and freshwater inflow points (all of which run through agriculturally active lands (*Table 4-1*)). The highest *E. coli* results for the survey area were recorded to the north stations 5, 7 and 10 and to the south at 21,24 & 25 (*Table 4-1* and *Figure 4-1*).These locations represent the areas of greatest risk for shellfish contamination within the BMPA.

Although the survey data offers an invaluable snapshot in time of the conditions during the sampling period, it is noted that the results may be affected by seasonal factors, including variations in rainfall, river flow, and agricultural activity, all of which may influence contamination patterns over time. Consequently, the sampling effort does not capture the variations that may occur at other times of the year. These seasonal effects should be considered when devising a suitable sampling plan. This limitation is partially mitigated by annual classification monitoring, which supports a more robust long-term assessment.

Hydrodynamic considerations indicate that contaminant dispersion within Achill South BMPA is primarily governed by semi-diurnal tidal cycles, these tidal oscillations induce strong alternating flows through the narrow channel with peak current velocities in the narrowest sections regularly exceeding 2-3 knots. Due to the constrained cross-sectional area, the channel supports relatively high velocities during peak flood and ebb phases, in particular in the narrower sections where flow is constricted. Such speeds promote significant vertical mixing and inhibit stable stratification.

The combined evidence suggests that while there are multiple potential high-risk sources of faecal contamination within the wider catchment area, their impact within the shellfish production area is highly variable and strongly moderated by hydrodynamics and episodic rainfall events. The desk-based study effectively identified the key risk sources and zones of concern; the shoreline survey confirmed the presence of unrecorded discharges and bacteriological analysis demonstrated generally low contamination levels with isolated elevated detections.

While the contamination assessment supports the overall understanding of risk distribution within the Achill South BMPA, the delineation of the production areas within the BMPA boundary warrants attention particularly in light of the elevated *E. coli* levels recorded in the southern stations.

Hydrodynamic evidence suggests that the northern section is more constrained, generating strong vertical mixing resulting in reduced stratification and comparatively shorter residence times. In contract the southern section has more pronounced embayment's, which appear to experience weaker mixing resulting in conditions that favour the accumulation and expression of contamination. Although detailed modelling is not available to quantify these processes, these slight hydrodynamic differences were considered when defining the extent of the production areas within the BMPA. The observed contamination pattern therefore supports retaining the two distinct production areas. Future modelling may further refine this delineation.

Given the hydrodynamic characteristics, overall morphology of the BMPA, and the distribution of the most prominent pollution sources, It is recommended that the BMPA remain divided into two distinct production areas (Corraun and Balfarsad), each with its own individual RMP. The distinct circulation patterns and localised contamination pressures in each area justify maintaining separate production areas, each with its own standalone Representative Monitoring Point (RMP). Accordingly, it is recommended that the existing structure of two production areas—with individual RMPs—be retained to ensure monitoring remains accurate, robust, and truly reflective of microbiological water quality conditions.

6 RECOMMENDATIONS FOR RMPS FOR CURRENTLY LICENCED SPECIES

The selection of the Representative Monitoring Points (RMPs) are critical components of this report, as they provide the basis for protecting public health by ensuring that shellfish harvested for human consumption are effectively monitored for contamination risks, including *E. coli*.

The RMP represents the location within the production area most likely to reflect the highest contamination risk to shellfish production, thereby providing a conservative and protective basis for classification. In determining the RMP and BMPA boundaries, multiple factors were considered in line with established regulatory guidance, including hydrographic conditions, contaminant sources and pathways, historical and current bacteriological data, historic aquaculture activity and granted licences, and practical accessibility for sampling.

A spatial tolerance is applied around the RMP to ensure that the monitoring point remains representative of the wider production area while maintaining sufficient proximity to potential shellfish production sites. These determinations are therefore central to ensuring that the classification accurately reflects the sanitary quality of shellfish production waters and supports the safe commercial harvesting of bivalve molluscs, in accordance with Regulation (EU) 2019/627 and relevant Food Standards Agency (FSA) sanitary survey protocols.

In accordance with Article 61 of Regulation (EU) 2019/627, the following recommendations are made for incorporation into future sampling plans. It should be noted that these recommendations, based on the completed sanitary survey (desktop review and shoreline visit), relate specifically to the positioning of RMPs and should not be misconstrued as a full sampling plan.

6.1 REPRESENTATIVE MONITORING POINTS (PACIFIC OYSTERS)

Considering the extent of the proposed BMPA, prevailing circulation patterns, and the distribution of licensed sites, It is recommended that the BMPA remain divided into two distinct production areas (Corraun and Balfarsad), each with its own individual RMP. However, the locations of the existing RMPs were originally selected without a sanitary survey. It is now recommended that these locations are revised, considering the findings of this sanitary survey (summarised in *Section 5*) and ensuring that the RMPs represent the area's most at risk of contamination under worst-case scenarios.

