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Report in Support of Appropriate Assessment
(AA) Screening & NIS

Industrial Emissions Licence (IEL) Review (P0621-02)

Carhue Piggeries,
Cooligboy, Timoleague, Bandon, Cork

On Behalf of
Martin O'Donovan

May 2022

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Project	Report in Support of Appropriate Assessment (AA) Screening & NIS Industrial Emissions Licence (IEL) Review (P0621-02) Carhue Piggeries	
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05/05/22	1 st Draft	Sorcha Sheehy BSc PhD
13/05/22	Issue to client	Carl Dixon BSc MSc
DixonBrosnan Lios Ri Na hAoine, 1 Redemption Road, Cork. Tel 086 851 1437 carl@dixonbrosnan.com www.dixonbrosnan.com		
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1. Introduction

1.1 Background

DixonBrosnan Environmental Consultants has been commissioned by Martin O'Donovan to prepare a Natura Impact Statement (NIS) in respect of an Industrial Emissions Licence (IEL) Application review (Ref No. P0621-02) for an existing pig farm at Cooligboy, Timoleague, Co. Cork.

The pig farm includes two sets of housing units including:

- A set of housing units located in the southern area of the site that was initially constructed in the 1980s (old housing units)
- A set of housing units located in the northern area of the site that has been under construction since 2019 (new housing units).

The Environmental Protection Agency (EPA) issued an Integrated Pollution Prevention and Control (IPPC) licence (Register number P0621-01) for the old housing units in 2003. In 2013, the licence was amended to an Industrial Emissions Licence (IEL) (Register number P0621-02). Carhue Piggeries anticipates that the new housing units will be incorporated into the IEL, based on a licence review application. This report along will form part of the licence review application. It is noted that an ammonia assessment carried out by Katestone Environmental Pty Ltd (Katestone) has been used to inform the conclusions of this report and the ammonia assessment been included as an appendix to this report (Refer to **Appendix 2**).

The Birds Directive (2009/147/EC) and the Habitats Directive (92/42/EEC) put an obligation on EU Member States to establish the Natura 2000 network of sites of highest biodiversity importance for rare and threatened habitats and species across the EU. In Ireland, the Natura 2000 network of European sites includes Special Areas of Conservation (SACs, including candidate SACs) and Special Protection Areas (SPAs, including proposed SPAs). SACs are selected for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds). SPAs are selected for the conservation of Annex I birds and other regularly occurring migratory birds and their habitats. The annexed habitats and species for which each site is selected correspond to the qualifying interests of the sites and from these the conservation objectives of the site are derived. The Birds and Habitats Directives set out various procedures and obligations in relation to nature conservation management in Member States in general, and of the Natura 2000 sites and their habitats and species in particular. A key protection mechanism is the requirement to consider the possible nature conservation implications of any plan or project on the Natura 2000 site network before any decision is made to allow that plan or project to proceed. Not only is every new plan or project captured by this requirement but each plan or project, when being considered for approval at any stage, must take into consideration the possible effects it may have in combination with other plans and projects when going through the process known as Appropriate Assessment (AA).

The obligation to undertake Appropriate Assessment (AA) derives from Article 6(3) and 6(4) of the Habitats Directive, and both involve a number of steps and tests that need to be applied in sequential order. Article 6(3) is concerned with the strict protection of sites, while Article 6(4) is the procedure for allowing derogation from this strict protection in certain restricted

circumstances. As set out in Section 177U of the Planning and Development Act 2000 as amended, a screening for appropriate assessment of an application for consent for the project must be carried out by the competent authority to assess, in view of best scientific knowledge, if the project, individually or in combination with another plan or project is likely to have a significant effect on any European site. Each step in the assessment process precedes and provides a basis for other steps. The results at each step must be documented and recorded carefully so there is full traceability and transparency of the decisions made.

1.2 Aim of Report

The purpose of this report is to inform the AA process as required under the Habitats Directive (92/43/EEC) in instances where a plan or project may give rise to significant impacts on a Natura 2000 site. This report aims to inform the Appropriate Assessment process in determining whether the development, both alone and in combination with other plans or projects, are likely to have a significant impact on the Natura 2000 sites in the study area, in the context of their conservation objectives and specifically on the habitats and species for which the sites have been designated.

This report has been prepared with regard to the following guidance documents, where relevant.

- *Managing Natura 2000 Sites: The Provision of Article 6 of the Habitats Directive 92/43/EEC* (European Commission (EC), 2018);
- *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodical Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC* (European Commission (EC), 2001);
- *Guidance Document on Article 6(4) of the Habitats Directive 92/43/EEC* (European Commission, (EC) 2007);
- *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities* (Department of Environment, Heritage and Local Government, 2010 revision);
- *Appropriate Assessment under Article 6 of the Habitats Directive; Guidance for Planning Authorities. Circular NPW 1/10 and PSSP 2/10* (Department of Environment, Heritage and Local Government, 2010);
- *Guidelines for Good Practice Appropriate Assessment of Plans under Article 6(3) Habitats Directive* (International Workshop on Assessment of Plans under the Habitats Directive, 2011);
- *Communication from the Commission on the precautionary principle. European Commission* (2000) and
- CJEU Case C 164/17 *Edel Grace Peter Sweetman v An Bord Pleanála*.
- IAQM (2020) Holman et al (2020). *A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites – version 1.1*, Institute of Air Quality Management London.

- EPA (2020) *Assessment of the Impact of ammonia Emissions from Intensive Agricultural Installations on Special Areas of Conservation and Special Protection Areas (2013-EH-MS-14) EPA Research Report.*
- EPA (2021) *Licence Application Guidance Assessment of the impact of ammonia and nitrogen on Natura 2000 sites from intensive agricultural installations. Version 1.0 May 2021. Environmental Protection Agency. An Ghníomhaireacht um Chaomhnú Comhshaoil PO Box 3000, Johnstown Castle, Co. Wexford, Ireland.*
- EPA (2003) *Integrated Pollution Control Licence. Licence Register Number: 621. Licensee: Martin O'Donovan. Location of Activity: Cooligboy, Timoleague, Bandon, County Cork. Environmental Protection Agency, Johnstown Castle Estate Wexford, Ireland.*
- EPA (2017) *Guidelines on the information to be contained in environmental impact assessment reports Draft. August 2017. Environmental Protection Agency. An Ghníomhaireacht um Chaomhnú Comhshaoil PO Box 3000, Johnstown Castle, Co. Wexford, Ireland.*
- EPA (2020) *Air Dispersion Modelling from Industrial Installations Guidance Note (AG4). Environmental Protection Agency, Johnstown Castle Estate, Wexford, Ireland.*
- Air Pollution Information System (APIS) (<http://www.apis.ac.uk/>)

1.3 Authors of Report

This report was prepared by Carl Dixon MSc (Ecological Monitoring) and Sorcha Sheehy PhD (Ecology/ornithology).

Carl Dixon holds an Honours Degree (BSc) in Ecology and a Masters (MSc) in Ecological Monitoring from UCC. He is a senior ecologist who has over 25 years' experience in ecological assessment. Prior to setting up DixonBrosnan Environmental Consultants in 2000, Carl set up and ran Core Environmental Services which included REPS planning for landowners and ecological assessments.

Carl has particular experience in freshwater ecology including electrofishing fish stock assessments and water quality assessments. He also has considerable experience in habitat mapping and mammal ecology including survey work and reporting in relation to badgers and bats. Other competencies include surveys for invasive species and bird surveys.

Carl has extensive experience with regards to EIAR and NIS mitigation and impact assessment. He has particular experience in large-scale industrial developments with extensive experience in complex assessments as part of multi-disciplinary teams. Such projects include gas pipelines, incinerators, electrical cable routes, oil refineries and quarries.

Sorcha Sheehy PhD (ecology/ornithology) is an ecologist and ornithologist who has worked for 13 years in environmental consultancy. She has worked on Screening/NISs for a range of small and large-scale projects with expertise in assessing impacts on birds.

Sorcha's PhD research focused on bird behaviour at airports, where she studied bird avoidance behaviour and collision risk to aircraft. Her research involved field observations,

post-mortem analysis and radar surveys. Sorcha has worked on bird collision risk assessments at airports throughout Ireland including Dublin airport, Cork airport, Shannon airport and Kerry airport.

During her consultancy work Sorcha carried out field-based surveys and environmental reports including NIS, AA screening and EIARs. Notable projects include the Arklow Bank Wind Park, Indaver Ireland Waste Management Facility at Ringaskiddy, Irving Oil Whitegate Refinery (IOWR), Shannon LNG and Greenlink Interconnector.

2. Regulatory Context and Appropriate Assessment Procedure

2.1 Regulatory Context

The Habitats Directive (Council Directive 92/43/EEC on the *Conservation of Natural Habitats and of Wild Fauna and Flora*) aims to maintain or restore the favourable conservation status of habitats and species of community interest across Europe. The requirements of these directives are transposed into Irish law through the European Communities (Birds and Natural Habitats Regulations; S.I. No. 477 of 2011).

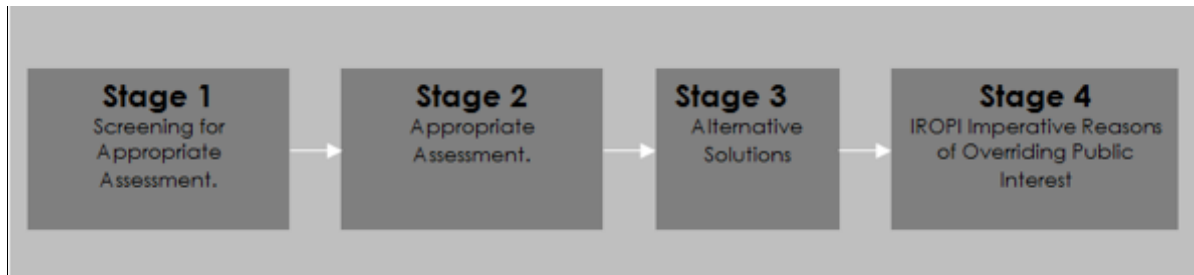
Under the Directive a network of sites of nature conservation importance have been identified by each Member State as containing specified habitats or species requiring to be maintained or returned to favourable conservation status. In Ireland the network consists of SACs and SPAs, and also candidate sites, which form the Natura 2000 network.

Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the *Conservation of Natural Habitats and of Wild Fauna and Flora* (as amended) (hereafter ‘the Habitats Directive’) requires that, any plan or project not directly connected with or necessary to the management of a designated site, but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. A competent authority (e.g. the EPA or Local Authority) can only agree to a plan or project after having determined that it will not adversely affect the integrity of the site concerned.

The possibility of a significant effect on a designated or “European” site has generated the need for an appropriate assessment to be carried out by the competent authority for the purposes of Article 6(3). A Stage Two Appropriate Assessment is required if it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site. The first (Screening) Stage for appropriate assessment operates merely to determine whether a (Stage Two) Appropriate Assessment must be undertaken on the implications of the plan or project for the conservation objectives of relevant European sites.

2.2 Appropriate Assessment Procedure

The assessment requirements of Article 6(3) establish a stage-by-stage approach. This assessment follows the stages outlined in the 2001 European Commission publications “Assessment of plans and projects significantly affecting Natura 2000 sites: methodological guidance on the provisions of Articles 6(3) and 6(4) of the Habitats Directive 92/43/EEC” (2001) and *Managing Natura 2000 Sites: the provisions of Article 6 of the ‘Habitats’ Directive*



The stages are as follows:

Stage One: Screening — the process which identifies any appreciable impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant;

Stage Two: Appropriate assessment — the consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site’s structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts;

Stage Three: Assessment of alternative solutions: The process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site. It is confirmed that no reliance is placed by the developer on Stage Three in the context of this application for development consent;

Stage Four: Assessment where no alternative solutions exist and where adverse impacts remain — an assessment of compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed (it is important to note that this guidance does not deal with the assessment of imperative reasons of overriding public interest). Again, for the avoidance of doubt, it is confirmed that no reliance is placed by the developer on Stage Four in the context of this application for development consent.

It is the responsibility of the competent authority, in this instance the Environmental Protection Agency (EPA), to make a decision on whether or not the proposed development should be approved, taking into consideration any potential impact upon any Natura 2000 site within its zone of influence.

3. Description of Development

3.1 Existing site

Cooligboy Pig Farm is located in the townland of Cooligboy, approximately 1.2km northwest of Timoleague village, and 6.9 km northeast of Clonakilty. The site is located at an elevation of approximately 100 mOD. The site is on the side of a rise which peaks to the north of the site at approximately 144 mOD. The surrounding landscape is dominated by intensive agricultural activity with a mixture of tillage and pasture.

The site is in a remote rural location surrounded by pasture. The old housing units are on the south facing slope of an area of elevated terrain. The new housing units are at the top of this area of elevated terrain. The terrain falls north of the new housing units, the north facing slope forming the southern wall of a valley that contains the Argideen River at its lowest point. The Argideen River runs west to east approximately 1.5 km north of the new housing units.

The Argideen River rises northwest of Clonakilty and flows into the Timoleague estuary. The river is 18km long and drains approximately 56 square miles of catchment. It is tidal to Inchy Bridge. The main channel of the Argideen River is designated a salmonid river under European Community's (Quality of Salmonid Waters) Regulations, 1988.

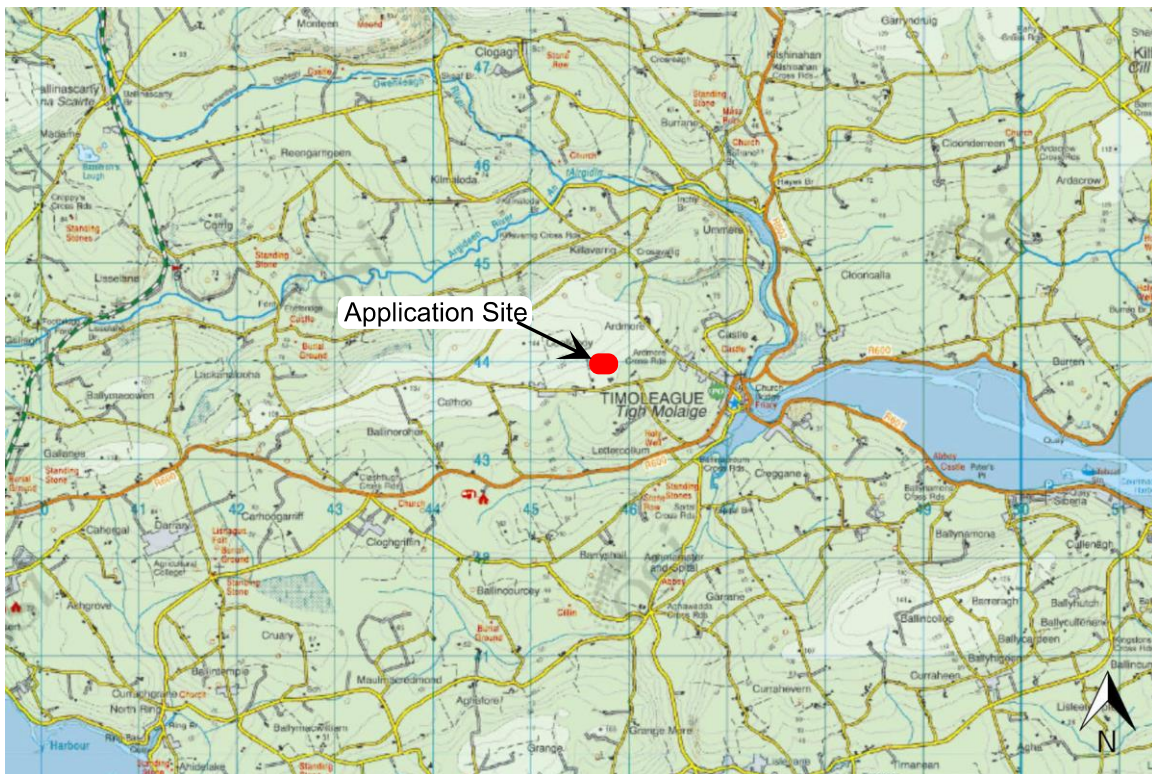


Figure 1. Location of proposed development | Source OSI

3.2 Proposed Development

Permission was granted under Planning Ref. 09/896 to Construct 6no. pig houses (2no. dry sow houses with attached service houses, 2no. weaner houses, 2no. farrowing houses) with 6no. meal bins, loading bay, feed mill house, storage tank, servicing concrete and hardcore yard, with complete storm and foul water collection systems and associated site works for new

sow breeding unit to fully comply with new Animal Welfare Regulations. Under planning reference 14/493 an extension of duration was granted.

The IED licence is for the breeding and rearing of pigs for meat production. The farm is designed and managed to provide high health and minimal disease.

The old housing units currently have the following maximum animal holding capacity:

- 676 dry sows
- 156 suckling sows
- 119 maiden gilts.
- 10 boars
- 3,300 weaners pigs
- 4,200 fattening pigs.

The new housing units will have the following maximum animal holding capacity:

- 670 dry sows
- 280 suckling sows
- 160 maiden gilts.
- 10 boars
- 3,910 weaners pigs
- 4,850 fattening pigs.

The animal numbers housed in the old housing units will be reduced slightly as part of the proposed development, as follows:

- 650 dry sows
- 150 suckling sows
- 119 maiden gilts.
- 6 boars
- 3,090 weaners pigs
- 4,150 fattening pigs

The layout of the old housing units are shown in **Figure 2**. The new housing unit layout is shown **Figure 3**.

The operation of the farm will be carried out in accordance with SI 113 of 2022 European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2022. In addition, the operation and management of the pig facility will follow guidance contained in the JRC

Science for Policy Report Best Available Techniques (BAT) reference Document for the Intensive Rearing of Poultry or Pigs IED 2010/75/EU (Integrated Pollution Prevention and Control (Sanjonja *et al.*, 2017).

All uncontaminated surface waters from roofs and clean pavement areas is diverted away from the farmyard and discharged to soakaways directly. All soiled water, slurry spillages, yard washings and any other contaminated run-off, arising in the yards and adjacent areas, etc are stored in onsite tanks.

