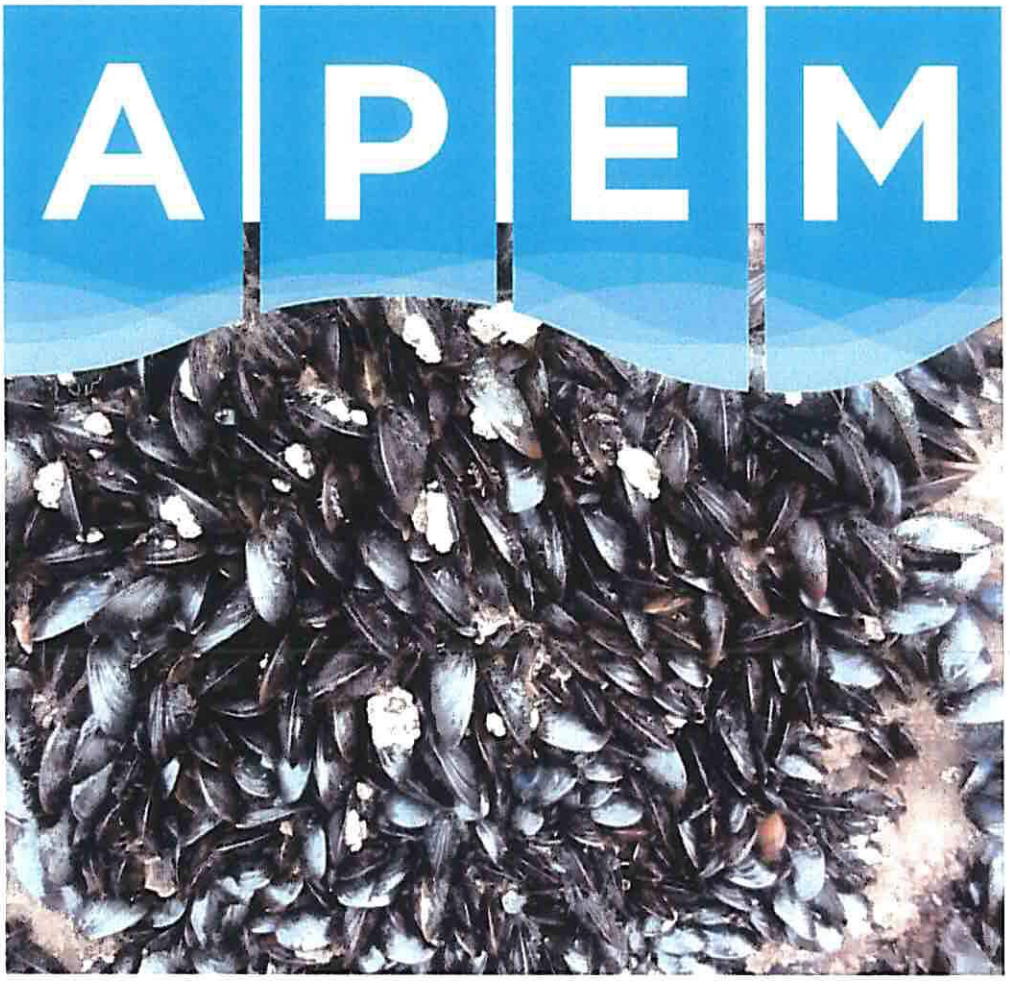

Annex II

Ballymacoda Bay SPA Assessment of Aquaculture Activities under Article 6 of the Habitats Directive

Marine Institute

APEM Ref: P00000148-01

December 2016

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Revision and Amendment Register

Version	Date	Section(s)	Summary of Changes	Prepared by	Approved by
A	27/05/16	All	Creation of outline report	RB	R P-D
B	06/07/16	All	First site specific draft with available data	PT	RB
C	25/11/16	2,5 & 6	Review of aquaculture information and assessment	KL	RB
D	23/12/16	All	Updates prior to issue as draft to client	KL & RB	RB

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Executive Summary

Introduction

APEM Ltd was commissioned by the Marine Institute to provide ornithological services related to the appropriate assessment of aquaculture on coastal Special Protection Areas (SPAs). This report contains the Appropriate Assessment of aquaculture activities in Ballymacoda Bay, assessed alone as well as 'in combination' with other activities in and around the Bay. The activities being assessed are within the Ballymacoda Bay SPA (Site code 004023) and this SPA is the primary focus of this assessment.