It is recommended that the Balfarsad production area RMP (1), is located within the centre of Site T10-313A at ITM coordinates 53. 9187845478 N, - 9.9185058976 W

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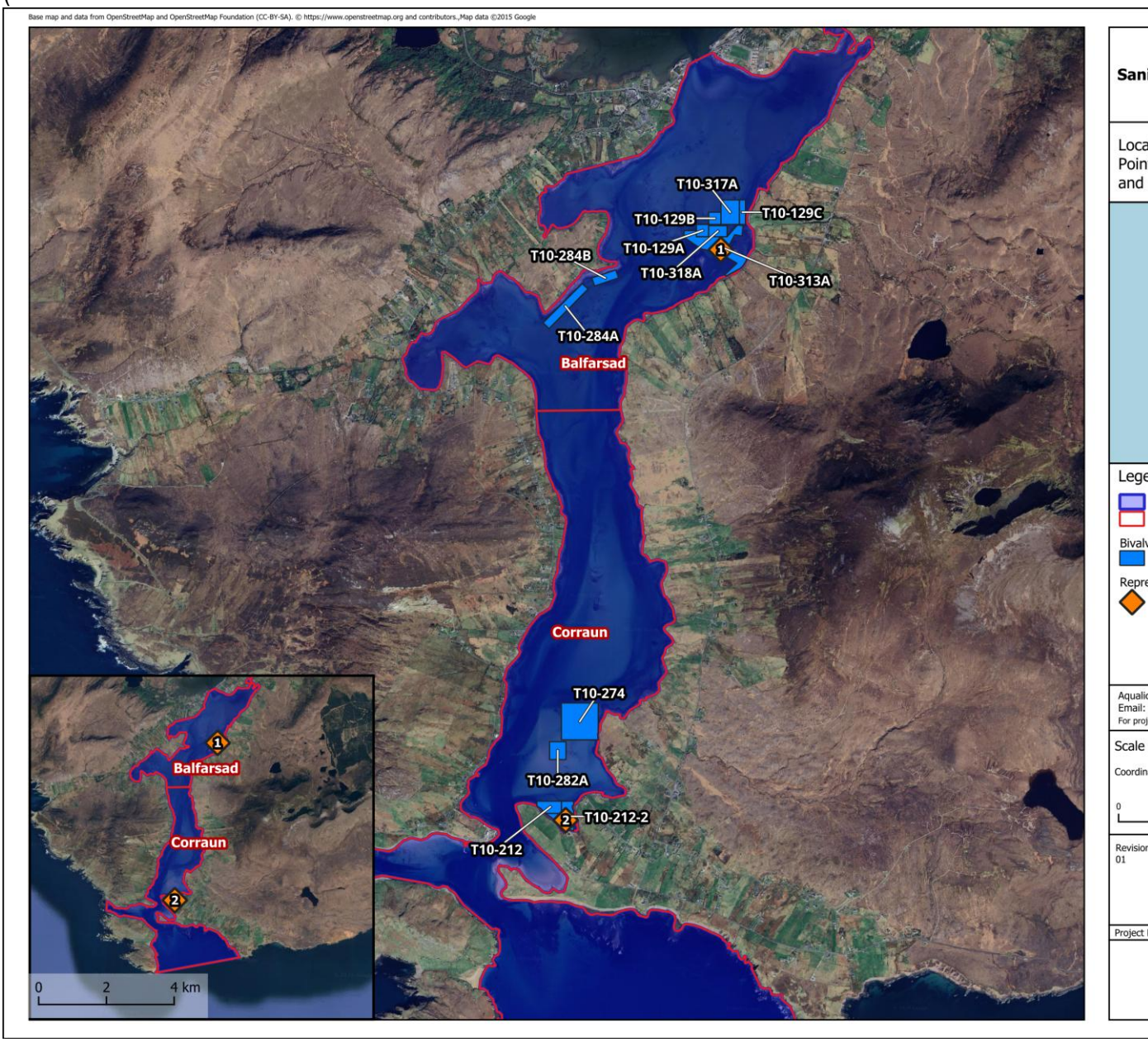

Figure 6-1). This location is likely to be influenced by contamination from the Achill North UWWT which has a discharge pipe ~1.2 km to the north and the multiple inflow points all of which demonstrated elevated contamination levels (11-14 inclusive). This site likely represents the "worst case scenario" for the area. Oyster harvesting is contingent upon the availability of stock.

To the south of the BMPA, the Corraun production area RMP (2) is in the centre of Site T10-212-2 at ITM coordinates 53.8767346 N, -9. 9358055397 W, situated within a shallow embayment with multiple input flows. Furthermore, this area is characterised by reduced water circulation, high levels of recorded *E. coli* which has the potential to result in increased contaminant accumulation.