Waste water from staff facilities will be treated by the onsite septic tank. The system has been designed using the Code of Practice: Wastewater treatment and disposal-systems serving single houses (pe>10) (EPA, 2009) and relevant parts of *EN12566 Small wastewater treatment for up to 50pe* (European committee for standardization, 2001-2013).

All building work was carried out and completed in accordance with the Department of Agriculture & Food 'Specification for Bovine Livestock Units and Reinforced Tanks'. The slurry storage tank is fitted with a standard leak detection system.

The pig slurry produced at this farm is primarily (90% approx) delivered to an Anaerobic Digester located nearby which is operated by Timoleague AgriGen Ltd, under EPA Licence Reg No P0986-01. The remaining amount is used as a fertilizer for agricultural crops displacing chemical fertilizers.

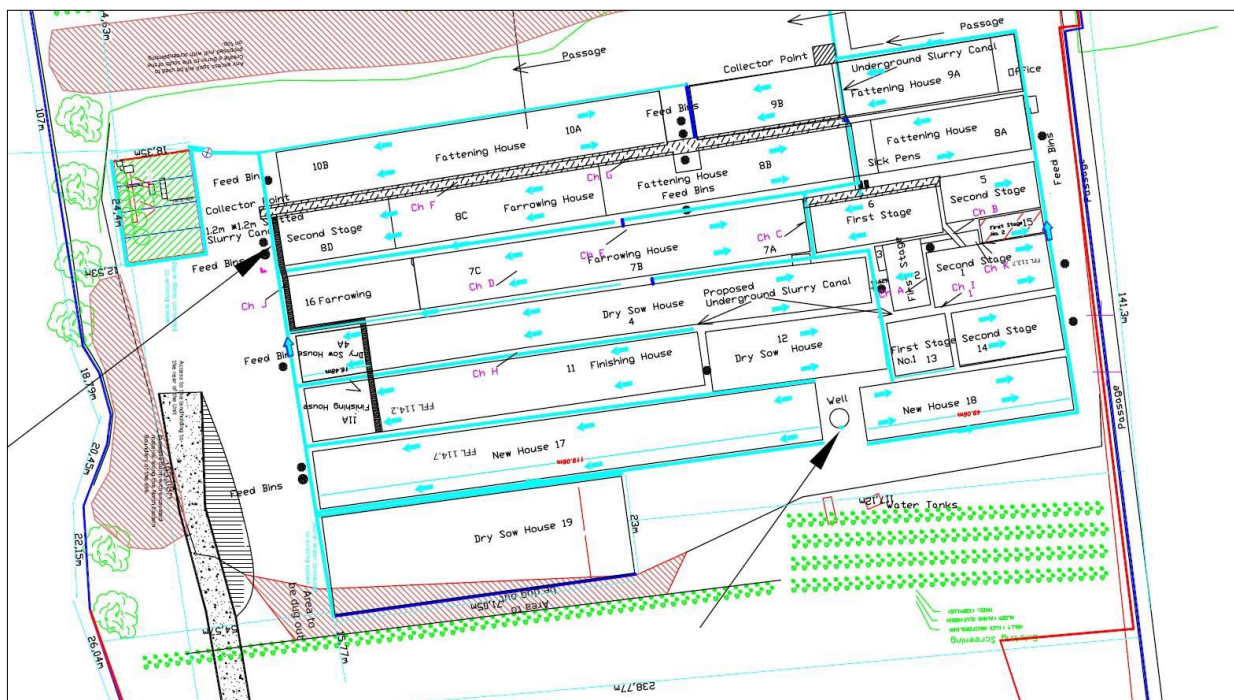


Figure 2. Carhue pig farm site plan – Old housing units

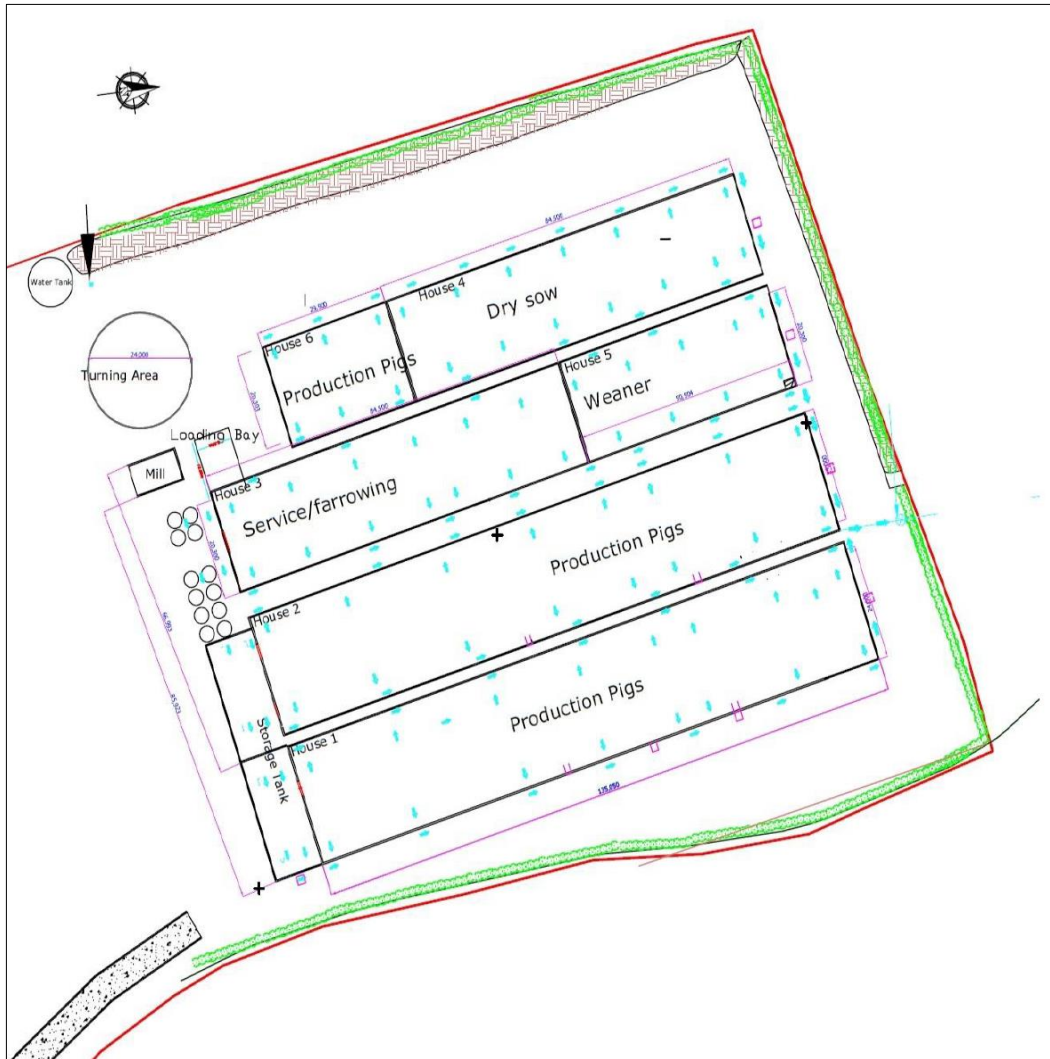


Figure 3. Carhue pig farm site plan – New housing units

3.3 Hydrology and Hydrology

A Pipe, Tank and Groundwater Assessment was carried out in 2022 (*Pipe, Tank & Groundwater Assessment Cooligboy Pig Farm, Cooligboy, Timoleague, Co. Cork, IE Consulting 2022*). This report which is included as **Appendix 3** noted the following;

The groundwater flow direction is understood to be towards the south-southeast of the site, towards the Argrideen River.

Both the Bandon and the Skibbereen-Clonakilty Groundwater Bodies were assigned a “good” overall groundwater status for the 2013-2018 monitoring period under the Water Framework Directive (WFD). The Skibbereen-Clonakilty GWB is deemed to be “not at risk” of not achieving good status again in the next monitoring period, and the Bandon GWB is classified as “under review” (EPA, 2021).

Water quality data is available from all four groundwater wells on the pig farm site. The water quality data was compared to the following regulations: S.I. No. 366/2016 – European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016, S.I. No. 122/2014 – European Union (Drinking Water) Regulations 2014 and Environmental Protection Agency (EPA) Interim Guideline Values (IGV) (2003).

Overall, the groundwater quality beneath the site can be considered to be good. The data ranges from 2008-2021 for GW1, GW2, and GW3; and from 2010-2021 for GW4 – with some gaps. Measurements were taken annually until 2014, when they began to be taken biannually. Samples were sent to ALS laboratories. The groundwater samples are tested for Nitrate, Total Ammonia, Faecal Coliforms, and E Coli. The GSI Groundwater Vulnerability Mapping was reviewed. The pig farm sits within an area of Extreme Vulnerability (GSI, 2021).

The pig farm is located in the Bandon-ilen Catchment, which is designated as Hydrometric Area No. 20. The pig farm is situated within the East Cruary Sub-catchment No. 010. The Argideen River is the main drainage feature in the area surrounding the pig farm site and is located 1.61 km north and then curves around to be 1.44 km to the east of the site. Several smaller tributaries to the river are closer to the site, including the East Cruary tributaries. The Argideen River flows towards the west and south and widens towards the sea to the south.

The existing groundwater wells across the site are suitably positioned to act as monitoring points for tank integrity and risk to groundwater as follows:

- GW1 – Down-gradient on the site
- GW2 – Mid-gradient on the site
- GW3 – Down-gradient of the site
- GW4 – Up-gradient of the site

Pumping of these wells will form a zone of contribution which will draw water from the surrounding aquifer which underlies the site. These wells are suitable to act as monitoring points for groundwater quality as the water will be abstracted from beneath the pig farm site.

The groundwater quality has been monitored consistently for the past 16 years (annually 2008-2016 and biannually 2017-2021), and is considered good for ammonia and nitrate, which are key contamination indicator parameters from pig farm sites. This indicates that there is no leakage from pipes or tanks. The zone of contribution of the production wells" will underlie the pig farm site and is considered satisfactory to detect any leaks from tanks or pipelines. Continued monitoring at these points is proposed in order to enable rapid identification and remediation of any leaks.

Based on the above the report concluded the following:

1. The pig farm is located in an area classified as extreme groundwater vulnerability.
2. The site is situated over Locally Important Bedrock Aquifer, which is described as moderately productive only in local zones.
3. The groundwater flow is interpreted as being towards the southeast, where it discharges to the regionally to the sea to the southeast, and locally towards a tributary of the Argideen located to the south.
4. The water quality underlying the site is considered to be good for both ammonia and nitrate –which are key contamination indicator parameters for pig farm sites.

5. The existing production wells onsite have formed a zone of contribution which extends beneath the pig farm site. The zone of contribution will draw water from beneath the pig farm's tanks/pipelines and water quality analysis of the production wells will act as a suitable monitoring regime to detect any leaks from underground tanks/pipelines. Therefore, further pipeline and tank integrity testing is not warranted at this stage.

4. Stage 1- Screening for Appropriate Assessment

4.1 Introduction

This section contains the information required for the competent authority to undertake screening for AA for the proposed development.

The aims of this section are to:

- Determine whether the proposed development is directly connected with, or necessary to, the conservation management of any Natura 2000 sites;
- Provide information on, and assess the potential for the proposed development to significantly effect on Natura 2000 Sites (also known as European sites); and
- Determine whether the proposed development, alone or in combination with other projects, is likely to have significant effects on Natura 2000 sites in view of their conservation objectives.

The proposed development is not directly connected with, or necessary to the conservation management of any Natura 2000 sites.

4.2 Zone of Influence

The Zone of Influence (Zol) comprises the area within which the proposed development may potentially affect the conservation objectives (or qualifying interests) of a Natura 2000 site. There is no recommended zone of influence, and guidance from the National Parks and Wildlife Service (NPWS) recommends that the distance should be evaluated on a case-by-case basis with reference to the nature, size and location of the project, the sensitivities of the ecological receptors, and the potential for in-combination effects (cumulative).

In ecological and environmental impact assessment, for an effect to occur there must be a risk enabled by having a source (e.g. construction works at a proposed development site), a 'receptor' (e.g. SAC or other ecologically sensitive feature), and a pathway between the source and the receptor (e.g. a watercourse which connects the proposed development site to the SAC, *ex situ* foraging habitat for SCI birds). A 'receptor' is defined as the Special Conservation Interest (SCI) of SPAs or Qualifying Interest (QI) of SACs for which conservation objectives have been set for the European sites being screened.

Consideration is therefore given to the source-pathway-receptor linkage and associated risks between the proposed development and Natura 2000 sites. For a significant effect to occur there needs to be an identified risk whereby a source (e.g. contaminant or pollutant arising from construction activities) affects a particular receptor (i.e. Natura 2000 site) through a

particular pathway (e.g. a watercourse which connects the proposed development with the Natura 2000 site).

The identification of risk does not automatically mean that an effect will occur, nor that it will be significant. The identification of these risks means that there is a possibility of environmental or ecological damage occurring. The level and significance of the effect depends upon the nature of the consequence, likelihood of the risk and characteristics of the receptor.

The precautionary principle is applied for the purposes of screening to ensure that consideration and pre-emptive action is undertaken where there is a lack of scientific evidence. It is noted that mitigation measures are not taken into account in the AA screening assessment process.

4.3 Desktop Review

A desktop review facilitates the identification of the baseline ecological conditions and key ecological issues relating to Natura 2000 sites and facilitates an evaluation assessment of potential in-combination impacts. Sources of information used for this report include reports prepared for the Timoleague area and information from statutory and non-statutory bodies. The following sources of information and relevant documentation were utilised:

- National Parks & Wildlife Service (NPWS) - www.npws.ie
- Environmental Protection Agency (EPA) – www.epa.ie
- National Biodiversity Data Centre (NBDC) – www.biodiversityireland.ie
- Cork County Biodiversity Action Plan 2009-2014;
- Cork County Development Plan 2014 (Cork City Council, 2014);
- Draft Cork County Development Plan 2022-2028
- Birdwatch Ireland - <http://www.birdwatchireland.ie/>
- Invasive Species Ireland - <http://www.invasivespeciesireland.com/>
- Best Practice Guidance for Habitat Survey and Mapping (Heritage Council, 2011)
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (National Roads Authority, 2009) and
- Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) European Union, 2017.

4.4 Designated sites within zone of influence

In accordance with the European Commission Methodological Guidance (EC 2018), a list of Natura 2000 Sites that can be potentially affected by the proposed project has been compiled. All SACs and SPAs sites within the zone of influence of the proposed development have been identified in **Table 1** and illustrated in **Figure 4**

The Courtmacsherry Estuary SAC and Courtmacsherry Bay SPA are located downgradient of the pig farm and there are spreadlands for slurry within the catchment. Therefore, surface water impacts associated with the spreadlands could potentially impact on water quality within these Natura 2000 sites.

Potentially increased ammonia concentration (levels) and nitrogen deposition (load) as a result of emissions to air from the operation of the pig farm could impact on Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SPA and Clonakilty Bay SAC. Noise and disturbance could impact on *ex situ* foraging birds which are special conservation interests for the Courtmacsherry Bay SPA.

Therefore, a source-pathway-receptor link has been identified between the source (proposed development) and the receptor (Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SPA and Clonakilty Bay SAC) via a potential pathway (impacts on water quality due to surface water impacts or air quality impacts, disturbance of *ex situ* foraging birds). Further information on the Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SPA and Clonakilty Bay SAC is provided below, and full site synopses included **Appendix 1**.

Two SPAs are designated for Chough, namely Seven Heads SPA and Galley Head to Duneen Point SPA. There is no significant hydrological link between the proposed development site and these SPA sites. The habitats on which Chough forage, which is primarily grassland within these SPA's, will not be effected by nitrogen/ammonia deposition associated with air emissions from the proposed development as the net impact of proposed development as a percentage of the critical level is significantly below 1% (Refer to **Appendix 2 Table 5** for further detail). While there are no specific conservation objectives for habitats within these SPA's, the nett nitrogen/ammonia levels from the proposed development site are low enough that even the most sensitive habitats i.e. heath would not be impacted. Therefore there is no pathway for impact between the proposed development and the Seven Heads SPA and Galley Head to Duneen Point SPA and these sites are not considered further in this appropriate assessment.