Methodology

The method applied follows the stepwise requirements of Article 6 of the Habitats Directive. The first step is to identify if the activity is related, or not, to the management of the Natura 2000 site for nature conservation purposes. If it is not, then the method moves on to a preliminary screening based on distance of the SPA from the aquaculture activities. The purpose of this is to screen out SPAs that are so distant from the location of the aquaculture activities that detailed consideration of such SPAs is not required. This is followed by consideration of the Special Conservation Interest (SCI) species for each screened in SPA to assess if their habitat requirements and feeding ecology are such that there is no potential for impacts e.g. species that feed and / or nest on terrestrial habitats away from the aquaculture activities. The next, and more detailed, step examines finer scale bird distribution in relation to aquaculture activities and is the application of the approach based on assessing spatial overlap using in particular the National Parks and Wildlife Service (NPWS) Baseline Waterbird Survey (BWS) low tide bird count data. It examines the scale of that spatial overlap and, in relation to conservation objectives of each SCI, identifies a significant negative impact for those species that respond negatively to aquaculture activities and for which there is an overlap between bird distribution at low tide and aquaculture activities of 5% or more of the total SPA population. At this detailed stage the potential for in-combination effects between aquaculture activities and other activities is also assessed.

Outcome of initial screening

Those SPAs that were considered for screening because they were located within 15 km of the aquaculture activities were:

Ballymacoda Bay SPA	(Site code 004023)
Blackwater Estuary SPA	(Site code 004028)
Ballycotton Bay SPA	(Site code 004022)
Helvick Head to Ballyquin SPA	(Site code 004192)

A consideration of the spatial overlap, potential for at a distance effects and SCI species habitat requirements and feeding ecology led the following SPA to be screened in for detailed consideration:

Ballymacoda Bay SPA	(Site code 004023)

Interest features and conservation objectives of the screened in SPA

The SCIs of the Ballymacoda Bay SPA are:

Wigeon
Teal
Ringed Plover
Golden Plover
Grey Plover
Lapwing
Sanderling
Dunlin
Black-tailed Godwit
Bar-tailed Godwit
Curlew
Redshank
Turnstone
Black-headed Gull
Common Gull
Lesser Black-backed Gull
Wetland habitats

The conservation objectives for all of the SCI bird species of the Ballymacoda Bay SPA are expressed in a standard form as:

To maintain the favourable conservation condition of [species name] in Ballymacoda Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target
Population trend	Percentage change	Long term population trend stable or increasing
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing and intensity of use of areas by [species name], other than that occurring from natural patterns of variation

The conservation objective for the SCI 'Wetland habitats' is presented as:

To maintain the favourable conservation condition of the wetland habitat in Ballymacoda Bay SPA as a resource for the regularly occurring migratory waterbirds that utilise it. This is defined by the following attribute and target:

Attribute	Measure	Target
Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 602 hectares, other than that occurring from natural patterns of variation

Description of aquaculture activities

The aquaculture activities relate to one method of cultivation only, the bag and trestle method within the intertidal zone. The species of shellfish licenced for cultivation are the Pacific oyster *Crassostrea gigas* and the blue mussel *Mytilus edulis*. Currently only oyster is cultivated. The bag and trestle method uses steel table-like structures in the middle to lower intertidal zone. The trestles are mostly accessed at the time of spring tides (around 3 – 10 days per month) and on average for between 2 and 5 hours on such days, although access depends on tidal and weather conditions. The shellfish are thinned out and graded as they grow. General maintenance work on the trestles and bags includes shaking and turning of bags and hand removal of fouling and seaweed to ensure a flow of water flow through the bags when they are submerged. Access is by vehicle across the intertidal at low tide. Time to harvest, depending on intake size, ranges from 2.5 to 4 years.

The specific activities assessed are a series of renewal licence applications and the new licence applications within Ballymacoda Bay and almost wholly within the SPA. The existing licences that are for renewal occupy 6.12% of the SPA. The applications for new licences are wholly within the SPA and represent 31.85% of the SPA. The renewal and new application licence locations and access routes are all in the outer section of Ballymacoda Bay. In relation to the NPWS BWS count sub-sites the renewal and new applications overlap with only three of those sub-sites: OL571, OL572 and OL573.