While specific RMPs have been identified for Pacific oysters, it is recognised that, oysters may not always be available within 100 metres of the RMP. In such circumstances, the SFPA sample coordinator and local industry representatives should be informed, and an alternative sampling

location agreed. This alternative location should be selected with reference to the findings of the sanitary survey and should continue to represent a worst-case scenario for contamination risk.

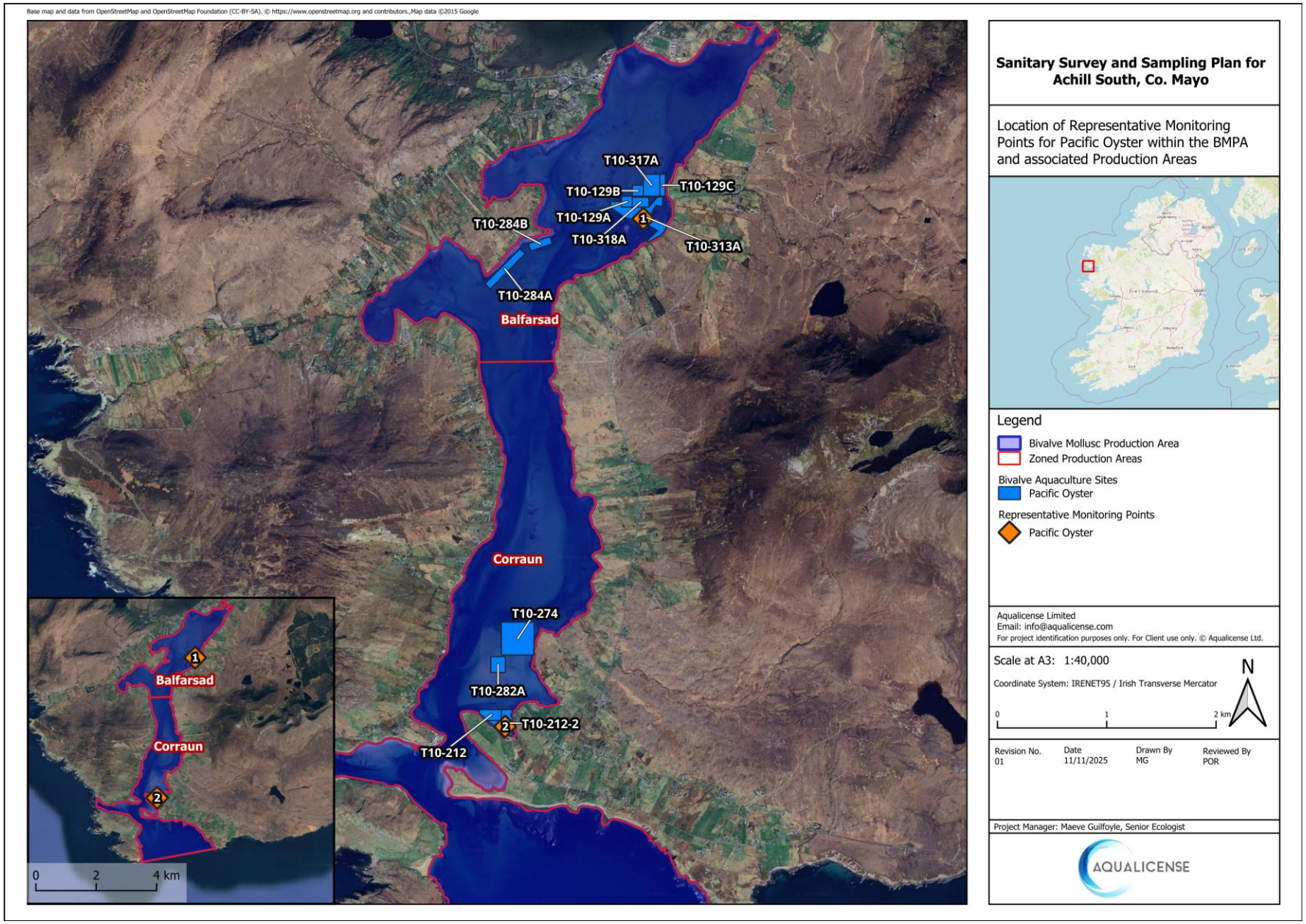

Figure 6-1 Location of RMPs for Pacific Oysters within Achill South BMPA

6.2 Sampling Plan For Pacific Oyster

A species-specific sampling plan has been developed in line with EU Regulation 2019/627 and the SFPA Code of Practice (2025). Key features of the plans are detailed in *Table 6-1* and *Table 6-2*.