Table 1. Designated sites and their distance from proposed development site

Site	Site Code	Distance (Closest Point) and potential source-pathway-receptor link	Qualifying interests/Special Conservation Interests
Special Area of Conservation (SAC)			
Courtmacsherry Estuary SAC	001230	1.3km southeast. A potential source-pathway-receptor link has been identified between the source (proposed development) and the receptor (Courtmacsherry Estuary SAC) via the potential pathway (surface water runoff and potentially increased ammonia concentration (levels) and nitrogen deposition (load) as a result of emissions to air	Habitats 1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1220 Perennial vegetation of stony banks 1310 Salicornia and other annuals colonising mud and sand

Site	Site Code	Distance (Closest Point) and potential source-pathway-receptor link	Qualifying interests/Special Conservation Interests
		from the operation of the pig farm.	<p>1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>)</p> <p>1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>)</p> <p>2110 Embryonic shifting dunes</p> <p>2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)</p> <p>2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)*</p>
Clonakilty Bay SAC	000091	5.5km southwest. A potential source-pathway-receptor link has been identified between the source (proposed development) and the receptor (Clonakilty Bay SPA) via the potential pathway; potentially increased ammonia concentration (levels) and nitrogen deposition (load) as a result of emissions to air from the operation of the pig farm	<p>Habitats</p> <p>1140 Mudflats and sandflats not covered by seawater at low tide</p> <p>1210 Annual vegetation of drift lines</p> <p>2110 Embryonic shifting dunes</p> <p>2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)</p> <p>2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)*</p> <p>2150 Atlantic decalcified fixed dunes (<i>Calluno-Ulicetea</i>)*</p>
Kilkeran Lake and Castlefreke Dunes SAC	001061	14.6km southwest. Given the distance involved and in the absence of significant hydrological or air impact pathways, no significant pathway exists.	<p>Habitats</p> <p>1150 Coastal lagoons*</p> <p>2110 Embryonic shifting dunes</p> <p>2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)</p> <p>2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)*</p>
Special Protection Area (SPA)			
Courtmacsherry Bay SPA	004219	1.3km southeast. A potential source-pathway-receptor link has been identified between the source (proposed development) and the receptor (Courtmacsherry Bay SPA) via a potential pathway (surface water runoff and potentially increased ammonia concentration (levels) and nitrogen	<p>Birds</p> <p>A149 Dunlin (<i>Calidris alpina</i>)</p> <p>A140 Golden Plover (<i>Pluvialis apricaria</i>)</p> <p>A160 Curlew (<i>Numenius arquata</i>)</p> <p>A069 Red-breasted Merganser (<i>Mergus serrator</i>)</p>

Site	Site Code	Distance (Closest Point) and potential source-pathway-receptor link	Qualifying interests/Special Conservation Interests
		deposition (load) as a result of emissions to air from the operation of the pig farm and disturbance of ex situ foraging birds.	<p>A003 Great Northern Diver (<i>Gavia immer</i>)</p> <p>A156 Black-tailed Godwit (<i>Limosa limosa</i>)</p> <p>A050 Wigeon (<i>Anas penelope</i>)</p> <p>A182 Common Gull (<i>Larus canus</i>)</p> <p>A157 Bar-tailed Godwit (<i>Limosa lapponica</i>)</p> <p>A179 Black-headed Gull (<i>Chroicocephalus ridibundus</i>)</p> <p>A048 Shelduck (<i>Tadorna tadorna</i>)</p> <p>A142 Lapwing (<i>Vanellus vanellus</i>)</p> <p>Habitats</p> <p>Wetlands</p>
Clonakilty Bay SPA	004081	5.5km southwest. Although unlikely given the distance involved a potential source-pathway-receptor link has been identified between the source (proposed development) and the receptor (Clonakilty Bay SPA) via a potential pathway (potentially increased ammonia concentration (levels) and nitrogen deposition (load) as a result of emissions to air from the operation of the pig farm)	<p>Birds</p> <p>A149 Dunlin (<i>Calidris alpina</i>)</p> <p>A156 Black-tailed Godwit (<i>Limosa limosa</i>)</p> <p>A048 Shelduck (<i>Tadorna tadorna</i>)</p> <p>A160 Curlew (<i>Numenius arquata</i>)</p> <p>Habitats</p> <p>Wetlands</p>
Seven Heads SPA	004191	5.7km south. Given the distance involved and in the absence of significant hydrological or air impact pathways, no significant pathway exists.	<p>Birds</p> <p>A346 Chough (<i>Pyrrhocorax pyrrhocorax</i>)</p>
Galley Head to Duneen Point SPA	004190	9.2km southwest. Given the distance involved and in the absence of significant hydrological or air impact pathways, no significant pathway exists.	<p>Birds</p> <p>A346 Chough (<i>Pyrrhocorax pyrrhocorax</i>)</p>

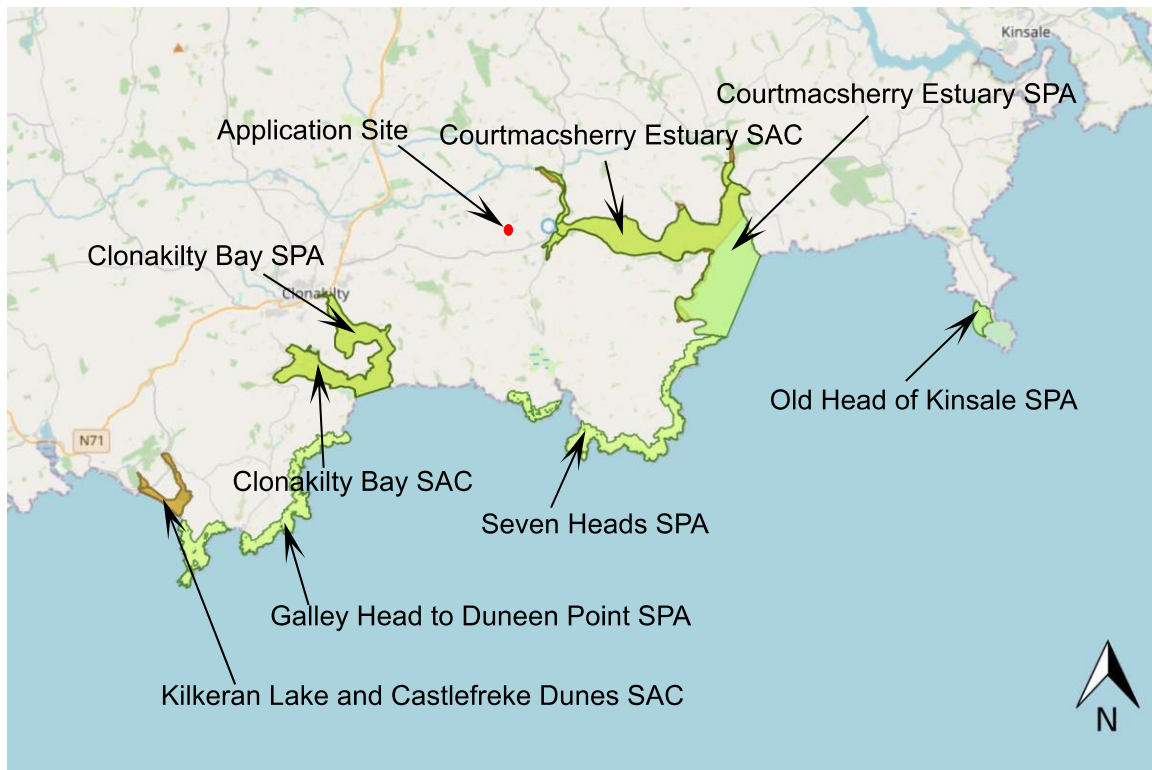


Figure 4. Location of the development site and Natura 2000 sites located within zone of influence
 | Source: EPA Envision mapping <https://gis.epa.ie/EPAMaps/> | Not to scale

4.5 Courtmacsherry Estuary SAC (Site code 001230)

This site is located in west Cork, some 12 km south of Bandon and immediately east of the village of Timoleague. The estuary consists of the drowned valley of the Argideen River, which is now filled with sediments, resulting in an extensive area of mudflats. The site contains a complex of coastal habitats, including ten which are listed in the E.U. Habitats Directive. The greater part of this estuary site is mudflat and tidal channels, but three rivers flow into the site and areas of fresh- and saltmarsh are found. Most of the mudflat at Courtmacsherry is unvegetated, although in places cord-grass (*Spartina* sp.) occurs. Courtmacsherry Estuary is an important site for the complex of coastal habitats found there, including ten listed on Annex I of the E.U. Habitats Directive, and for the large numbers of birds that use the area. The presence of rare and scarce plant species adds further interest and value to the site.

A full site synopsis for the Courtmacsherry Estuary SAC is included as **Appendix 1** of this report.

4.6 Courtmacsherry Bay SPA (Site code 004219)

Courtmacsherry Bay SPA is located approximately 12 km south of Bandon and immediately east of the village of Timoleague in west Co. Cork. The site, which is largely estuarine in nature, consists of the drowned valley of the Argideen River which is now filled with sediments, resulting in extensive mudflats and areas of saltmarsh. The estuary of the Kilbrittain River in the north-east of the site holds an area of well-developed saltmarsh. The seaward boundary for the site stretches from Coolmain Point to Barry Point, and includes Coolmain Bay and Broadstrand Bay.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Great Northern Diver, Shelduck, Wigeon, Red-breasted Merganser, Golden Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Black-headed Gull and Common Gull. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

A full site synopsis for the Courtmacsherry Bay SPA is included as **Appendix 1** of this report.

4.7 Clonakilty Bay SAC (site code 000091)

Clonakilty Bay in west Cork is an intertidal expanse that stretches from Clonakilty to the open sea, and comprises two small estuaries separated by Inchydoney Island. The site also includes adjacent sand dunes and inland marshes, and therefore is a coastal complex with a good diversity of habitats. This site is of considerable scientific interest because it contains a good diversity of coastal habitats. These habitats show a succession from salt to freshwater influences and include six which are listed on Annex I of the E.U. Habitats Directive. Its value is enhanced considerably by the birdlife it supports. The occurrence of Black-tailed Godwit in internationally important numbers is particularly significant. The site also supports nationally important numbers of seven other species of waterfowl as well as two species listed on Annex I of the E.U. Birds Directive.

A full site synopsis for the Clonakilty Bay SAC is included as **Appendix 1** of this report.

4.8 Clonakilty Bay SPA

Clonakilty Bay is a wetland complex that stretches from the town of Clonakilty to the open sea. It comprises two small estuarine bays, Clonakilty Harbour and Muckcross Strand, separated by Inchydoney Island. Several small rivers flow into the site, notably the Fealge River. At low tide, substantial areas of sand and mud flats are exposed. The construction of a causeway across the inner part of Muckcross Strand created an extensive wetland complex, with brackish characters, known as Cloheen Strand Intake. The site includes a well-developed sand dune system.

Clonakilty Bay SPA supports an internationally important population of *Limosa limosa*, and nationally important numbers of *Tadorna tadorna*, *Charadrius hiaticula* and *Tringa nebularia*. A range of other species occur in numbers of regional importance, including *Anas penelope*, *Pluvialis apricaria*, *Pluvialis squatarola*, *Vanellus vanellus*, *Calidris alpina* and *Numenius arquata*. A small population of *Limosa lapponica* is present. The site is visited by passage waders, with regular concentrations of *Calidris minuta* and *Calidris ferruginea*. In recent years *Egretta garzetta* has become regular at the site. *Asio flammeus* is a regular winter visitor. The site provides both feeding and roosting areas for the waterfowl species and habitat quality is generally good. Wintering bird populations have been well monitored since the 1970s and there have been specific studies on the *Limosa limosa* population. A substantial part of the site is now state-owned. A full site synopsis for this Natura 2000 site is included in **Appendix 1**.

4.9 Natura 2000 sites – Features of interests and conservation objectives.

The EU Habitats Directive contains a list of habitats (Annex I) and species (Annex II) for which SACs must be established by Member States. Similarly, the EU Birds Directive contains lists of important bird species (Annex I) and other migratory bird species for which SPAs must be established. Those that are known to occur at a site are referred to as ‘qualifying interests’ and are listed in the Natura 2000 forms which are lodged with the EU Commission by each Member State. A ‘qualifying interest’ is one of the factors (such as the species or habitat that is present) for which the site merits designation. The National Parks and Wildlife Service (NPWS) are responsible for the designation of SACs and SPAs in Ireland. The conservation objectives for the Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SPA and Clonakilty Bay SAC are detailed in the following publications:

NPWS (2014) *Conservation Objectives: Courtmacsherry Estuary SAC 001230. Version 1.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2014) *Conservation Objectives: Courtmacsherry Bay SPA 004219. Version 1.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2014) *Conservation Objectives: Clonakilty Bay SAC 000091. Version 1.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2014) *Conservation Objectives: Clonakilty Bay SPA 004081. Version 1.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network. European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status sites designated as Special Areas of Conservation and Special Protection Areas. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level. Favourable conservation status of a habitat is achieved when its natural range, and area it covers within that range, is stable or increasing, and the ecological factors that are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable. The species listed as qualifying interests for the Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SPA and Clonakilty Bay SAC are included in **Tables 2 to 5**.

Table 2. Qualifying Interests (QI) for the Courtmacsherry Estuary SAC

Habitat Code	Habitat	Conservation objective
1130	Estuaries	Maintain
1140	Mudflats and sandflats not covered by seawater at low tide	Maintain
1210	Annual vegetation on drift lines	Maintain
1220	Perennial vegetation on stony banks	Maintain
1310	Salicornia and other annuals colonising mud and sand	Maintain
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	Restore
1410	Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	Restore
2110	Embryonic shifting dunes	Maintain
2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)	Maintain
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)*	Maintain

Restore = Restore favourable conservation condition, Maintain = Maintain favourable conservation condition *Priority habitat

Table 3. Qualifying Habitats Clonakilty Bay SAC

Habitat Code	Habitat	Conservation objective
1140	Mudflats and sandflats not covered by seawater at low tide	Maintain
1210	Annual vegetation of drift lines	Maintain
2110	Embryonic Shifting Dunes	Maintain
2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)	Maintain
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)	Restore
2150	Atlantic decalcified fixed dunes (<i>Calluno-Ulicetalia</i>)	Maintain

Restore = Restore favourable conservation condition, Maintain = Restore favourable conservation condition

Table 4. Special Conservation Interests (SCIs) for Courtmacsherry Bay SPA

Species code	Species	Scientific name	Conservation objective
A003	Great Northern Diver	<i>Gavia immer</i>	Maintain
A048	Shelduck	<i>Tadorna tadorna</i>	Maintain
A050	Wigeon	<i>Anas Penelope</i>	Maintain
A140	Golden Plover	<i>Pluvialis apricaria</i>	Maintain
A142	Lapwing	<i>Vanellus vanellus</i>	Maintain
A149	Dunlin	<i>Calidris alpina alpina</i>	Maintain
A156	Black-tailed Godwit	<i>Limosa limosa</i>	Maintain
A160	Curlew	<i>Numenius arquata</i>	Maintain
A179	Black-headed Gull	<i>Chroicocephalus ridibundus</i>	Maintain
A182	Common Gull	<i>Larus canus</i>	Maintain
A999	Wetlands		Maintain

Maintain = Maintain favourable conservation condition

Table 5. Special Conservation Interests (SCIs) for Clonakilty Bay SPA

Species code	Species	Scientific name	Conservation objective
A048	Shelduck	<i>Tadorna tadorna</i>	Maintain
A149	Dunlin	<i>Calidris alpina</i>	Maintain
A156	Black-tailed Godwit	<i>Limosa limosa</i>	Maintain
A160	Curlew	<i>Numenius arquata</i>	Maintain
A999	Wetland and Waterbirds		Maintain

Restore = Restore favourable conservation condition, Maintain = Restore favourable conservation condition

To acknowledge the importance of Ireland's wetlands to wintering waterbirds, "Wetland and Waterbirds" may be included as a SCI for some SPAs that have been designated for wintering waterbirds and that contain a wetland site of significant importance to one or more of the species of Special Conservation Interest. Thus, a further objective is to maintain or restore the favourable conservation condition of the wetland habitat within Courtmacsherry Bay SPA as a resource for the regularly-occurring migratory waterbirds that utilise these habitats.

4.10 Water Quality data - River Basin Management Plan for Ireland 2018 – 2021 (2nd Cycle)

The Water Framework Directive (WFD) sets out the environmental objectives which are required to be met through the process of river basin planning and implementation of those plans. Specific objectives are set out for surface water, groundwater and protected areas. The challenges that must be overcome in order to achieve those objectives are very significant.

Therefore, a key purpose of the River Basin Management Plan (RBMP) is to set out priorities and ensure that implementation is guided by these priorities.

The second-cycle RBMP aims to build on the progress made during the first cycle. Key measures during the first cycle included the licensing of urban waste-water discharges (with an associated investment in urban waste-water treatment) and the implementation of the Nitrates Action Programme (Good Agricultural Practice Regulations). The former measure has resulted in significant progress in terms both of compliance levels and of the impact of urban waste-water on water quality. The latter provides a considerable environmental baseline which all Irish farmers must achieve and has resulted in improving trends in the level of nitrates and phosphates in rivers and groundwater. It is acknowledged, however, that sufficient progress has not been made in developing and implementing supporting measures during the first cycle.

The third cycle River Basin Management Plan (draft) (2022-2027) was out for public consultation until March 31st 2022. In advance of drafting the third RBMP, the Department of Housing, Planning and Local Government ran a public consultation to identify key pressures or 'significant water management issues' (SWMIs) currently impacting water bodies in Ireland. The EPA's consultation closed on the 30th April 2022. The results discussed below refer to the RBMP 2nd Cycle as the full set of 3rd data have yet to be published.

Overall, RBMP assesses the quality of water in Ireland and presents detailed scientific characterisation of our water bodies. The characterisation process also takes into account wider water quality considerations, such as the special water-quality requirements of protected areas. The characterisation process identifies those water bodies that are *At Risk* of not meeting the objectives of the WFD, and the process also identifies the significant pressures causing this risk. Based on an assessment of risk and pressures, a programme of measures has been developed to address the identified pressures and work towards achieving the required objectives for water quality and protected areas. Data relating to the watercourses within the study area is provided in **Table 6** and the location of these shown in **Figure 5**.

Table 6. Water Framework Directive Data – Relevant data

Catchment: Bandon Ilen (HA 20) – 2 nd Cycle
<p>This catchment includes the area drained by the Rivers Bandon and Ilen and all streams entering tidal water between Templebreedy Battery and Mizen Head, Co. Cork, draining a total area of 1,803km². The largest urban centre in the catchment is Bandon. The other main urban centres in this catchment are Kinsale, Clonakilty, Skibbereen and Dunmanway. The total population of the catchment is approximately 71,211 with a population density of 39 people per km². Similarly to the surrounding Munster catchments, this catchment is dominated by east–west trending sandstone ridges. In this catchment the low lying parts are predominantly underlain by mudstones and the mountainous peninsular areas by old red sandstone.</p>
<p>The Bandon Ilen catchment comprises 17 sub-catchments with 87 river water bodies, six lakes, 25 transitional and coastal water bodies, and five groundwater bodies. There are no heavily modified or artificial water bodies in the Bandon Ilen Catchment.</p>
<p>There were 51 (55%) river and lake water bodies at Good or High status, and 9 (10%) at less than Good status in 2015. Thirty-three (35%) river water bodies are unassigned.</p>
<p>Eleven river water bodies and sites have a high ecological status objective. In 2015, seven (64%) of these water bodies were at High status, and four were at Good.</p>

Catchment: Bandon Ilen (HA 20) – 2nd Cycle

The proposed development site is located within the sub-catchment of EastCruary_SC_010. Within this sub-catchment Both East Cruary_010 and Barreragh_010 are unmonitored, and investigative monitoring is therefore required so as to determine whether any issue exist in these water bodies. All three waterbodies listed below are at risk due to agricultural pressures.