Table 6-1. Sampling Plan for Pacific Oysters within the Balfarsad Production Area

Species	*Magallana gigas*
Site Name	Balfarsad Production Area
Sample Point Identifier	MO-AS-BD
Geographical location of sampling point (RMP)	53.9187845 N, - 9.9185059 W (53° 55′ 7.62N, 009° 55” 6.62’ W)
Sampling Frequency	Samples shall be taken monthly form Achill South BMPA. Sampling will occur throughout the year.
Sampling Depth	Samples should be taken as close to the surface as possible, within the top one metre of the water column.
Maximum Allowed Distance from Sampling Point	Samples are to be collected within 100m of the RMP. Where this is not possible, the SFPA sample coordinator and local industry shall be informed to agree an alternative sampling location.
Sampling Method	Sampling will be conducted in accordance with the SFPA Code of Practice for the Classification and Microbiological Monitoring of Bivalve Mollusc Production Areas (SFPA, 2020), specifically in accordance with Appendix 9.2.
Sample Size	A minimum of 10 oysters of market size
Authorised Samplers	It is the responsibility of the SFPA Ros an Mhil Port Office to arrange sampling, with designated sampling officers assigned to collect samples.

Table 6-2. Sampling Plan for Pacific Oysters within the Corraun Production Area

Species	*Magallana gigas*
Site Name	Corraun Production Area
Sample Point Identifier	MO-AS-CN
Geographical location of sampling point (RMP)	53.8767346 N, -9. 9358055397 W (53° 52′ 36.2 N, 009° 56′ 8.90W)
Sampling Frequency	Samples shall be taken monthly form Achill South BMPA. Sampling will occur throughout the year.
Sampling Depth	Samples should be taken as close to the surface as possible, within the top one metre of the water column.
Maximum Allowed Distance from Sampling Point	Samples are to be collected within 100m of the RMP. Where this is not possible, the SFPA sample coordinator and local industry shall be informed to agree an alternative sampling location.

SAMPLING METHOD	Sampling will be conducted in accordance with the SFPA Code of Practice for the Classification and Microbiological Monitoring of Bivalve Mollusc Production Areas (SFPA, 2020), specifically in accordance with Appendix 9.2.
SAMPLE SIZE	A minimum of 10 oysters of market size
AUTHORISED SAMPLERS	It is the responsibility of the SFPA Ros an Mhil Port Office to arrange sampling, with designated sampling officers assigned to collect samples.

These plans ensure the data collected will be representative of contamination affecting the production areas, supporting both initial classification and ongoing official controls.

7 SAMPLING PLAN FOR CURRENTLY LICENCED SPECIES (IN THE EVENT OF FUTURE PRODUCTION)

7.1 REPRESENTATIVE MONITORING POINT- MANILA CLAM

In the event that commercial production starts in the Corraun classification an RMP is recommended at ITM coordinates 53.8857184448 N, -9.9292755236 W within the licensed site T10-297A

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Figure 7-1*)*. Manila clam harvesting in the area is contingent upon the availability of stock. In the absence of clam production, the RMP will remain inactive until harvesting activities resumes.

Based on the findings of the desk based current pattern analysis (*Section 2.5,Figure 2-6*), S-P-R outcome (*Table 2-9*) and sanitary survey results, summarised in *Section 5* site T10-297A is

identified as the most representative sampling location. This site is in a small embayment which is in close proximity to inflow 5, which registered relatively high contamination levels on the southern and eastern section of the production area. Considering the size of the BMPA, prevailing circulation patterns, and production site, a single Representative Monitoring Point (RMP) is recommended.

While a specific RMP have been identified for site T10-297A, it is recognised that, due to the unpredictable nature of seed Manila clam supply, intermittent growth at this site, sample may not always be available within 100 metres of the RMP. In such circumstances, the SFPA sample coordinator and local industry representatives should be informed, and an alternative sampling location agreed. This alternative location should be selected with reference to the findings of the sanitary survey and should continue to represent a worst-case scenario for contamination risk.

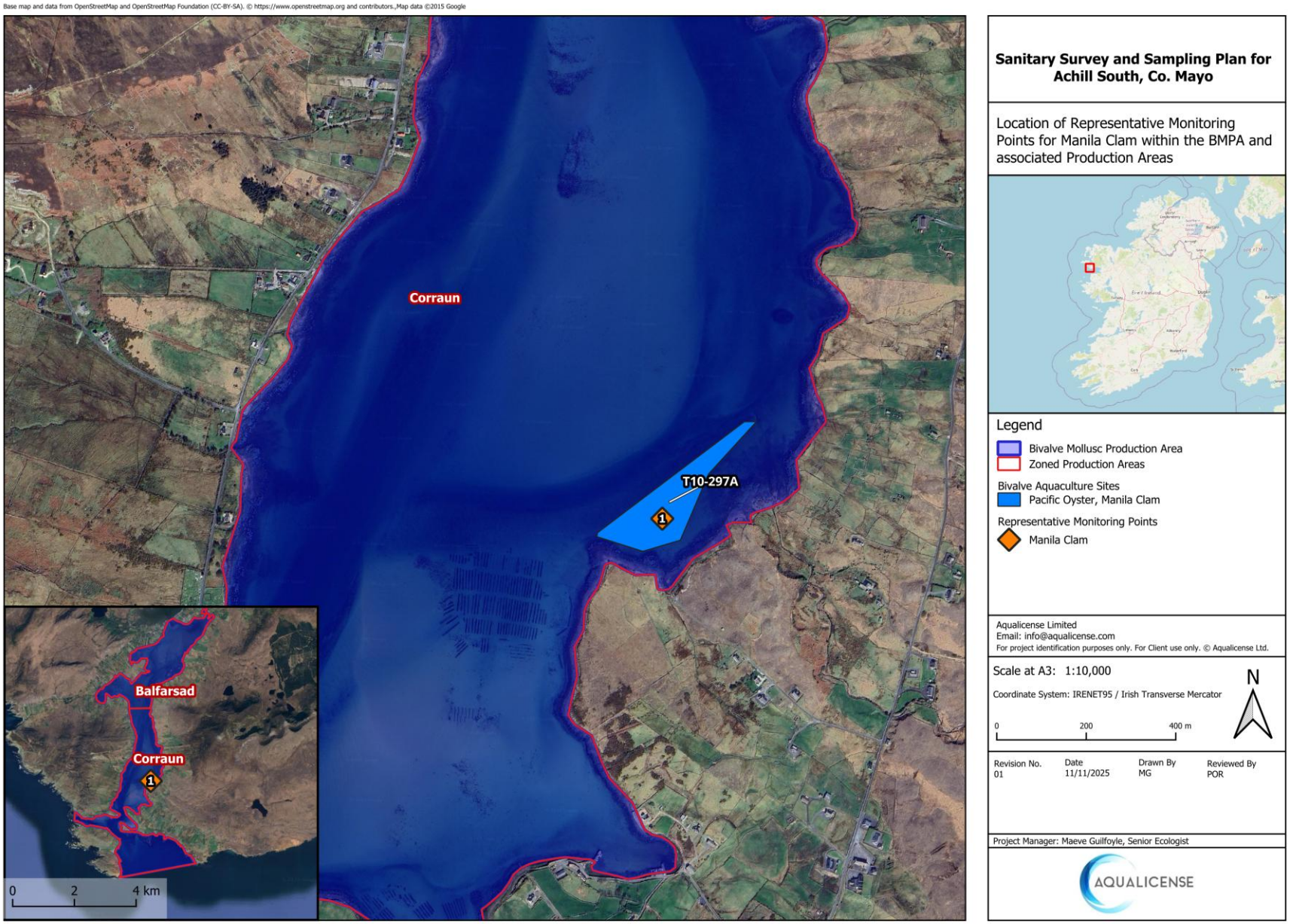

Figure 7-1 Location of RMP for Manila clam within Achill South BMPA

7.2 Sampling Plan for Manila Clam

A species-specific sampling plan has been developed in line with EU Regulation 2019/627 and the SFPA Code of Practice (2025). Key features of the plan are detailed in *Table 7-1* :

Table 7-1. Sampling Plan for Manila clam within the Corraun Production Area

Species	*Ruditapes philippinarum*
Site Name	Corraun Production Area
Sample Point Identifier	MO-AS-CR
Geographical location of sampling point (RMP)	53.8857184448 N, -9.9292755236 W (53°53’08.59 N, 009°55"45.3' W)
Sampling Frequency	Samples shall be taken monthly upon classification of Achill South BMPA. Sampling will occur throughout the year.
Sampling Depth	Samples will be collected from the bottom.
Maximum Allowed Distance from Sampling Point	Samples are to be collected within 100 m of the RMP. Where this is not possible, the SFPA sample coordinator and local industry shall be informed to agree an alternative sampling location.
Sampling Method	Sampling will be conducted in accordance with the SFPA Code of Practice for the Classification and Microbiological Monitoring of Bivalve Mollusc Production Areas (SFPA, 2020), specifically in accordance with Appendix 9.2.
Sample Size	A minimum of 15 clams of market size
Authorised Samplers	It is the responsibility of the SFPA Ros an Mhil Port Office to arrange sampling, with designated sampling officers assigned to collect samples.

This plan ensures the data collected will be representative of contamination affecting the production area, supporting both initial classification and ongoing official controls.

8 CONCLUSION

A sanitary survey has been conducted in accordance with Article 56 of Regulation (EU) 2017/625 and Regulation (EU) 2019/627 (European Commission, 2024). The survey integrated a catchment-scale desk assessment, field-based shoreline verification, and bacteriological sampling to evaluate faecal contamination risks in Achill South.