Sub-catchment East Cruary_SC_010

Waterbody	WFD Risk	WFD Status (2013-2018)	Pressures
East Cruary_010	Review	Moderate	Agriculture
Argideen Estuary	At Risk	Poor	Agricultural, Urban waste
Courtmacsherry Bay	Review	Good	Agriculture

Source: www.catchments.ie

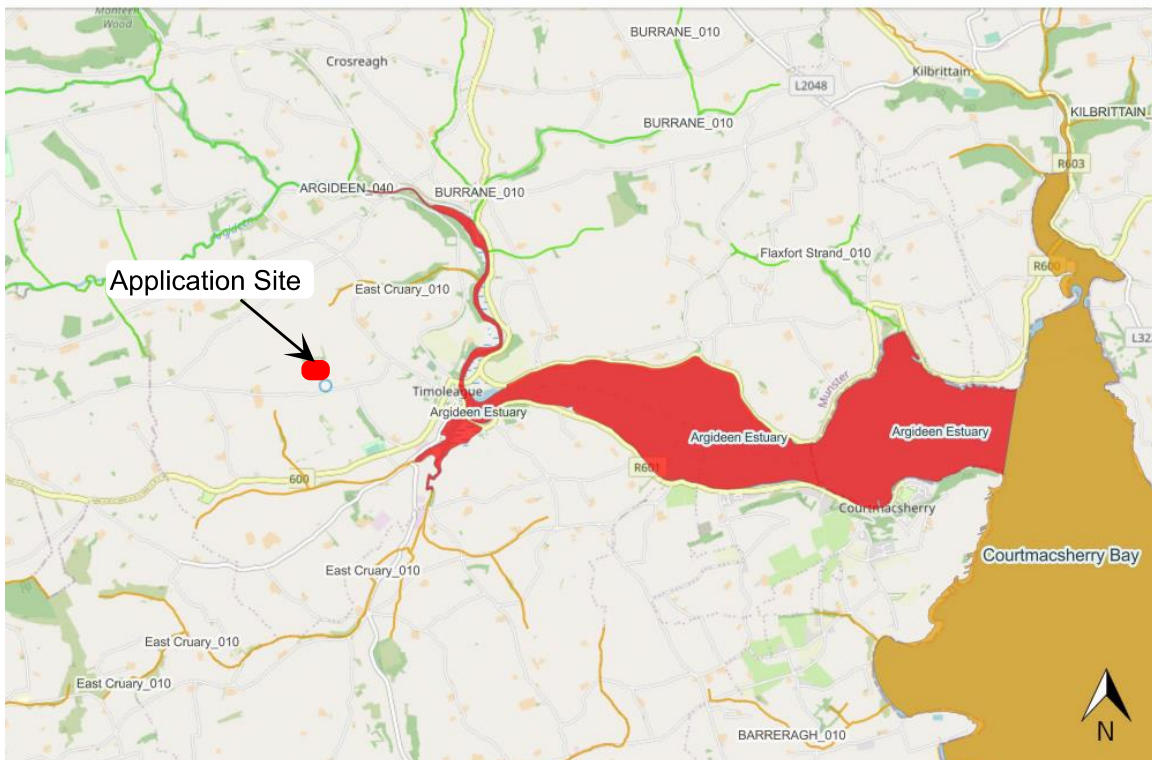


Figure 5. WFD waterbodies in the vicinity of the proposed development | Source: EPA Envision mapping <https://gis.epa.ie/EPAMaps/> | Not to scale

4.11 Potential Impacts

4.11.1 Potential impacts from loss of habitat

Any habitat loss of Natura 2000 sites or deterioration in habitat quality would reduce the extent of habitat available for QI/SCI species. This could potentially decrease the viability of existing QI habitats and increase the pressure on existing habitat and may result in further deterioration.

The application site is located within an existing agricultural facility. The development is not located within a designated site and the habitats recorded within the works area do not correspond to habitats listed on Annex I of the Habitats Directive or to qualifying habitats for the Courtmacsherry Estuary SAC or Clonakilty Bay SAC.

The lands used for landspreading of slurry is already intensively farmed and in receipt of landspread animal waste and fertilizer. No breeding habitat for species listed as qualifying interests for these Natura 2000 sites will be affected. No suitable roosting habitat for wading birds, which are SCI species for Courtmacsherry Bay SPA occurs in proximity to the development. Therefore, the proposed development will not result in any significant deterioration in habitat quality or loss of habitat within the Courtmacsherry Bay SPA.

Therefore, the proposed development will not result in any significant deterioration in habitat quality or loss of habitat within Clonakilty Bay SAC, Courtmacsherry Bay SAC and Courtmacsherry Bay SPA.

4.11.2 Potential impacts from noise and disturbance

Potentially increased noise and disturbance associated with the construction works could cause disturbance/displacement of fauna. If of sufficient severity, there could be impacts on reproductive success. Disturbance can cause sensitive species, such as birds, to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.

The potential effects and impacts of disturbance have been widely recognised in wildlife conservation legislation, as has the need to develop conservation measures for birds whilst taking human activities into account. Article 4.4 of the Bird's Directive (79/409/EEC) requires member states to *"take appropriate steps to avoid... any disturbances affecting the birds, in so far as these would be significant having regard to the objectives of this Article"*. This specifically relates to conservation measures concerning Annex I species.

The wintering birds listed as qualifying interests for the Courtmacsherry Bay SPA are strongly associated with estuarine shoreline areas or wetland, habitat types absent from the pig farm location. While the majority of wading birds forage across exposed tidal flats, species such as Lapwing and Golden Plover are considered to be 'terrestrial waders,' typically foraging across grassland. The lands used for landspreading of slurry is already intensively farmed and in receipt of land-spread animal waste and fertilizer and are subject to ongoing disturbance. While SCI birds could potentially roost or foraging within these grasslands there is nothing to differentiate the grasslands within the application site from similar habitat in the vicinity. Any birds which forage in in this area are already habituated to the disturbance created by agricultural activities and would be likely to continue to forage in this area during construction and operation of the development.

Therefore the proposed development will no impact on conservation interests of Courtmacsherry Bay SPA due to noise and disturbance.

4.11.3 Potential impacts on water quality

The operation of the farm will be carried out in accordance with S.I. 113 of 2022 European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2022. In addition, the operation and management of the pig facility will follow guidance contained in the JRC

Science for Policy Report Best Available Techniques (BAT) reference Document for the Intensive Rearing of Poultry or Pigs IED 2010/75/EU (Integrated Pollution Prevention and Control (Sanjonja *et al.*, 2017).

All uncontaminated surface waters from roofs and clean pavement areas is diverted away from the farmyard discharged to soakaways directly. All soiled water, slurry spillages, yard washings and any other contaminated run-off, arising in the yards and adjacent areas, etc are stored in onsite tanks. Waste water from staff facilities will be treated by the onsite septic tank. The system has been designed using the Code of Practice: Wastewater treatment and disposal-systems serving single houses (pe>10) (EPA, 2009) and relevant parts of *EN12566 Small wastewater treatment for up to 50pe (European committee for standardization, 2001-2013)*.

Slurry is currently stored under the animals in the buildings and there is sufficient capacity under the animals to store slurry for at least 12 weeks and in compliance with GAEC. All building work was carried out and completed in accordance with the Department of Agriculture & Food 'Specification for Bovine Livestock Units and Reinforced Tanks'. The slurry storage tank is fitted with a standard leak detection system.

The pig slurry produced at this farm is primarily (90%) delivered to an Anaerobic Digester located nearby which is operated by Timoleague AgriGen Ltd, under EPA Licence Reg No P0986-01. The remaining amount is used as a fertilizer for agricultural crops displacing chemical fertilizers.

Potential impacts on water quality and subsequently on aquatic habitats which can arise from this type of development relate primarily to increases nutrient levels from land spreading of animal waste. While slurry will only be spread on lands owned by Martin O'Donovan, lands are located within the Clonakilty area and Timoleague area. A number of qualifying habitats for the Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SAC and Clonakilty Bay SPA are potentially hydrologically connected to the development and could potentially be impacted by surface water runoff and therefore potential impacts on Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SAC and Clonakilty Bay SPA from changes in water quality have been screened in for further assessment.

4.11.4 Potential Impacts from Elevation Ammonia and Nitrogen

Atmospheric ammonia can adversely impact ecological environments through both dry deposition of ammonia itself and wet deposition of ammonium. A review paper published by Bobbink *et al.* (2010) has stated that nitrogen accumulation is the main driver of changes to species composition across the whole range of different ecosystem types. Nitrogen deposition causes a decline in species diversity, increased susceptibility to secondary stresses and altered soil processes. The deposition of atmospheric nitrogen can result in acidification and eutrophication of ecosystems; this is a significant consequence to ombrotrophic systems, such as heaths and bogs, because these systems are particularly susceptible to elevated nitrogen inputs (EPA, 2020). Further investigation is required to determine if ammonia and nitrogen emissions from the proposed development will impact on nearby Natura 2000 sites. Therefore, the impact on ammonia and nitrogen emissions on Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SPA and Clonakilty Bay SAC has been screened in for further assessment.

4.11.5 In-combination Impacts

In-combination (cumulative) impacts refer to a series of individual impacts that may, in combination, produce a significant effect. The underlying intention of this in-combination provision is to take account of in-combination impacts from existing or proposed plans and projects and these will often only occur over time.

The area surrounding the proposed development is dominated by agriculture, largely livestock or dairy farming, as well as one off housing and roads. Wastewater is discharged from surrounding settlements (e.g Timoleague, Courtmacsherry and industrial facilities. Further investigation is also required to determine if impacts on water quality will have an in-combination impact on qualifying interests for designated sites.

4.12 Screening of Relevant Natura 2000 Sites and Qualifying Interests/Special Conservation Interests

Potential impacts have been identified for the Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SAC and Clonakilty Bay SPA. Screening conclusions with regards to the qualifying species and habitats for relevant Natura 2000 sites are provided in **Table 7**. No significant effects on the conservation objectives of other Natura 2000 sites will occur. Sites/QIs/SCIs that are screened in for further assessment are highlighted in bold.

Table 7. Screening of relevant Natura 2000 sites

Natura 2000 Site	Qualifying Interest	Potential Impacts	Screened In/Out
Courtmacsherry Estuary SAC	Habitats 1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1220 Perennial vegetation of stony banks 1310 Salicornia and other annuals colonising mud and sand 1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) 1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>) 2110 Embryonic shifting dunes 2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)*	Given the proximity of the Courtmacsherry Estuary SAC, potential effects could occur due to impacts on water quality from landspreading of animal waste. Further investigation required to determine if increased ammonia concentration (levels) and nitrogen deposition (load) as a result of emissions to air from the operation of the pig farm could impact on habitats within this Natura 2000 site	Screened in
Courtmacsherry Bay SPA	Birds A149 Dunlin (<i>Calidris alpina</i>) A140 Golden Plover (<i>Pluvialis apricaria</i>) A160 Curlew (<i>Numenius arquata</i>) A069 Red-breasted Merganser (<i>Mergus serrator</i>) A003 Great Northern Diver (<i>Gavia immer</i>)	Given the proximity of the development site to the Courtmacsherry Bay SPA boundary, potential effects could occur due to landspreading of animal waste. Further investigation required to determine if increased ammonia concentration (levels) and nitrogen deposition (load) as a result of emissions to air from the operation of the pig farm could impact on habitats within this Natura 2000 site	Screened in

Natura 2000 Site	Qualifying Interest	Potential Impacts	Screened In/Out
	<p>A156 Black-tailed Godwit (<i>Limosa limosa</i>)</p> <p>A050 Wigeon (<i>Anas penelope</i>)</p> <p>A182 Common Gull (<i>Larus canus</i>)</p> <p>A157 Bar-tailed Godwit (<i>Limosa lapponica</i>)</p> <p>A179 Black-headed Gull (<i>Chroicocephalus ridibundus</i>)</p> <p>A048 Shelduck (<i>Tadorna tadorna</i>)</p> <p>A142 Lapwing (<i>Vanellus vanellus</i>)</p> <p>Habitats</p> <p>Wetlands</p>		
Clonakilty Bay SPA	<p>Birds</p> <p>A149 Dunlin (<i>Calidris alpina</i>)</p> <p>A140 Golden Plover (<i>Pluvialis apricaria</i>)</p> <p>A160 Curlew (<i>Numenius arquata</i>)</p> <p>A069 Red-breasted Merganser (<i>Mergus serrator</i>)</p> <p>A003 Great Northern Diver (<i>Gavia immer</i>)</p> <p>A156 Black-tailed Godwit (<i>Limosa limosa</i>)</p> <p>A050 Wigeon (<i>Anas penelope</i>)</p> <p>A182 Common Gull (<i>Larus canus</i>)</p> <p>A157 Bar-tailed Godwit (<i>Limosa lapponica</i>)</p>	<p>Given the proximity of the Clonakilty Bay SPA, potential effects could occur due to impacts on water quality from landspreading of animal waste.</p> <p>The proposed development site does not provide any suitable <i>ex situ</i> foraging habitat and no disturbance impacts have been identified.</p> <p>Further investigation required to determine if increased ammonia concentration (levels) and nitrogen deposition (load) as a result of emissions to air from the operation of the</p>	Screened in

Natura 2000 Site	Qualifying Interest	Potential Impacts	Screened In/Out
	<p>A179 Black-headed Gull (<i>Chroicocephalus ridibundus</i>)</p> <p>A048 Shelduck (<i>Tadorna tadorna</i>)</p> <p>A142 Lapwing (<i>Vanellus vanellus</i>)</p> <p>Habitats</p> <p>Wetlands</p>	<p>pig farm could impact on habitats within this Natura 2000 site</p>	
<p>Clonakilty Bay SAC</p>	<p>Habitats</p> <p>1140 Mudflats and sandflats not covered by seawater at low tide</p> <p>1210 Annual vegetation of drift lines</p> <p>2110 Embryonic shifting dunes</p> <p>2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)</p> <p>2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)*</p> <p>2150 Atlantic decalcified fixed dunes (<i>Calluno-Ulicetea</i>)*</p>	<p>Given the proximity of the Clonakilty Bay SAC, potential effects could occur due to impacts on water quality from landspreading of animal waste.</p> <p>Further investigation required to determine if increased ammonia concentration (levels) and nitrogen deposition (load) as a result of emissions to air from the operation of the pig farm could impact on habitats within this Natura 2000 site</p>	<p>Screened in</p>

4.13 Screening conclusion and statement

The aims of this screening section of this report were as follows:

- Determine whether the proposed development, alone or in combination with other projects, is likely to have significant effects on Natura 2000 sites in view of their conservation objectives.
- Provide information on and assess the potential for the proposed development to significantly impact on Natura 2000 Sites (also known as European sites).
- Determine whether the proposed development is directly connected with, or necessary to the conservation management of any Natura 2000 sites.

It has been objectively concluded that:

- The proposed development is not directly connected with, or necessary to the conservation management of any Natura 2000 sites.
- On the basis of objective information, the possibility of significant effects from the proposed development on European sites cannot be ruled out. There is potential for the proposed development to significantly impact the Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SAC and Clonakilty Bay SPA via impacts on water quality and air emissions.
- The proposed development, alone or in combination with other projects could potentially impact on the conservation objectives of Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SAC and Clonakilty Bay SP

On the basis of objective information and in view of best scientific knowledge, the possibility of significant effects from the proposed project on European sites, cannot be ruled out and therefore an Appropriate Assessment is required.

The NIS has been prepared to inform and assist the EPA, to assess, in view of best scientific knowledge, if the proposed development, individually or in combination with another plan or project is likely to have a significant effect on the European site.

5. Natura Impact Statement (NIS)

5.1 Introduction

This NIS now examines and analyses, in light of the best scientific knowledge, with respect to this Natura 2000 site within the zone of influence of the proposed development, the potential effect sources and pathways, how these could impact on the SCI species and whether the predicted effects would adversely affect the integrity of the Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SAC and Clonakilty Bay SPA.

5.2 Status of qualifying interests for the Courtmacsherry Estuary SAC and Clonakilty Bay SAC

5.2.1 Estuaries

The Courtmacsherry Estuary SAC is designated for Estuaries. The habitat Estuaries [1130] defined by the Interpretation Manual of European Union Habitats - EUR28 as follows;

“Downstream part of a river valley, subject to the tide and extending from the limit of brackish waters. River estuaries are coastal inlets where, unlike 'large shallow inlets and bays' there is generally a substantial freshwater influence. The mixing of freshwater and sea water and the reduced current flows in the shelter of the estuary lead to deposition of fine sediments, often forming extensive intertidal sand and mud flats. Where the tidal currents are faster than flood tides, most sediments deposit to form a delta at the mouth of the estuary.”

Estuaries are habitat complexes which comprise an interdependent mosaic of subtidal and intertidal habitats, which are closely associated with surrounding terrestrial habitats. Many of these habitats, such as Mudflats and sandflats not covered by sea water at low tide [1140], saltmarshes, Sandbanks which are slightly covered by sea water all the time [1110] and Reefs [1170], are identified as Annex I habitat types in their own right. Estuaries are considered to be the transitional water body area as defined by the EPA under the Water Framework Directive.

The overall conservation objective for Estuaries [1130] in the Courtmacsherry Estuary SAC is to maintain a favourable conservation condition.