Given the hydrodynamic characteristics, overall morphology of the Bivalve Mollusc Production Area (BMPA), and the distribution of the most prominent pollution sources, It is recommended that the BMPA remain divided into two distinct production areas (Corraun and Balfarsad), each with its own individual RMP. The distinct circulation patterns and localised contamination pressures in each area justify maintaining separate production areas, each with its own standalone Representative Monitoring Point (RMP). Accordingly, it is recommended that the existing structure of two production areas—with individual RMPs—be retained to ensure monitoring remains accurate, robust, and truly reflective of microbiological water quality conditions.

The outputs of the survey are as follows:

- A geographically defined BMPA boundary of approximately 10.18 km^2 with two classification areas Balfarsad 3.95 km^2 and Corraun 6.24 km^2 respectively.
- Key contamination pressures identified were primarily in the southern and eastern areas including a number of inflows entering the bay near piers and drainage outflows. To the north there were minimal contamination pressures though the discharge point of the UWWTP in Achill North 1.4 km^2 to the north was noted as a possible significant source.
- In order to capture the dominant contamination pressures in the production areas 3 RMPs (2 active, 1 inactive) were created. These RMPs were placed within the licenced sites that were representative of the area's most likely to be impacted by the localised faecal inputs (e.g. UWWTP discharge points, run off from agricultural land, freshwater inputs identified as having high *E. coli* counts) located at the following:
    - Balfarsad RMP:
        - Pacific Oyster (active) at site T10-313A (53. 9187845478 N, - 9.9185058976 W
    - Corraun RMPs:
        - Manila clam (inactive) RMP at site T10-212-2 (53.8767346 N, -9. 9358055397 W
        - Pacific Oyster (active) at site T10-297A (53.8857184448 N, -9.9292755236 W)
- Recommendations for a species-specific sampling plan for, Pacific oyster (*Magallana gigas)* and Manila clam (*Ruditapes philippinarum)* in line with SFPA COP (2017 as amended in 2022) and EU (2019/627) regulatory requirements.

These components provide the scientific basis for the classification and ongoing monitoring of Achill South BMPA as a shellfish production area.

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APPENDIX 1 – SUMMARY STATISTICS FOR WEATHER

Appendix 1A - Summary statistics for wind derived from Newport Furnace weather station (August 2015 to September 2025 inclusive)

DIRECTION	FREQUENCY (%)	MAX. MEAN WIND SPEED (M/S)	MEAN WIND SPEED (M/S)
S	27.6	17.6	7.5
SW	22.1	16.6	6.6
N	11.5	12.5	4.8
W	10.7	14.4	5.7
NW	8.2	13.3	5.3
NE	7.9	10.3	4.4
SE	7.9	14.5	5.5
E	4.1	9.1	3.9

Appendix 1B - Summary statistics for daily rainfall derived from Newport Furnace weather station (August 2015 to September 2025 inclusive)

MONTH	MAX. DAILY RAIN (MM)	MEAN DAILY RAIN (MM)	MEDIAN DAILY RAIN (MM)
January	228.3	128.82	125.95
February	241.9	132.48	117.8
March	151.3	98.52	103.6
April	95.2	61.53	63.55
May	95.6	57.22	50.05
June	100.9	77.48	84.65
July	148.5	92	97.45
August	208.1	118.99	119.45
September	145.8	104.46	102.1
October	222.4	134.27	131.85
November	191.8	136.5	141.65
December	255.7	157.28	151.3