Table 8. Specific conservation objectives for Estuaries within Courtmacsherry Estuary SAC

Attribute	Measure	Target
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes
Community distribution	Hectares	Conserve the following community types in a natural condition: Sandy mud to mixed sediments with <i>Tubificoides benedii</i> and <i>Hediste diversicolor</i> community complex; Sand to mixed sediment with oligochaetes community complex; Sand with <i>Nephtys cirrosa</i> community complex

5.2.2 Mudflats and sandflats not covered by seawater at low tide

The Courtmacsherry Estuary SAC and Clonakilty Bay SAC are designated for the marine Annex I qualifying interest Mudflats and sandflats not covered by seawater at low tide. The Interpretation Manual of European Union Habitats - EUR28 defines the habitat as ‘*Sands and muds of the coasts of the oceans, their connected seas and associated lagoons, not covered by sea water at low tide, devoid of vascular plants, usually coated by blue algae and diatoms. They are of particular importance as feeding grounds for wildfowl and waders. The diverse intertidal communities of invertebrates and algae that occupy them can be used to define subdivisions of 11.27, eelgrass communities that may be exposed for a few hours in the course of every tide have been listed under 11.3, brackish water vegetation of permanent pools by use of those of 11.4.*’

This Annex I habitat occurs intertidally between the mean low water mark (MLWM) and the mean high-water mark (HMWM), its seaward boundary is defined by the Ordnance Survey mean low water boundary.

The overall conservation objectives for Mudflats and sandflats not covered by seawater at low tide in Courtmacsherry Estuary SAC and Clonakilty Bay SAC (**Table 9**) is to maintain a favourable conservation condition.

Table 9. Specific conservation objectives for Mudflats and sandflats not covered by seawater at low tide Courtmacsherry Estuary SAC and Clonakilty Bay SAC

Attribute	Measure	Target
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes
Community distribution	Hectares	Conserve the following community types in a natural condition: Sandy mud to mixed sediments with <i>Tubificoides benedii</i> and <i>Hediste diversicolor</i> community complex; Sand to mixed sediment with oligochaetes community complex; Sand with <i>Nephtys cirrosa</i> community complex

5.2.3 Salicornia and other annuals colonising mud and sandflats

The Courtmacsherry Estuary SAC is designated for Salicornia and other annuals colonising mud and sandflats. This pioneer saltmarsh vegetation colonises intertidal mud and sandflats in areas protected from strong wave action and is an important precursor to the development of more stable saltmarsh vegetation. It develops at the lower reaches of saltmarshes where the vegetation is frequently flooded by the tide, and can also colonise open creek sides, depressions or pans within saltmarshes, as well as disturbed areas of upper saltmarshes.

The overall objective for ‘*Salicornia* and other annuals colonising mud and sand’ in the Courtmacsherry Estuary SAC is to restore the favourable conservation condition.

Table 10. Specific Conservation Objectives for Salicornia and other annuals colonising mud and sandflats for Courtmacsherry Estuary SAC

Attribute	Measure	Target
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For the one sub- site mapped: Harbour view – 1.18ha
Habitat distribution	Occurrence	No decline, subject to natural processes
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain or where necessary restore natural circulation of sediments and organic matter, without any physical obstructions
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime

Attribute	Measure	Target
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession
Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward
Vegetation structure: vegetation cover.	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub- communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009).
Vegetation structure: negative indicator species: <i>Spartina anglica</i>	Hectares	No significant expansion of <i>Spartina</i> . No new sites for this species and an annual spread of less than 1% where it is

5.2.4 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) and Mediterranean salt meadows (*Juncetalia maritimi*)

The Courtmacsherry Estuary SAC is designated for Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) and Mediterranean salt meadows (*Juncetalia maritimi*). Saltmarshes are stands of vegetation that occur along sheltered coasts, mainly on mud or sand, and are flooded periodically by the sea. They are restricted to the area between mid-neap tide level and high-water spring tide level. Both Atlantic and Mediterranean salt meadows occur within the Courtmacsherry Estuary SAC.

The overall conservation objective for Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in the Courtmacsherry Estuary SAC is to restore a favourable conservation condition. The overall conservation objective for Mediterranean salt meadows (*Juncetalia maritimi*) in the Courtmacsherry Estuary SAC is to maintain a favourable conservation condition.

Table 11. Specific Conservation Objectives for Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) and Mediterranean salt meadows (*Juncetalia maritimi*) within Courtmacsherry Estuary SAC

Attribute	Measure	Target
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. ASM - For sub-sites mapped: <ul style="list-style-type: none"> • Harbour view 10.79ha MSM - For sub-sites mapped: <ul style="list-style-type: none"> • Harbour View 3.45ha
Habitat distribution	Occurrence	No decline, subject to natural processes
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain or where necessary restore natural circulation of sediments and organic matter, without any physical obstructions
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession
Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward
Vegetation structure: vegetation cover.	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub- communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009).
Vegetation structure: negative indicator species: <i>Spartina anglica</i>	Hectares	No significant expansion of <i>Spartina</i> . No new sites for this species and an annual spread of less than 1% where it is already known to occur

5.2.5 Annual vegetation of drift lines [1210],

The Courtmacsherry Estuary SAC and Clonakilty Bay SAC are designated for annual vegetation on drift lines. The habitat Annual vegetation of drift lines [1210] defined by the Interpretation Manual of European Union Habitats - EUR28 as follows; Formations of annuals or representatives of annuals and perennials, occupying accumulations of drift material and gravel rich in nitrogenous organic matter (*Cakiletea maritima* p.). The overall conservation objective for Annual vegetation of drift lines in the Courtmacsherry Estuary SAC and Clonakilty Bay SAC is to maintain a favourable conservation condition.

Table 12. Conservation Objectives for Annual vegetation of drift lines Courtmacsherry Estuary SAC and Clonakilty Bay SAC

Attribute	Measure	Target
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: <ul style="list-style-type: none"> Harbour View - 0.65ha (Courtmacsherry Estuary SAC)
Habitat distribution	Occurrence	No decline, subject to natural processes
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and Succession
Vegetation composition: plant health of foredune grasses	Percentage cover	More than 95% of sand couch grass (<i>Elytrigia juncea</i>) and/or lyme grass (<i>Leymus arenarius</i>) should be healthy (i.e. green plant parts above ground and flowering heads present)
Vegetation composition: typical species and subcommunities	Percentage cover	Maintain the presence of species-poor communities with typical species: sand couch grass (<i>Elytrigia juncea</i>) and/or lyme grass (<i>Leymus arenarius</i>)
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover

5.2.6 Embryonic shifting dunes [2110],

The Courtmacsherry Estuary SAC and Clonakilty Bay SAC are designated for embryonic shifting dunes. The habitat Embryonic shifting dunes [2110] is defined by the Interpretation Manual of European Union Habitats - EUR28 as follows; Formations of the coast representing the first stages of dune construction, constituted by ripples or raised sand surfaces of the upper beach or by a seaward fringe at the foot of the tall dunes. The overall conservation

objective for Embryonic Shifting Dunes in the Courtmacsherry Estuary SAC and Clonakilty Bay SAC is to maintain a favourable conservation condition.

Table 13. Conservation Objectives for Embryonic shifting dunes [2110] Courtmacsherry Estuary SAC and Clonakilty Bay SAC

Attribute	Measure	Target
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: <ul style="list-style-type: none"> • Harbour View - 0.65ha (Courtmacsherry Estuary SAC) • Inchydoney - 1.62ha (Clonakilty Bay SAC).
Habitat distribution	Occurrence	No decline, subject to natural processes
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and Succession
Vegetation composition: plant health of foredune grasses	Percentage cover	More than 95% of sand couch grass (<i>Elytrigia juncea</i>) and/or lyme grass (<i>Leymus arenarius</i>) should be healthy (i.e. green plant parts above ground and flowering heads present)
Vegetation composition: typical species and subcommunities	Percentage cover	Maintain the presence of species-poor communities with typical species: sand couch grass (<i>Elytrigia juncea</i>) and/or lyme grass (<i>Leymus arenarius</i>)
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover

5.2.7 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]

The Courtmacsherry Estuary SAC and Clonakilty Bay SAC are designated for Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes). The habitat Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] is defined by the Interpretation Manual of European Union Habitats - EUR28 as follows; Mobile dunes forming the seaward cordon or cordons of dune systems of the coasts. The overall conservation objective for Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) in the Courtmacsherry Estuary SAC and Clonakilty Bay SAC is to maintain a favourable conservation condition.

Table 13. Conservation Objectives for Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) Courtmacsherry Estuary SAC and Clonakilty Bay SAC

Attribute	Measure	Target
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: <ul style="list-style-type: none"> • Harbour View - 0.41ha (Courtmacsherry Estuary SAC) • Inchidoney 0.72 ha (Clonakilty Bay SAC)
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation composition: plant health of foredune grasses	Percentage cover	More than 95% of marram grass (<i>Ammophila arenaria</i>) and/or lymegrass (<i>Leymus arenarius</i>) should be healthy (i.e. green plant parts above ground and flowering heads present)
Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities dominated by marram grass (<i>Ammophila arenaria</i>) and/or lymegrass (<i>Leymus arenarius</i>)
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover

5.2.8 Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]

The Courtmacsherry Estuary SAC and Clonakilty Bay SAC are designated for Fixed coastal dunes with herbaceous vegetation (grey dunes). The habitat Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] is defined by the Interpretation Manual of European Union Habitats - EUR28 as follows; Fixed dunes, stabilised and colonised by more or less closed perennial grasslands and abundant carpets of lichens and mosses, from the Atlantic coasts (and the English Channel) between the Straits of Gibraltar and Cap Blanc Nez, and the shores of the North Sea and the Baltic. The overall conservation objective for Fixed coastal dunes with herbaceous vegetation (grey dunes) in the Courtmacsherry Estuary SAC is to maintain a favourable conservation condition and in Clonakilty Bay SAC is to restore a favourable conservation condition.

Table 14. Conservation Objectives for Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Courtmacsherry Estuary SAC and Clonakilty Bay SAC

Attribute	Measure	Target
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: <ul style="list-style-type: none"> • Harbour View – 4.31 1ha. (Courmacsherry Estuary SAC) • Inchidoney 6.3 ha (Clonakilty Bay SAC)
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 10% of fixed dune habitat, subject to natural processes
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward
Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain range of subcommunities with typical species listed in Ryle et al. (2009)
Vegetation composition: negative indicator species (including Hippophae rhamnoides)	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover
Vegetation composition: negative indicator species (including Hippophae rhamnoides)	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover
Vegetation composition: scrub/trees	Percentage cover	No more than 5% cover or under control

5.2.9 Atlantic decalcified fixed dunes (Calluno-Ulicetea) 2150

The overall conservation objective for Atlantic decalcified fixed dunes (Calluno-Ulicetea) 2150 in the Clonakilty Bay SAC is to maintain a favourable conservation condition.

Table 15. Conservation Objectives for Atlantic decalcified fixed dunes (Calluno-Ulicetea) 2150 Clonakilty Bay SAC

Attribute	Measure	Target
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession.
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 10% of fixed dune habitat, subject to natural processes
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward
Vegetation composition: typical species and subcommunities	Percentage cover at a representative number of monitoring stops	Maintain range of subcommunities with typical species listed in Ryle et al. (2009)
Vegetation composition: negative indicator species (including Hippophae rhamnoides)	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover
Vegetation composition: negative indicator species (including Hippophae rhamnoides)	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover
Vegetation composition: scrub/trees	Percentage cover	No more than 5% cover or under control

5.3 Status of Qualifying Species in Courtmacsherry Bay SPA

The Special Conservation Interests listed for Courtmacsherry Bay SPA are as follows:

1. During winter the site regularly supports 1% or more of the all-Ireland population of Shelduck (*Tadorna tadorna*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 175 individuals.
2. During winter the site regularly supports 1% or more of the all-Ireland population of Wigeon (*Anas penelope*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 934 individuals.

3. During winter the site regularly supports 1% or more of the all-Ireland population of Red-breasted Merganser (*Mergus serrator*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 63 individuals.
4. During winter the site regularly supports 1% or more of the all-Ireland population of Great Northern Diver (*Gavia immer*). The mean peak number of this Annex I species within the SPA during the baseline period (1995/96 – 1999/00) was 27 individuals.
5. During winter the site regularly supports 1% or more of the all-Ireland population of Golden Plover (*Pluvialis apricaria*). The mean peak number of this Annex I species within the SPA during the baseline period (1995/96 – 1999/00) was 5,759 individuals.
6. During winter the site regularly supports 1% or more of the all-Ireland population of Lapwing (*Vanellus vanellus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,713 individuals.
7. During winter the site regularly supports 1% or more of the all-Ireland population of Dunlin (*Calidris alpina*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,353 individuals.
8. During winter the site regularly supports 1% or more of the biogeographical population of Black-tailed Godwit (*Limosa limosa*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 506 individuals.
9. During winter the site regularly supports 1% or more of the biogeographical population of Bar-tailed Godwit (*Limosa lapponica*). The mean peak number of this Annex I species within the SPA during the baseline period (1995/96 – 1999/00) was 182 individuals.
10. During winter the site regularly supports 1% or more of the all-Ireland population of Curlew (*Numenius arquata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,357 individuals.
11. During winter the site regularly supports 1% or more of the biogeographical population of Black-headed Gull (*Chroicocephalus ridibundus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,727 individuals.
12. During winter the site regularly supports 1% or more of the biogeographical population of Common Gull (*Larus canus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,226 individuals.
13. The wetland habitats contained within Courtmacsherry Bay SPA are identified of conservation importance for non-breeding (wintering) migratory waterbirds. Therefore the wetland habitats are considered to be an additional Special Conservation Interest.

Table 16. Specific conservation objectives for SCI species/habitats for Courtmacsherry Bay SPA

Species/Habitats	Attribute	Measure	Target
A003 Great Northern Diver <i>Gavia immer</i> A048 Shelduck <i>Tadorna tadorna</i> A050 Wigeon <i>Anas penelope</i> A069 Red-breasted Merganser <i>Mergus serrator</i>	Population trend	Percentage change	Long term population trend stable or increasing
A140 Golden Plover <i>Pluvialis apricaria</i> A142 Lapwing <i>Vanellus vanellus</i> A149 Dunlin <i>Calidris alpina alpina</i> A156 Black-tailed Godwit <i>Limosa limosa</i> A157 Bar-tailed Godwit <i>Limosa lapponica</i> A160 Curlew <i>Numenius arquata</i> A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> A182 Common Gull <i>Larus canus</i>	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by each species, other than that occurring from natural patterns of variation
Wetlands	Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 2,587 hectares, other than that occurring from natural patterns of variation

5.4. Status of qualifying species for the Clonakilty Bay SPA

The reasoning behind these species being listed as Special Conservation Interests of the Clonakilty Bay SPA is as follows:

During winter the site regularly supports 1% or more of the all-Ireland population of Shelduck (*Tadorna tadorna*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1998/99) was 156 individuals.

During winter the site regularly supports 1% or more of the all-Ireland population of Dunlin (*Calidris alpina*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1998/99) was 1,172 individuals.

During winter the site regularly supports 1% or more of the biogeographical population of Black-tailed Godwit (*Limosa limosa*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1998/99) was 874 individuals.

During winter the site regularly supports 1% or more of the all-Ireland population of Curlew (*Numenius arquata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1998/99) was 599 individuals.

In addition, the wetland habitats contained within Clonakilty Bay SPA are identified of conservation importance for non-breeding (wintering) migratory waterbirds. Therefore, the wetland habitats are considered to be an additional Special Conservation Interest.

The specific conservation objectives for species listed as conservation interests for the Clonakilty Bay SPA (**Table 17**) are to maintain a favourable conservation condition of the non-breeding waterbird and to maintain the favourable conservation condition of the wetland habitat at Clonakilty Bay SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.

Table 17. QI species for which a potential impact has been identified – specific targets

Species/Habitats	Attribute	Measure	Target
Shelduck (<i>Tadorna tadorna</i>) [A048] Dunlin (<i>Calidris alpina</i>) [A149] Black-tailed Godwit (<i>Limosa limosa</i>) [A156]	Population trend	Percentage change as per population trend assessment using waterbird count data collected through the Irish Wetland Bird Survey and other surveys.	The long-term population trend should be stable or increasing
Curlew (<i>Numenius arquata</i>) [A160]	Distribution	Range, timing or intensity of use of areas used by waterbirds, as determined by regular low tide and other waterbird surveys.	There should be no significant decrease in the range, timing or intensity of use of areas by the waterbird species of Special Conservation Interest other than that occurring from natural patterns of variation
Wetlands	Habitat	Area (ha)	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 508 ha, other than that occurring from natural patterns of variation.

6. Assessment of Potential Impacts

All potential impacts would relate to direct and indirect impacts to relevant habitats and fauna of the Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SAC and Clonakilty Bay SPA. The assessment of impacts is based on the EC (2018) *Managing Natura 2000 Sites: The Provision of Article 6 of the Habitats Directive 92/43/EEC*, professional judgement and criteria or standards where available.

The potential impacts associated with the development are discussed in the following section with respect to their likelihood to have had or to have significant impacts on Natura 2000 sites. As part of the assessment direct, indirect and cumulative impacts were considered. Direct impacts refer to habitat loss or fragmentation arising from land-take requirements for development. Indirect and secondary impacts do not have a straight-line route between cause and effect, and it is potentially more challenging to ensure that all the possible indirect impacts of the project/plan – in combination with other plans and projects have been established.

As part of the assessment the potential for impacts associated with the development were reviewed as outlined below:

- Impacts from surface water runoff
- Impacts from air quality impacts
- In-combination impacts

6.1 Impacts from surface water run-off

The pig slurry produced at this farm is primarily (90%) delivered to an Anaerobic Digester located nearby which is operated by Timoleague AgriGen Ltd, under EPA Licence Reg No P0986-01. The remaining amount is used as a fertilizer for agricultural crops displacing chemical fertilizers. During landspreading, surface water runoff from agricultural lands could potentially flow local watercourses/waterbodies, and impact on water quality within Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SAC and Clonakilty Bay SPA.

Although a natural component of shallow estuarine communities, macroalgal mats of species such as *Ulva spp* are considered a consequence of organic enrichment when they occur in excessive amounts. Algal mats can have both negative and positive effects upon waterbird foraging ecology; some species avoiding them or being negatively affected by lowered invertebrate abundances beneath them i.e. wading species (NPWS, 2014).

Wading birds will generally avoid areas with algal mat growth (Cabral *et al.*, 1999). Some individual may forage within these algal mats to predate fauna within the algae but long-term studies have shown these prey sources were not utilised to any great extent (Lewis, 2003). Studies have shown there is a shift in shorebird distributions towards areas less affected by macro-algal mats (Raffaelli, 1999). Avoidance of algal covered areas therefore amounts to habitat loss. Foraging distribution is related to the amount of algal cover and thus lower prey densities (Lewis, 2003). Algal mats negatively affect the foraging success of species like Black-tail Godwit but this is mitigated to some extent by macroinvertebrates recolonising

previously covered algal mat areas during mid to late winter. Macroalgal mats have been linked to declines in Dunlin within estuaries (Lopes *et al.*, 2006).

It is noted that the robust nature of the estuarine habitats listed as qualifying habitats for the Courtmacsherry Estuary SAC (Estuaries [1130], Mudflats and sandflats not covered by seawater at low tide [1140], Salicornia and other annuals colonising mud and sand [1310], Atlantic salt meadows (*Glaucopuccinellietalia maritima*) [1330] and Mediterranean salt meadows (*Juncetalia maritimi*) [1410]) means that impacts are only likely to arise due to significant water quality impacts.

All pig slurry will be landspread by the applicant in compliance with the S.I. 113 of 2022 according to spreadland agreements. The agreements will take into account nutrient management plans prepared in respect of each farm.

Under the Good Agricultural Practice for the Protection of Waters Regulations (S.I. 113 of 2022) (commonly known as the Nitrates Regulations) farmers must not apply more than 170kg of nitrogen from livestock manure per hectare per year. Compliance with the Nitrates Regulations is one of the Statutory Management Requirements under the Single Payment Scheme. The purpose of these Regulations is to give effect to Ireland's Nitrates Action Programme for the protection of waters against pollution caused by agricultural sources. The set of measures in these regulations provides a basic level of protection against possible adverse impacts to waters arising from the agricultural expansion targets set under Food Harvest 2020.

The regulations set out:

- Periods when land application of fertilisers is prohibited
- Limits on the land application of fertilisers
- Storage requirements for livestock manure, and
- Monitoring of the effectiveness of the measures in terms of agricultural practice and impact on water quality.

The Regulations give further effect to several EU Directives including Directives in relation to protection of waters against pollution from agricultural sources ("the Nitrates Directive"), dangerous substances in water, waste management, protection of groundwater, public participation in policy development and water policy (the Water Framework Directive).

It is a condition of planning that no slurry/manure is spread within 200m of any source of potable water supply or within 50m of any ditch, stream, river or other waters.

As noted previously, 90% of pig slurry will be exported from the site for use in a local anaerobic digester. The remaining 10% of slurry produced will be spread in accordance with the Nitrates Directive. No agricultural inputs to local watercourses are predicted to occur following the design/management measures described above and no significant impact on the integrity of Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SAC and Clonakilty Bay SPA are predicted to occur as a result of the proposed development.

6.2 Potential impacts of elevated ammonia and nitrogen

Atmospheric ammonia can adversely impact ecological environments through both dry deposition of ammonia itself and wet deposition of ammonium. A review paper published by Bobbink *et al.* (2010) has stated that nitrogen accumulation is the main driver of changes to species composition across the whole range of different ecosystem types. Nitrogen deposition causes a decline in species diversity, increased susceptibility to secondary stresses and altered soil processes. The deposition of atmospheric nitrogen can result in acidification and eutrophication of ecosystems; this is a significant consequence to ombrotrophic systems, such as heaths and bogs, because these systems are particularly susceptible to elevated nitrogen inputs (EPA, 2020).

Although impacts of atmospheric nitrogen deposition on Natura 2000 sites are primarily considered to be secondary by reducing suitable habitats available, they can influence the conservation objectives for that site. Direct impacts on habitats and species, in particular those with lichen and moss communities, are a more palpable threat (EPA, 2020).

6.2.1 Critical levels of ammonia

A critical level is defined as '*the concentration in the atmosphere above which direct adverse effects on receptors, such as plants, ecosystems or materials, may occur according to present knowledge*' (EPA, 2020). Critical levels have historically been set to cover multiple time periods, including hourly, daily, monthly, and annually. The use of annual critical levels has been recommended primarily due to the significance of long-term impacts over short-term impacts (Hayes *et al.*, 2017). The United Nations Economic Commission for Europe (UNECE) currently recommends the use of annual critical levels of 1 and 3 $\mu\text{gNH}_3 \text{ m}^3$, depending on species sensitivity (UNECE, 2007).

The acidification and eutrophication of ecosystems caused by the deposition of atmospheric ammonia is of consequence to all habitats, but more so to sensitive habitats and species, such as heaths, bogs and calcareous grasslands.

According to Cape *et al.* (2009), a critical level of 1 $\mu\text{gNH}_3 \text{ m}^3$ is intended to protect habitats where lichens or bryophytes form a key part of the ecosystem. For example, this critical level can be applied to habitats such as bogs, where sphagnum mosses act as "ecosystem engineers" or Atlantic oak woodlands, where lichens form extensive epiphytic communities (EPA, 2020). A critical level for higher plants was selected based on expert judgement and was set at 3 $\mu\text{gNH}_3 \text{ m}^3$, presuming uncertainty within the range of 2-4 $\mu\text{gNH}_3 \text{ m}^3$ (EPA, 2020). This decision was primarily based on an English study in which impacts on woodland ground flora were not observed at concentrations greater than 4 $\mu\text{gNH}_3 \text{ m}^3$ (Pitcairn *et al.*, 2006) and the no-effect concentration for *Caluna vulgaris* at 2 $\mu\text{gNH}_3 \text{ m}^3$ (Sheppard *et al.*, 2009).

In a UK study by Jones *et al.* (2013) – which showed that dune grassland species utilised ammonia as a nutrient source – the ammonia emissions from an intensive poultry unit (12 houses, 160,000–180,000 bird capacity) were detected up to 2.8km upwind, contributing to exceedance of the lower critical level of 1 $\mu\text{g m}^{-3}$ of ammonia within 800m and an exceedance of critical loads of nitrogen 2.8km upwind. This highlights that impacts are not restricted to areas downwind of such intensive hotspots. Studies have shown impacts from atmospheric ammonia on a number of different habitat types, including woodlands, grasslands, bogs and uplands (Sutton *et al.*, 2011; Henry and Aherne, 2014; Wilkins *et al.*, 2016; Stiles *et al.*, 2017).

Downwind of a poultry farm in Northern Ireland, epiphytic lichens on trees were replaced with a green algal slime, in addition to algal growth over decaying peat moss (Sphagnum) leading to its eventual decay and loss from site and also bleaching of reindeer lichen (*Cladonia* spp.) (Sutton, 2007; Sutton *et al.*, 2011). Atmospheric deposition of nitrogen also contributes to eutrophication of estuarine waters and acidification of lakes and streams.

Further detail on critical levels of ammonia is included in **Appendix 2 Ammonia Assessment – Carhue Piggeries Farm, Timoleague, Co. Cork Prepared for: Carhue Piggeries Limited.**

6.2.2 Critical loads of nitrogen

A critical load is defined as “a quantitative estimate of deposition of one or more pollutants below which significant harmful effects on specified elements of the environment do not occur according to present knowledge” (EPA, 2020). Critical loads refer to total nitrogen deposited from the air, whereas critical levels refer only to atmospheric concentrations of ammonia. Critical loads require calculations to be carried out using the ammonia concentrations present. The dry deposition flux of ammonia is calculated by multiplying the relevant deposition velocity (m/s) by the predicted concentration of ammonia ($\mu\text{g}/\text{m}^3$). The dry deposition is then multiplied by the conversion factor, as provided by Air Quality Technical Advisory Group (AQTAG06) guidance, to convert the levels into $\text{Kg N ha}^{-1} \text{ year}^{-1}$.

Within Courtmacsherry Estuary SAC and Clonakilty Bay SAC habitats which have been identified as potentially sensitive to nitrogen deposition are 2110 Embryonic shifting dunes, 2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) and 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)* and 2150 Atlantic decalcified fixed dunes (Calluno-Ulicetea).

Critical load values for nutrient nitrogen deposition are provided by the UNECE as a range (e.g., 10-20 $\text{Kg N ha}^{-1} \text{ year}^{-1}$ for dry heaths). This guidance recommends a critical load of 20 $\text{Kg N ha}^{-1} \text{ year}^{-1}$ for mid-upper saltmarshes and 30 $\text{Kg N ha}^{-1} \text{ year}^{-1}$ pioneer and low-mid salt marshes. Dunes have a lower threshold of between 8-1020 $\text{Kg N ha}^{-1} \text{ year}^{-1}$. UNECE have not published specific criteria for estuarine or mudflat habitats. However, Kelleghan *et al* (2022) recommend a critical load for estuaries of 20-30 $\text{Kg N ha}^{-1} \text{ year}^{-1}$.

6.2.3 Ammonia/Nitrogen Emissions Assessment for Application Site

Air emission modelling for the proposed development was carried out by Katestone to determine concentrations of ammonia and deposition rates of nitrogen from the pig farm in combination with background levels at ecologically sensitive locations near the site. The methodology was based on a dispersion modelling study incorporating source characteristics and operational activity data of the pig farm and other intensive pig and poultry developments with meteorological data that is representative of the site and surrounding region. The dispersion modelling assessment has been prepared in accordance with industry standards, regulatory requirements and best practice approaches.

The assessment methodology included:

- Determination of the locations and emission characteristics of intensive pig and poultry farms within the dispersion model domain.

- Derivation of an emissions inventory based on its design and data from the literature for:
 - o The pig farm
 - o Other intensive pig and poultry sources of ammonia emissions within 20 km of the pig farm.
- Generation of a representative meteorological dataset using prognostic meteorological modelling techniques.
- Characterisation of meteorological conditions in the region using prognostic meteorological data.
- Dispersion modelling using the regulatory dispersion model, CALPUFF, to predict ground-level concentrations of ammonia and nitrogen deposition:
 - o At sensitive receptor locations
 - o Across a cartesian grid that covers the modelling domain.

Deposition flux rates of nitrogen at sensitive receptors were estimated based on the predicted concentrations of ammonia across the modelled domain and using the following calculation methodology that is described in AG4:

The critical loads in ecologically sensitive areas such as SPAs, SACs and NHAs can be determined using the methodology outlined in the UK publication “AQTAG06 – Technical Guidance on Detailed Modelling Approach For An Appropriate Assessment For Emissions To Air” (Environment Agency, 2014)(64) . The approach is based on using the maximum annual average ground level concentration within the ecologically sensitive area and converting this concentration into a deposition flux based on a chemical species specific deposition velocity (m/s).

The sensitive receptors included in the dispersion modelling assessment are at ecologically sensitive locations on Natura 2000 sites. The locations were determined in conjunction with the DixonBrosnan. The sensitive receptor locations included in the dispersion modelling assessment are at points on Natura 2000 sites and at woodlands including:

- Courtmacsherry Estuary SAC (DR1 TO DR 52)
- Courtmacsherry Bay SPA (DR1 TO DR 52)
- Seven Heads SPA (53 TO 57)
- Clonakilty Bay SAC (58 TO 69)
- Clonakilty Bay SPA (58 TO 69)

The sensitive receptor locations included in the dispersion modelling assessment, the conservation interest at each location, the critical level for ammonia adopted in the modelling assessment and the critical load for nitrogen deposition are presented in **Table 18**. The sensitive receptor locations included in the dispersion modelling assessment are presented in a map in **Figure 6**. The critical loads in ecologically sensitive areas such as SPAs, SACs and

NHAs can be determined using the methodology outlined in the UK publication “AQTAG06 – Technical Guidance on Detailed Modelling Approach for An Appropriate Assessment For Emissions To Air” (Environment Agency, 2014). The approach is based on using the maximum annual average ground level concentration within the ecologically sensitive area and converting this concentration into a deposition flux based on a chemical species-specific deposition velocity (m/s).

Table 18. Sensitive receptor locations included in the dispersion modelling assessment, the conservation interest at each location, the critical level for ammonia adopted in the modelling assessment and the critical load for nitrogen deposition at each location (Source Katestone)

Source Number	Conservation Interest Identified	Ammonia - Critical Level ($\mu\text{g}/\text{m}^3$)	Nitrogen Deposition - Critical Load ($\text{kg}/\text{ha}/\text{yr}$)
DR1	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR2	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR3	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR4	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR5	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR6	Salt Marsh Habitats	3.0	20.0
DR7	No Conservation Objective identified	3.0	30.0
DR8	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR9	Salt Marsh Habitats	3.0	20.0
DR10	Salt Marsh Habitats	3.0	20.0
DR11	Salt Marsh Habitats	3.0	20.0
DR12	Salt Marsh Habitats	3.0	20.0
DR13	Salt Marsh Habitats	3.0	20.0
DR14	Salt Marsh Habitats	3.0	20.0
DR15	Salt Marsh Habitats	3.0	20.0
DR16	Salt Marsh Habitats	3.0	20.0
DR17	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR18	Salt Marsh Habitats	3.0	20.0
DR19	Salt Marsh Habitats	3.0	20.0
DR20	Salt Marsh Habitats	3.0	20.0
DR21	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR22	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR23	Salt Marsh Habitats	3.0	20.0
DR24	Salt Marsh Habitats	3.0	20.0
DR25	Salt Marsh Habitats	3.0	20.0
DR26	Salt Marsh Habitats	3.0	20.0

Source Number	Conservation Interest Identified	Ammonia - Critical Level ($\mu\text{g}/\text{m}^3$)	Nitrogen Deposition - Critical Load
DR27	Salt Marsh Habitats	3.0	20.0
DR28	Salt Marsh Habitats	3.0	20.0
DR29	Salt Marsh Habitats	3.0	20.0
DR30	Salt Marsh Habitats	3.0	20.0
DR31	Salt Marsh Habitats	3.0	20.0
DR32	Salt Marsh Habitats	3.0	20.0
DR33	Salt Marsh Habitats	3.0	20.0
DR34	Salt Marsh Habitats	3.0	20.0
DR35	Salt Marsh Habitats	3.0	20.0
DR36	Salt Marsh Habitats	3.0	20.0
DR37	Salt Marsh Habitats	3.0	20.0
DR38	Salt Marsh Habitats	3.0	20.0
DR39	Salt Marsh Habitats	3.0	20.0
DR40	Sand Dunes	3.0	8.0
DR41	Salt Marsh Habitats	3.0	20.0
DR42	Sand Dunes	3.0	8.0
DR43	Sand Dunes	3.0	8.0
DR44	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR45	Salt Marsh Habitats	3.0	20.0
DR46	Sand Dunes	3.0	8.0
DR47	Sand Dunes	3.0	8.0
DR48	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR49	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR50	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR51	Perrenial Vegetation of Stony Banks	3.0	8.0
DR52	Perrenial Vegetation of Stony Banks	3.0	8.0
DR53	Seven Heads SPA	3.0	30.0
DR54	Seven Heads SPA	3.0	30.0
DR55	Seven Heads SPA	3.0	30.0
DR56	Seven Heads SPA	3.0	30.0
DR57	Seven Heads SPA	3.0	30.0
DR58	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR59	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR60	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR61	Within SAC boundary - No Conservation Interest Identified	3.0	30.0

Source Number	Conservation Interest Identified	Ammonia - Critical Level ($\mu\text{g}/\text{m}^3$)	Nitrogen Deposition - Critical Load
DR62	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR63	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR64	Sand Dunes	3.0	8.0
DR65	Sand Dunes	3.0	8.0
DR66	Sand Dunes	3.0	8.0
DR67	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR68	Within SAC boundary - No Conservation Interest Identified	3.0	30.0
DR69	Within SAC boundary - No Conservation Interest Identified	3.0	30.0

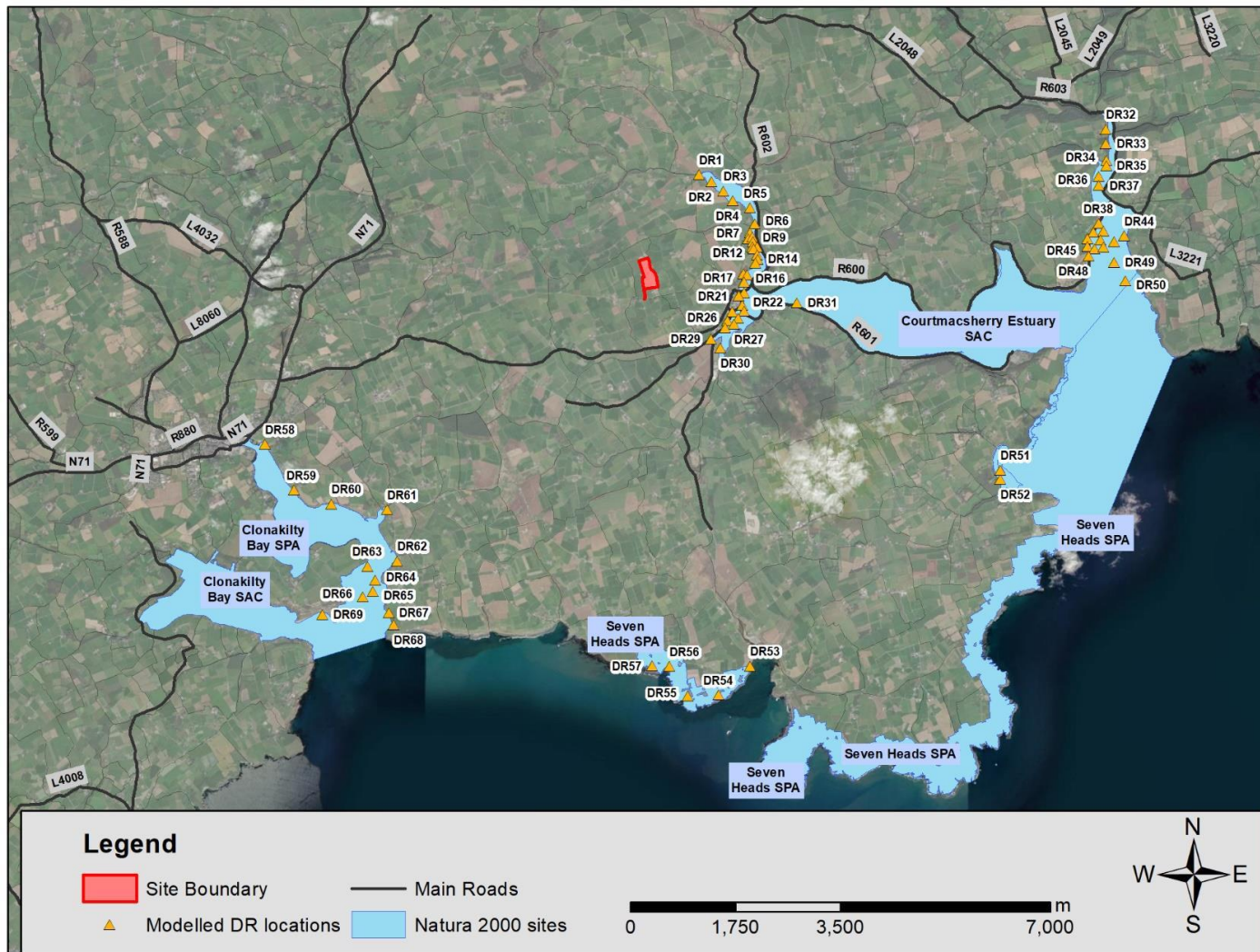


Figure 6. The sensitive receptors included in the dispersion modelling assessment to represent locations on Natura 2000 sites

| Source Katestone

The recommended dry deposition velocities for ammonia are 0.02 m/s for grassland and 0.03 m/s for forest. Dry deposition flux ($\mu\text{g m}^{-2} \text{s}^{-1}$) is calculated as the product of the ground-level process contribution ($\mu\text{g}/\text{m}^3$) and the deposition velocity (m/s).