APPENDIX 2 – Comparative COORDINATES

Appendix 2 Comparative Coordinates for Survey Locations

ID	LATITUDE (WGS 84) (DECIMAL)	LONGITUDE (WGS 84) (DECIMAL)	LATITUDE (WGS 84) (DMS)	LONGITUDE (WGS 84) (DMS)
1	53.93226	-9.91722	53° 55′ 56.1 N	9° 55′ 1.99 W
1+	53.9318	-9.91575	53° 55′ 54.4 N	9° 54′ 56.7 W
2	53.93323	-9.9106	53° 55′ 59.6 N	9° 54′ 38.1 W
3	53.93546	-9.90259	53° 56′ 7.66 N	9° 54′ 9.32 W
4	53.93228	-9.89493	53° 55′ 56.2 N	9° 53′ 41.7 W
5	53.92125	-9.90651	53° 55′ 16.5 N	9° 54′ 23.4 W
6	53.92055	-9.91459	53° 55′ 13.9 N	9° 54′ 52.5 W
7	53.9145	-9.9145	53° 54′ 52.2 N	9° 54′ 52.2 W
8	53.91767	-9.91569	53° 55′ 3.61 N	9° 54′ 56.4 W
9	53.91507	-9.90941	53° 54′ 54.2 N	9° 54′ 33.8 W
10	53.91095	-9.9261	53° 54′ 39.4 N	9° 55′ 33.9 W
11	53.9037	-9.92143	53° 54′ 13.3 N	9° 55′ 17.1 W
12	53.90161	-9.92106	53° 54′ 5.80 N	9° 55′ 15.8 W
13	53.9007	-9.92029	53° 54′ 2.52 N	9° 55′ 13.0 W
14	53.89953	-9.91978	53° 53′ 58.3 N	9° 55′ 11.2 W
15	53.89718	-9.91785	53° 53′ 49.8 N	9° 55′ 4.26 W
16	53.89135	-9.91794	53° 53′ 28.8 N	9° 55′ 4.58 W
17	53.8818	-9.92146	53° 52′ 54.4 N	9° 55′ 17.2 W
18	53.88427	-9.92906	53° 53′ 3.37 N	9° 55′ 44.6 W
20	53.87866	-9.93142	53° 52′ 43.1 N	9° 55′ 53.1 W
21	53.87889	-9.92826	53° 52′ 44.0 N	9° 55′ 41.7 W
24	53.87613	-9.93434	53° 52′ 34.0 N	9° 56′ 3.62 W
25	53.87607	-9.93592	53° 52′ 33.8 N	9° 56′ 9.31 W
27	53.87544	-9.94047	53° 52′ 31.5 N	9° 56′ 25.6 W
28	53.87532	-9.93996	53° 52′ 31.1 N	9° 56′ 23.8 W
31	53.87017	-9.92129	53° 52′ 12.6 N	9° 55′ 16.6 W
33	53.87551	-9.96394	53° 52′ 31.8 N	9° 57′ 50.1 W
35	53.8746	-9.94828	53° 52′ 28.5 N	9° 56′ 53.8 W
36	53.87511	-9.94508	53° 52′ 30.4 N	9° 56′ 42.2 W
37	53.88079	-9.94531	53° 52′ 50.8 N	9° 56′ 43.1 W
38	53.88255	-9.94377	53° 52′ 57.1 N	9° 56′ 37.5 W
39	53.88692	-9.94401	53° 53′ 12.9 N	9° 56′ 38.4 W
40	53.88981	-9.94171	53° 53′ 23.3 N	9° 56′ 30.1 W
41	53.8907	-9.94161	53° 53′ 26.5 N	9° 56′ 29.8 W
42	53.89354	-9.93814	53° 53′ 36.7 N	9° 56′ 17.3 W
43	53.90331	-9.94161	53° 54′ 11.9 N	9° 56′ 29.8 W

ID	Latitude (WGS 84) (Decimal)	Longitude (WGS 84) (Decimal)	Latitude (WGS 84) (DMS)	Longitude (WGS 84) (DMS)
44	53.90997	-9.95063	53° 54′ 35.8 N	9° 57′ 2.27 W
45	53.90787	-9.95567	53° 54′ 28.3 N	9° 57′ 20.4 W
46	53.91014	-9.95773	53° 54′ 36.5 N	9° 57′ 27.8 W
47	53.91185	-9.95625	53° 54′ 42.6 N	9° 57′ 22.5 W
48	53.91861	-9.95123	53° 55′ 7.00 N	9° 57′ 4.43 W
49	53.91921	-9.94025	53° 55′ 9.16 N	9° 56′ 24.9 W
50	53.92883	-9.92431	53° 55′ 43.7 N	9° 55′ 27.5 W