The dry deposition velocities adopted in the modelling assessment were 0.03 m/s for most of the modelled sensitive locations as a conservative estimate:

- DR1 to DR5 as the sensitive interest at these locations are tidal river habitats/estuarine where a deposition velocity of 0.02 m/s is more appropriate value to adopt
- DR69 to DR72 and DR77 to DR82 as these locations are non-forested coastal areas where a deposition velocity of 0.02 m/s is the most appropriate value to adopt.

Even with this conservative assumption there are no issues with nitrogen deposition based on the background levels + contribution of the proposed farm when calculated in accordance with EPA's guidance. However, it is noted that as the background level of ammonia (as extracted from the SCAIL model) is above the Critical level for ammonia at some locations of the modelled habitats, Katestone's assessment proceeded to a level 4 assessment which specifies the following:

The applicant/licensee is required to complete detailed modelling (not a screen) and a NIS. Following completion of the NIS and modelling, the results can again be assessed using the criteria below.

Thresholds: Is the process contribution (PC)

- $\leq 1\%$ of the critical level for ammonia
- $\leq 1\%$ of the critical load for nitrogen deposition.

Full results from the modelling assessment are included in **Appendix 2** of this NIS. The results are summarised as follows:

- In relation to nitrogen deposition, the Predicted Environmental Contribution (PEC defined here as PC + Baseline from SCAIL) does not exceed the Critical Load identified at any of the modelled points.
- The net impact of the proposed development will increase levels of ammonia in the vicinity of the pig farm
- The net impact of the proposed development does not result in additional exceedance at the modelled locations (i.e. the modelled locations that exceed the Critical Level without the proposed development are the same as modelled locations that exceed the Critical Level with the proposed development)
- The process contribution of the proposed development is above 1% for ammonia at some locations within the boundary of nearby Natura 2000 sites.
- The net change in level of ammonia at any of the modelled points will be less than 1%.

The impact of the proposed development in combination with baseline data extracted from SCAIL (in accordance with EPA 2021 guidance) is less than the critical load of nitrogen

deposition identified within Clonakilty Bay SAC and Clonakilty Bay SPA. The impact of nitrogen deposition is below the relevant thresholds and therefore the additional impact of the proposed development will not result in adverse impacts due to additional nitrogen within these Natura 2000 sites.

The results of the air modelling show that there will be no impact on more sensitive sand dune habitats (i.e. Embryonic shifting dunes [2110], Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] and Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]). The worst-case scenario for dune habitats would be at DR40 within Courtmacsherry Estuary SAC where the proposed development would result in a net increase of 0.4%. Areas of Annual vegetation of drift lines [1210] and Perennial vegetation of stony banks [1220] (closest location at DR 45) and *Salicornia* and other annuals colonising mud and sand [1310] (closest location DR46) will not be impacted.

Along the western side of Courtmacsherry Estuary SAC/Courtmacsherry Bay SPA habitats include areas of estuary, mudflat/sandflat, Atlantic salt meadow and Mediterranean salt meadow, some of which overlap in this area. As noted above there is no critical level of nitrogen specified for estuary or mudflat/saltmarsh habitat, therefore the worst-case scenario approach has been taken and all receptors within the estuary have been assessed based on critical load of 20 Kg N ha⁻¹ year⁻¹ (**Appendix 2, Table 5**). The critical ammonia level was considered 3µg/ m³ for a range of habitats within the SAC, including estuary, mudflat/sandflat, tidal river habitats etc. While estuaries and mudflats/sandflats are qualifying habitats for Courtmacsherry Bay these are not particularly sensitive to nitrogen/ammonia deposits.

CIEEM (2019) notes that the empirical evidence supporting the setting of critical loads is variable. This is reflected in the commentaries available on APIS and it is therefore necessary to apply the critical loads or levels assigned to each designated site on APIS with judgement, particularly for a site designated for its fauna, where the effect of air pollution is often indirect. CIEEM (2019) also notes that some nitrogen critical loads, such as for saltmarsh, are not as reliable as others and this is often indicated on APIS with a judgement of reliable/quite reliable/expert judgement. For example, APIS provides a minimum critical load of 20 kg/ha/yr N for saltmarsh, and nitrogen inputs have been experimentally demonstrated to have an effect on overall species composition of saltmarsh. There are very few studies of nitrogen deposition effects on salt meadows, but work undertaken in the Netherlands suggest salt marsh vegetation is nitrogen limited (Mitsch & Gosselink, 2000), which would make it vulnerable to eutrophication effects from atmospheric nitrogen deposition. However, the nitrogen addition experiments that have been undertaken have neither used very realistic nitrogen doses nor input methods i.e. they have relied on a single large application more representative of agricultural discharge. These studies have shown that the age of the marsh will influence the nitrogen response. This is because as marshes age i.e. during succession, nitrogen availability changes, increases as organic matter that has accumulated in the sediments is released through mineralization. They also demonstrate that nitrogen eutrophication will accelerate successional change and the speed at which some forbs decline.

Salt meadows/salt marshes are typically inter-tidal, and subject to continual, daily, periodic flooding with saline water. The degree and frequency of flooding and the salinity vary, decline from the coast moving inland up the estuary and similarly species richness increases. They are among the most productive natural ecosystems because of the continuous flushing with nutrient rich waters. Also, vegetation breakdown is quite rapid.

In the absence of experimental studies of nitrogen deposition effects, no quantified effects of potential modifiers are available.

Overall nitrogen deposition is likely to be of low importance for these systems as the inputs are probably significantly below the large nutrient loadings from river and tidal inputs. Recent review by Boorman & Hazelden (2012) suggests that the pioneer low – mid saltmarsh areas are more resilient to nitrogen deposition than the mature upper areas. Any effects of nitrogen deposition are likely to be found in the tall vegetation of the closed upper marsh communities where interspecific competition is greatest. These more mature areas may also be subject to direct run-off from the surrounding catchment. Biogeochemical cycling of nutrients through microbial activity is quite rapid in this open system and nitrogen losses via denitrification may be considerable (Barnes & Owen 1998).

There may be some localized effects of ammonia from wintering wildfowl, especially large geese flocks. Since phosphorous availability affects nitrogen responses in this habitat and wildfowl provide an additional source of phosphorous and potassium this factor should be considered. Most likely impacts would be loss of nitrogen sensitive species and increases in tall grass and graminoid biomass.

Marine systems for example, such as estuaries, mudflats habitats are generally nitrogen-limited. As such, nitrogen inputs are more likely to affect marine systems than freshwater systems. However, consideration should also be given to the relative scale of nitrogen inputs from air into marine habitats compared to those from other sources. In most cases, nitrogen inputs from the atmosphere are likely to be miniscule compared to inputs from marine and riverine sources. Therefore, even if it were possible to completely remove nitrogen inputs from the atmosphere (at least from local sources), it may have a negligible effect on nitrogen inputs into marine systems relative to the inputs from other sources.

Potential impacts of the proposed development on the QI habitats Estuaries [1130], Mudflats and sandflats not covered by seawater at low tide [1140], Atlantic salt meadows (*Glaucopuccinellietalia maritima*) [1330] and Mediterranean salt meadows (*Juncetalia maritimi*) [1410] within Courtmacsherry Estuary SAC as well as wetland habitats within Courtmacsherry Bay SPA are detailed in **Table 19 and Table 20** below.

Table 19. Assessment of potential impacts on QIs/SCIs which exceed 1% of critical load for ammonia within Courtmacsherry Estuary SAC

QI Habitat	Attribute	Measure	Target	Potential impacts on application site
Estuaries 1130	Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes	<p>The proposed development will result in a slight increase in ammonia deposition within this habitat (Worst case scenario at DR6 Net Impact of proposed development 1.5% of the critical level).</p> <p>It is noted that inter-tidal habitats will be subject to tidal flushing. Depending on the extent and frequency of inundation, this is likely both to have a much greater influence on botanical composition than atmospheric nitrogen inputs and to remove a large proportion of any nitrogen that does deposit from atmosphere, thus preventing it from accumulating to the same extent as in terrestrial habitats.</p> <p>There is no pathway for this slight increase in ammonia from the proposed development to impact on habitat area or community distribution of estuarine habitat within Courtmacsherry Estuary SAC.</p> <p>Therefore the proposed development will not have a significant impact on Estuarine habitats within the SAC.</p>
	Community distribution	Hectares	Conserve the following community types in a natural condition: Sandy mud to mixed sediments with <i>Tubificoides benedii</i> and <i>Hediste diversicolor</i> community complex; Sand to mixed sediment with oligochaetes community complex; Sand with <i>Nephtys cirrosa</i> community complex	
Mudflats and sandflats not covered by seawater at low tide 1140	Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes	<p>The proposed development will result in a slight increase in ammonia deposition within this habitat (Worst case scenario at DR6 net impact of proposed development 1.5% of the critical level).</p> <p>It is noted that inter-tidal habitats will be subject to tidal flushing. Depending on the extent and frequency of inundation, this is likely both to have a much greater influence on botanical composition than atmospheric nitrogen inputs and to remove a large proportion of any nitrogen that does deposit from atmosphere, thus preventing it from accumulating to the same extent as in terrestrial habitats.</p> <p>There is no pathway for this slight increase in ammonia from the proposed development to impact on habitat area or community distribution of mudflat habitat within Courtmacsherry Estuary SAC.</p>
	Community distribution	Hectares	Conserve the following community types in a natural condition: Sandy mud to mixed sediments with <i>Tubificoides benedii</i> and <i>Hediste diversicolor</i> community complex; Sand to mixed sediment with oligochaetes community complex; Sand with	

QI Habitat	Attribute	Measure	Target	Potential impacts on application site
			<i>Nephtys cirrosa</i> community complex	Therefore the proposed development will not have a significant impact on Estuarine habitats within the SAC.
1330 Atlantic salt meadows (Glaucopuccinellietalia maritimae)/ 1410 Mediterranean salt meadows (Juncetalia maritimi)	Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. ASM - For sub-sites mapped: <ul style="list-style-type: none">Harbour view 10.79ha MSM - For sub-sites mapped: <ul style="list-style-type: none">Harbour View 3.45ha	Nitrogen deposition [from the atmosphere] is likely to be of low importance for these systems as the inputs are probably significantly below the large nutrient loadings from river and tidal inputs. The most significant areas of these habitats are located at Harbour view. However there are potential salt meadow habitats mapped by NPWS 2014a closer to the proposed development site. As noted above, in relation to nitrogen deposition, the Predicted Environmental Contribution (PEC defined as PC + Baseline from SCAIL) does not exceed the Critical Load identified at any of the modelled points. However, the process contribution of the proposed development is above 1% for ammonia at some locations within Courtmacsherry Estuary SAC where these habitats are potentially present. The impacts on ammonia on salt marsh vegetation is less understood. However, Boorman & Hazelden (2012) note that the robustness of the salt marsh nutrient system might suggest that the application of the critical load limits for nitrogen may afford sufficient protection even where ammonia levels are above the threshold.
	Habitat distribution	Occurrence	No decline, subject to natural processes	According to APIS overall nitrogen deposition is likely to be of low importance for these systems as the inputs are probably significantly below the large nutrient loadings from river and tidal inputs. Recent review by Boorman & Hazelden (2012) suggests that the pioneer low – mid saltmarsh areas are more resilient to N deposition than the mature upper areas. Any effects of nitrogen deposition are likely to be found in the tall vegetation of the closed upper marsh communities where interspecific competition is greatest. These more mature areas may also be subject to direct run-off from the surrounding catchment. Biogeochemical cycling of nutrients through microbial activity is quite rapid in this open system and nitrogen losses via denitrification may be considerable (Barnes & Owen 1998).
	Physical structure: sediment supply	Presence/absence of physical barriers	Maintain or where necessary restore natural circulation of sediments and organic matter, without any physical obstructions	
	Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	
	Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Given that the PEC for nitrogen does not exceed the critical load at any site within the SAC, the robust nature of salt meadows habitats, the tidal nature of habitats where the critical load for ammonia is in excess of 1%, and given that nett change in level of ammonia at any of the modelled points will be less than

QI Habitat	Attribute	Measure	Target	Potential impacts on application site
	Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitat zonation including transitional zones, subject to natural processes including erosion and succession	1%, no significant impact on the distribution, physical structure or vegetation structure of Atlantic salt meadows or Mediterranean salt meadows within Courtmacsherry Bay SAC is predicted to occur. Therefore, the proposed development will not impact on the integrity of habitats within Courtmacsherry Estuary SAC.
	Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	
	Vegetation structure: vegetation cover.	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	
	Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009).	
	Vegetation structure: negative indicator species: <i>Spartina anglica</i>	Hectares	No significant expansion of <i>Spartina</i> . No new sites for this species and an annual spread of less than 1% where it is already known to occur	

Table 19. Assessment of potential impacts on QIs/SCIs which exceed 1% of critical load for ammonia within Courtmacsherry Estuary SAC

Species/Habitats	Attribute	Measure	Target	Potential impacts on application site
A003 Great Northern Diver <i>Gavia immer</i>	Population trend	Percentage change	Long term population trend stable or increasing	No significant impact predicted on the extent of wetland habitat within the SPA. No change in physical structure or vegetation structure within the SPA. Therefore, there will be no significant decrease in the range, timing or intensity of use of areas by each species, other than that occurring from natural patterns of variation
A048 Shelduck <i>Tadorna tadorna</i>				
A050 Wigeon <i>Anas penelope</i>	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by each species, other than that occurring from natural patterns of variation	
A069 Red-breasted Merganser <i>Mergus serrator</i> A140 Golden Plover <i>Pluvialis apricaria</i>				
A142 Lapwing <i>Vanellus vanellus</i> A149 Dunlin <i>Calidris alpina alpina</i>				
A156 Black-tailed Godwit <i>Limosa limosa</i>				
A157 Bar-tailed Godwit <i>Limosa lapponica</i>				
A160 Curlew <i>Numenius arquata</i>				
A179 Black-headed Gull <i>Chroicocephalus ridibundus</i> A182				

Species/Habitats	Attribute	Measure	Target	Potential impacts on application site
Common Gull <i>Larus canus</i> A999 Wetlands				
Wetlands	Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 2,587 hectares, other than that occurring from natural patterns of variation	

Based on the results of the nitrogen and ammonia modelling for the proposed development along with a review of the available literature for the relevant habitats and species, it has been concluded that the proposed development will not impact on the integrity of the Courtmacsherry Estuary SAC or Courtmacsherry Bay SPA.

6.3 In combination Impacts

In-combination impacts refer to a series of individually modest impacts that may in combination produce a significant impact. The underlying intention of this in combination provision is to take account of in-combination impacts from existing or proposed plans and projects and these will often only occur over time. Other developments near site and potential in-combination impacts are identified in **Table 21**. In the absence of any significant impacts on qualifying interests or conservation objectives associated with this project no significant in-combination impacts have been identified.

Table 21. Other developments near site and potential in-combination impacts

Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Impact
<p>River Basin Management Plan 2018-2021</p> <p>(Noted that the Draft River Basin Management Plan for Ireland 2022-2027 is currently at public consultation stage)</p>	<p>The project should comply with the environmental objectives of the Irish RBMP which are to be achieved generally by 2021.</p> <ul style="list-style-type: none"> • Ensure full compliance with relevant EU legislation • Prevent deterioration • Meeting the objectives for designated protected areas • Protect high status water • Implement targeted actions and pilot schemes in focus sub-catchments aimed at: targeting water bodies close to meeting their objective and addressing more complex issues which will build knowledge for the third cycle. 	<p>The implementation and compliance with key environmental policies, issues and objectives of this management plan will result in positive in-combination effects to European sites. The implementation of this plan will have a positive impact for the biodiversity. It will not contribute to in-combination or cumulative impacts with the proposed development.</p>
<p>Inland Fisheries Ireland Corporate Plan 2021-2025</p>	<p>To ensure that Ireland's fish populations are managed and protected to ensure their conservation status remains favourable. That they provide a basis for a sustainable world class recreational angling product, and that pristine aquatic habitats are also enjoyed for other recreational uses.</p> <p>To develop and improve fish habitats and ensure that the conditions required for fish populations to thrive are sustained and protected.</p> <p>To grow the number of anglers and ensure the needs of IFI's other key stakeholders are being met in a sustainable conservation focused manner.</p>	<p>The implementation and compliance with key environmental issues and objectives of this corporate plan will result in positive on-combination effects to European sites. The implementation of this corporate plan will have a positive impact for biodiversity of inland fisheries and ecosystems. It will not contribute to in-combination or cumulative impacts with the proposed works.</p>

Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Impact
	<p>EU (Quality of Salmonid Waters) Regulations 1988. All works during development and operation of the project must aim to conserve fish and other species of fauna and flora habitat; biodiversity of inland fisheries and ecosystems and protect spawning salmon and trout.</p>	
<p>Irish Water Capital Investment Plan 2020-2024</p>	<p>Proposals to upgrade and secure water services and water treatment services countrywide.</p>	<p>Likely net positive impact due to water conservation and more effective treatment of water.</p>
<p>Water Services Strategic Plan (WSSP, 2015)</p>	<p>Irish Water prepared a Water Services Strategic Plan (WSSP, 2015), under Section 33 of the Water Service No. 2 Act of 2013 to address the delivery of strategic objectives which will contribute towards improved water quality and biodiversity requirements through reducing:</p> <ul style="list-style-type: none"> • Habitat loss and disturbance from new / upgraded infrastructure; • Species disturbance; • Changes to water quality or quantity; and <p>Nutrient enrichment /eutrophication.</p>	<p>The WSSP forms the highest tier of asset management plans (Tier 1) which Irish Water prepare and it sets the overarching framework for subsequent detailed implementation plans (Tier 2) and water services projects (Tier 3). The WSSP also sets out the strategic objectives against which the Irish Water Capital Investment Programme is developed. The current version of the CAP outlines the proposals for capital expenditure in terms of upgrades and new builds within the Irish Water owned assets.</p> <p>Therefore, no adverse significant in-combination effects are envisaged.</p>
<p>NPWS Conservation Management Plans</p>	<p>Conservation Management Plans have not been fully prepared for the European sites being assessed. However, conservation objectives are set for all sites.</p>	<p>The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest.</p> <p>A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site. The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.</p> <p>The resultant effects of conservation objectives are a net</p>

Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Impact
		positive and there is no potential for in combination effects on European sites.
WWTP discharges	Treated wastewater from Timoleague and Courtmacsherry ultimately discharges to the Courtmacsherry Estuary.	Discharges from municipal WWTPs are required to meet water quality standards. Irish Water Capital Investment Plan proposes to upgrade water treatment services countrywide (see above). No long-term in-combination effect on Natura 2000 sites will occur.

The potential for the proposed development to indirectly impact the Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SAC and Clonakilty Bay SPA has been assessed. Potential in-combination impacts on the sites may arise owing to an alteration to water quality or quantity. Deterioration in water quality can occur as an indirect consequence of point source or diffuse pollution, which in turn changes the aquatic environment and reduces its capacity to support certain plants and animals. This leads to potential negative consequences for the qualifying interests that rely on the maintenance of water quality within the Natura 2000 site. It is noted that the dispersion modelling assessment considered the potential impact of the proposed development in isolation and in combination with representative background concentrations of ammonia and rates of nitrogen deposition. Following a review, no significant in-combination effects have been identified.

7. Conclusions

The AA screening concluded, on the basis of objective information and in view of best scientific knowledge, the possibility of significant effects from the proposed project on European sites could not be ruled out and therefore an Appropriate Assessment was required. The AA screening concluded that there was potential for the project to significantly impact the Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SAC and Clonakilty Bay SPA.

The NIS has been prepared to inform and assist the EPA to assess, in view of best scientific knowledge, if the project, individually or in combination with another plan or project is likely to have a significant effect on the European sites, Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SAC and Clonakilty Bay SPA.

This NIS has examined and analysed, in light of the best scientific knowledge, with respect to the Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Clonakilty Bay SAC and Clonakilty Bay SPA within the potential zone of influence of the application site, the potential effect pathways, how these could impact on QI/SCI species and habitats and whether the predicted effects would adversely affect the integrity of these Natura 2000 sites.

It has been objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted effects from the project and with the implementation of the mitigation measures proposed, that the construction and operation of the project will not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in combination with other plans or projects. There is no reasonable scientific doubt in relation to this conclusion. The competent authority will make the final determination in this regard.

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Appendices

Appendix 1 Site synopses for Natura 2000 sites

Courtmacsherry Bay SPA (SITE CODE: 004219)

Courtmacsherry Bay SPA is located approximately 12 km south of Bandon and immediately east of the village of Timoleague in west Co. Cork. The site, which is largely estuarine in nature, consists of the drowned valley of the Argideen River which is now filled with sediments, resulting in extensive mudflats and areas of saltmarsh. The estuary of the Kilbrittain River in the north-east of the site holds an area of well-developed saltmarsh. The seaward boundary for the site stretches from Coolmain Point to Barry Point, and includes Coolmain Bay and Broadstrand Bay. Most of the mudflats are unvegetated, although in places Cord-grass (*Spartina anglica*) occurs. Saltmarsh has developed in a number of areas, the abundant species mostly being Sea Club-rush (*Scirpus maritimus*), Common Scurvygrass (*Cochlearia officinalis*), Sea Arrowgrass (*Triglochin maritima*), Sea Plantain (*Plantago maritima*), Thrift (*Armeria maritima*) and Saltmarsh Rush (*Juncus gerardi*).

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Great Northern Diver, Shelduck, Wigeon, Red-breasted Merganser, Golden Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Black-headed Gull and Common Gull. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds. The site is of ornithological importance for the wintering waders and wildfowl that feed on the mudflats. It supports internationally important numbers of Black-tailed Godwit (506 - figures given here and below are mean peaks for the five winters in the period 1995/96 to 1999/00), as well as nationally important numbers of a further eleven species, i.e. Great Northern Diver (27), Shelduck (175), Wigeon (934), Redbreasted Merganser (63), Golden Plover (5,759), Lapwing (2,713), Dunlin (1,353), Bar-tailed Godwit (182), Curlew (1,357), Black-headed Gull (2,727) and Common Gull (2,226). Other species which occur include Oystercatcher (610), Redshank (227) and Greenshank (26). Courtmacsherry Bay SPA is an important site for wintering birds. It holds internationally important numbers of Black-tailed Godwit and nationally important numbers of a further eleven species, including three that are listed on Annex I of the E.U. Birds Directive, i.e. Great Northern Diver, Golden Plover and Bar-tailed Godwit.

Courtmacsherry Estuary SAC (SITE CODE 001230)

This site is located in west Cork, some 12 km south of Bandon and immediately east of the village of Timoleague. The estuary consists of the drowned valley of the Argideen River, which is now filled with sediments, resulting in an extensive area of mudflats. The site contains a complex of coastal habitats, including ten which are listed in the E.U. Habitats Directive.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1130] Estuaries

[1140] Tidal Mudflats and Sandflats

[1210] Annual Vegetation of Drift Lines [1220] Perennial Vegetation of Stony Banks [1310] Salicornia Mud

[1330] Atlantic Salt Meadows

[1410] Mediterranean Salt Meadows

[2110] Embryonic Shifting Dunes

[2120] Marram Dunes (White Dunes) [2130] Fixed Dunes (Grey Dunes)*

The greater part of this estuary site is mudflat and tidal channels, but three rivers flow into the site and areas of fresh- and saltmarsh are found. Most of the mudflat at Courtmacsherry is unvegetated, although in places cord-grass (*Spartina* sp.) occurs.

Saltmarsh has developed in a number of areas, with the most abundant species being Sea Club-rush (*Scirpus maritimus*), Common Scurvygrass (*Cochlearia officinalis*), Sea Arrowgrass (*Triglochin maritima*), Sea Plantain (*Plantago maritima*), Thrift (*Armeria maritima*) and Saltmarsh Rush (*Juncus gerardi*). On the outer edges such species as Greater Sea-spurrey (*Spergularia media*), Lesser Sea-spurrey (*S. marina*) and Lax-flowered Sea-lavender (*Limonium humile*) occur, while on their landward edge the saltmarshes frequently support Creeping Bent (*Agrostis stolonifera*), Red Fescue (*Festuca rubra*), Silverweed (*Potentilla anserina*), Soft Rush (*Juncus effusus*), Common Sorrel (*Rumex acetosa*) and others. A particularly well-developed and intact saltmarsh occurs at Garranefeen Strand.

Tideline communities of Sea Rocket (*Cakile maritima*) and oraches (*Atriplex* spp.), including Grass-leaved Orache (*A. littoralis*), are noted from this site. In stony area east of Courtmacsherry the uncommon Sea-kale (*Crambe maritima*) occurs, and Yellow Horned-poppy (*Glaucium flavum*) has also been recorded. Glasswort (*Salicornia* spp.) communities have been recorded from Garranefeen inlet.

The site also supports small but interesting sand dune systems. Embryonic dunes occur in a number of places, including Garranefeen, Flaxford Strand and near Courtmacsherry, and the species Sand Couch (*Elymus farctus*) occurs. Marram dunes are well developed on the eastern spit at Garranefeen inlet. Species present include Sea Bindweed (*Calystegia soldanella*), Sea-spurge (*Euphorbia paralias*) and Sand Couch. Fixed dunes are not particularly well developed at this site, but where present, support species such as Red Fescue, Common Restharrow

(*Ononis repens*), Kidney Vetch (*Anthyllis vulneraria*), Pyramidal Orchid (*Anacamptis pyramidalis*) and Lady's Bedstraw (*Galium verum*).

The site also includes small areas of sand dune, sandy and shingle beaches, reedbeds of Common Reed (*Phragmites australis*), scrub, dry grassland, and areas of both wet and dry semi-natural broadleaved woodland, parts of which are dominated by oak (*Quercus* sp.).

The presence of some rare and scarce plant species at the site is noteworthy. The rare Red Data Book species Sea-kale occurs on shingle and the scarce grass, Tor-grass (*Brachypodium pinnatum*), has been recorded on cliffs between Broadstrand and Wood Point.

The site is of ornithological importance for the many waders and wildfowl that feed on the mud- and sandflats. The winter flocks of Golden Plover (2,600) and Black- Tailed Godwit (110) constitute nationally important numbers, and at least nine other species occur in numbers which are significant for the region - Wigeon (58), Mallard (69), Red-breasted Merganser (18), Oystercatcher (162), Lapwing (629), Dunlin (215), Bar-tailed Godwit (178), Curlew (731) and Redshank (139). Although these figures are the average peaks of 4 counts between 1984/85 and 1986/87, at times the numbers present far exceed those given. For example, in January 1992, 5,800 Golden Plover, 671 Wigeon, 731 Dunlin and 456 Oystercatchers were present.

The spread of cord-grass on parts of the mudflats poses a threat to the quality of the area for feeding birds, and pollution is an ever-present threat in such a wetland.

Courtmacsherry Estuary is an important site for the complex of coastal habitats found there, including ten listed on Annex I of the E.U. Habitats Directive, and for the large numbers of birds that use the area. The presence of rare and scarce plant species adds further interest and value to the site.

Site Name: Clonakilty Bay SAC Site Code: 000091

Clonakilty Bay in west Cork is an intertidal expanse that stretches from Clonakilty to the open sea, and comprises two small estuaries separated by Inchydoney Island. The site also includes adjacent sand dunes and inland marshes, and therefore is a coastal complex with a good diversity of habitats.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1140] Tidal Mudflats and Sandflats [1210] Annual Vegetation of Drift Lines [2110] Embryonic Shifting Dunes [2120] Marram Dunes (White Dunes) [2130] Fixed Dunes (Grey Dunes)* [2150] Decalcified Dune Heath*

Sand flats dominate the intertidal area, although mudflats occur at the sheltered upper end of the inlets. The vegetation consists of algal mats (*Enteromorpha* spp.), with brown seaweeds

(*Fucus* spp.) occurring where the coast is rocky. The invasive Cord-grass (*Spartina* sp.) occurs in places. The intertidal flats have a typical diversity of macro-invertebrates, including *Arenicola marina*, *Scrobicularia plana*, *Hediste diversicolor*, *Nephtys hombergii*, *N. cirrosa*, *Hydrobia ulvae* and *Cerastoderma edule*.

Sand dunes grade from a strandline, colonised by Frosted Orache (*Atriplex laciniata*), Sea Sandwort (*Honkenya peploides*) and Sea Rocket (*Cakile maritima*), through to fixed dunes vegetated by grasses, small herbs and several species of orchid. They support an interesting array of plants, amongst which Great Mullein (*Verbascum thapsus*), Viper's-bugloss (*Echium vulgare*) and Teasel (*Dipsacus fullonum*) are some of the most noticeable. Embryonic shifting dunes and white Marram (*Ammophila arenaria*) dunes are also represented. Of particular interest is a small area of decalcified dune heath with some Gorse (*Ulex europaeus*).

Inland of the western estuary, an extensive area of wetland occurs, which in itself contains a fine range of habitats from saline lagoons, to brackish grasslands, open freshwater marsh and Alder (*Alnus glutinosa*) scrub. Species found here are characteristic of marshy areas and include Creeping Bent (*Agrostis stolonifera*), Water Horsetail (*Equisetum fluviatile*), Marsh Cinquefoil (*Potentilla palustris*) and Marsh Willowherb (*Epilobium palustre*). The saline influence is evident by the occurrence of species such as Saltmarsh Rush (*Juncus gerardi*) and Sea Rush (*J. maritimus*).

The site contains a good diversity and density of waterfowl, with over 7,000 waders and wildfowl occurring regularly. Seven species have populations of national importance: Shelduck (168), Grey Plover (76), Lapwing (2,509), Dunlin (1,508) Curlew (1,231), Redshank (263) and Greenshank (27). The site is most noted, however, for its population of Black-tailed Godwit (866), which is of international importance and comprises over 10% of the national total. Amongst the other species which occur, there are notable populations of Golden Plover and Bar-tailed Godwit, both of which are listed on Annex I of the E.U. Birds Directive. All counts given are average winter peaks over either two or three seasons from 1994/95 to 1996/97. Herons commonly use the site and a heronry exists in the trees near Clonakilty.

Otter spraints were found frequently during a recent survey of the marsh area. This species is listed on Annex II of the E.U. Habitats Directive.

The site is under pressure from a number of sources, notably recreation and tourism developments and agricultural improvements, including drainage and fertiliser application.

This site is of considerable scientific interest because it contains a good diversity of coastal habitats. These habitats show a succession from salt to freshwater influences and include six which are listed on Annex I of the E.U. Habitats Directive. Its value is enhanced considerably by the birdlife it supports. The occurrence of Black-tailed Godwit in internationally important numbers is particularly significant. The site also supports nationally important numbers of seven other species of waterfowl as well as two species listed on Annex I of the E.U. Birds Directive.

SITE NAME: CLONAKILTY BAY SPA SITE CODE: 004081

Clonakilty Bay, which is located in west County Cork, is a wetland complex that stretches from the town of Clonakilty to the open sea. It comprises two small estuarine bays, Clonakilty Harbour and Muckcross Strand, separated by Inchydoney Island and its empoldered isthmus. Several small rivers flow into the site, notably the Fealge River. At low tide, substantial areas of sand and mud flats are exposed. The construction of a causeway across the inner part of Muckcross Strand created an extensive wetland complex known as Cloheen Strand Intake.

Intertidal sand and mud flats occupy the majority of the site area and these provide the main food resource for the wintering waterfowl. Sand flats dominate the inter-tidal area, although mud flats occur at the sheltered upper end of the inlets. The vegetation consists of algal mats (*Ulva* spp.), with brown seaweeds (*Fucus* spp.) occurring where the shore is rocky. The invasive Common Cord-grass (*Spartina anglica*) occurs in places. The intertidal flats have a typical diversity of macro-invertebrates, including Lugworm (*Arenicola marina*), Peppery Furrow-shell (*Scrobicularia plana*), Ragworm (*Hediste diversicolor*), the marine bristle worms *Nephtys hombergii* and *N. cirrosa*, Laver Spire-shell (*Hydrobia ulvae*) and Common Cockle (*Cerastoderma edule*).

The Cloheen Strand Intake wetland contains a fine range of habitats from saline lagoons, to brackish grasslands, open freshwater marsh and wet grassland. This area provides the main roosting area for birds at high tide. Birds also roost elsewhere above the shoreline and on the sandy beach associated with the dune system at Inchydoney Island.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Shelduck, Dunlin, Black-tailed Godwit and Curlew. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The site contains a good diversity of wintering waterbirds, with over 8,000 birds occurring regularly. The site is noted for its internationally important population of Black-tailed Godwit (874) - all count data refers to the 4-year mean peak 1995/96 to 1998/99. The ecology of this population has been studied in detail in recent years. Three species occur in nationally important numbers: Shelduck (156), Dunlin (1,172), and Curlew (599). Other species that occur at the site include Mute Swan (53), Wigeon (487), Teal (216), Mallard (93), Red-breasted Merganser (10), Cormorant (13), Oystercatcher (316), Ringed Plover (103), Golden Plover (857), Grey Plover (61), Lapwing (1,658), Knot (168), Bar-tailed Godwit (79) Redshank (252), Greenshank (33) and Turnstone (38).

Little Egret, a species that has recently colonised Ireland, has been recorded in small numbers (4 year mean peak of 5, maximum 7). Grey Heron (14) commonly uses the site and a heronry is located in the trees near Clonakilty. Cloheen Strand Inlet is also a regular wintering site for usually up to 3, but occasionally 7, Short-eared Owl.

The site is a regular staging post for scarce autumn migrants, especially Little Stint, Curlew Sandpiper and Spotted Redshank. In most years it is also visited by vagrant waders from North America.

Clonakilty Bay SPA is of high ornithological importance, particularly for its internationally important population of Black-tailed Godwit. In addition, there are three species with

populations of national importance. The presence of the E.U. Birds Directive Annex I species, Golden Plover, Bar-tailed Godwit, Little Egret and Short-eared Owl, is of note.

Appendix 2. Ammonia modelling report

Appendix 3. Pipe, Tank & Groundwater Assessment Cooligboy Pig Farm, Cooligboy, Timoleague, Co. Cork, IE Consulting 2022