APPENDIX 3 - SHORELINE SURVEY PHOTOGRAPHS

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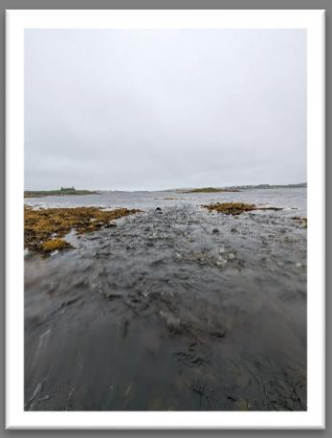
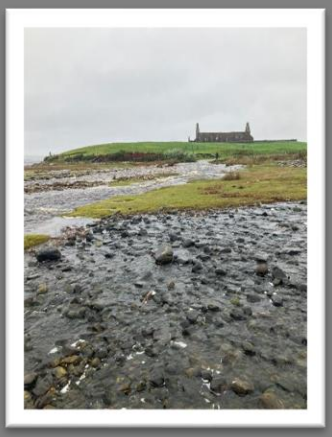
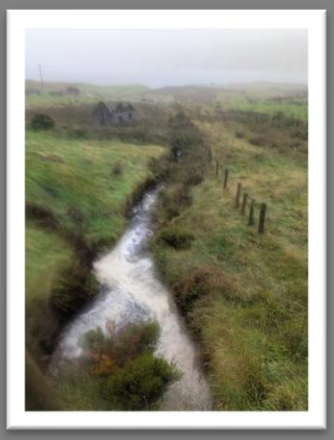
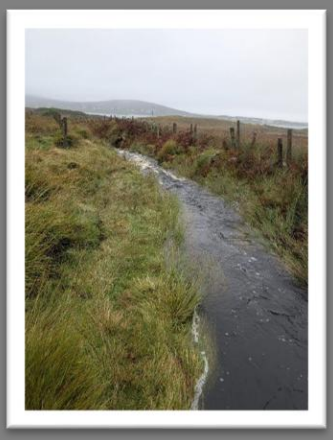
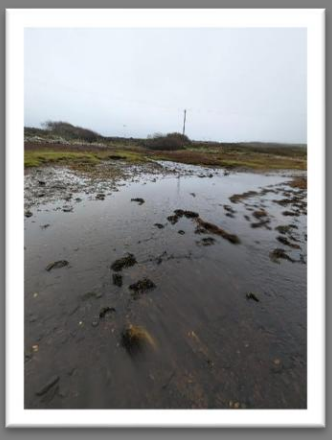
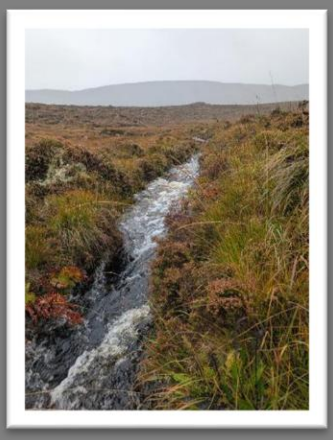


6 	**7** 
8 	**9** 
10 	**11** 

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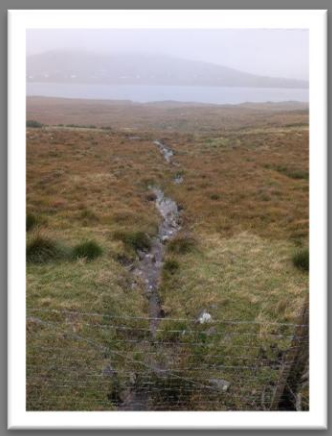

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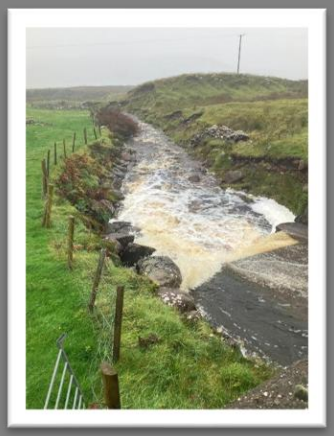

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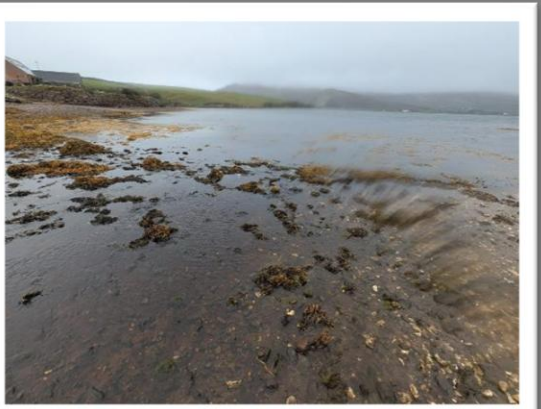

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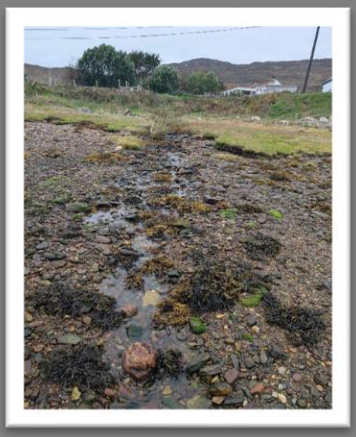

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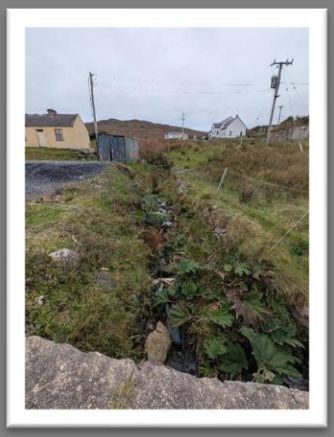

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APPENDIX 4 - INDUSTRY ENGAGEMENT SUMMARY (PREPARED BY SFPA)

Date of circulation of draft report: 28/11/2025

Stakeholders contacted: IFA Aquaculture, BIM, Producers

Method of engagement: email circulation

Period for responses: 28/11/2025 – 08/12/2025

Summary of feedback received:

- Query raised on animal numbers.
- Clarification sought on discharge points.
- Given the feedback, this report is recommended for publication and finalisation.