Assessment of aquaculture activities

The assessment of spatial overlap for each SCI species, divided by consideration of renewal licence applications alone, new licence applications alone and all licence applications together identified the following potential scale of displacement in relation to the SPA baseline population:

SCI species	Renewal licences	New licences	All licences
Wigeon	3.8%	12.4%	15.1%
Teal	0.1%	1.4%	1.7%
Ringed Plover	1.2%	16.7%	20.3%
Golden Plover	1.0%	3.3%	4.0%
Grey Plover	4.2%	15.8%	19.3%
Lapwing	0.2%	0.8%	0.9%
Sanderling	20.0%	71.8%	87.7%
Dunlin	1.6%	6.6%	8.0%
Black-tailed Godwit	7.4%	21.2%	25.9%
Bar-tailed Godwit	2.0%	26.6%	32.5%
Curlew	1.5%	5.0%	6.1%
Redshank	3.4%	12.2%	14.9%
Turnstone	0.8%	8.0%	9.7%
Black-headed Gull	1.3%	4.7%	5.7%
Common Gull	1.5%	6.1%	7.4%
Lesser Black-backed Gull	0.3%	0.8%	0.9%

The SCI 'wetland habitat' is not subject to a potential adverse impact under any aquaculture licence scenario.

In-combination effects

The assessment of in-combination effects screened in and considered the following activities occurring in and around Ballymacoda Bay:

- Coastal recreation
- Bait digging
- Fisheries and shellfisheries

No in-combination impacts were identified.

Conclusion of the assessment

The assessment that has been undertaken has identified the potential for significant adverse impact on a number of the SCI species of the Ballymacoda Bay SPA, with the potential for that adverse impact varying dependent on whether the renewal applications are considered alone, the new applications are considered alone and the two categories of application are considered together.

The renewal applications alone have the potential to result in significant adverse impact on the following SCI species of the Ballymacoda Bay SPA:

- Sanderling
- Black-tailed Godwit

The new applications alone have the potential to result in significant adverse impact on the following SCI species of the Ballymacoda Bay SPA:

- Wigeon
- Ringed Plover
- Grey Plover
- Sanderling
- Black-tailed Godwit
- Bar-tailed Godwit

The renewal applications and the new applications considered together have the potential to result in significant adverse impact on the following SCI species of the Ballymacoda Bay SPA:

- Wigeon
- Ringed Plover
- Grey Plover
- Sanderling
- Dunlin
- Black-tailed Godwit
- Bar-tailed Godwit
- Common Gull

The following SCI species of the Ballymacoda Bay SPA are not subject to a potential adverse impact under any aquaculture licence scenario:

- Teal
- Golden Plover
- Lapwing
- Curlew
- Redshank
- Turnstone
- Black-headed Gull
- Lesser Black-backed Gull

In addition the SCI 'wetland habitat' is not subject to a potential adverse impact under any aquaculture licence scenario.

Consideration of potential in-combination impacts has been made and the conclusions above remain as stated as no in-combination impacts have been identified

As a result of the conclusion that some of the SCI species are potentially subject to adverse impacts as a result of the aquaculture licence applications, consideration should be given to further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring.

1. Introduction

1.1 Background

APEM Ltd (APEM) was commissioned by the Marine Institute to conduct an assessment of the potential impacts of aquaculture conducted in Ballymacoda Bay on Special Protection Areas (SPAs) in and around this location.

This report contains an assessment of a set of renewal and new applications for aquaculture licences in Ballymacoda Bay as well as any other activities in and around this location that have the potential to act 'in combination'.

Such an assessment of activities for their potential effects on SPAs is a requirement of Article 6 of EU Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora 92/43/EEC (the Habitats Directive).

The aquaculture activities being assessed are within the Ballymacoda Bay SPA (Site code 004023) and this SPA is the primary focus of this assessment. The potential to affect other SPAs in the vicinity is identified through a spatial scoping exercise.

This assessment is based on a desk based review of existing information. Where relevant, this report identifies information gaps and other limitations that may affect the certainty with which the conclusions of this assessment are made.

1.2 Scope of the assessment

The scope of this assessment is limited to:

- The cultivation of shellfish using the bag and trestle method within the intertidal zone of Ballymacoda Bay.
- Other activities in and around this location that have the potential to act 'in combination'.
- SPAs and their Special Conservation Interests (SCIs).

1.3 Structure of this report

The structure of the report is as follows:

Section 2 Describes the methodology applied in the assessment.

Section 3 Is a preliminary 'coarse' screening based on spatial scope that screens out SPAs distant from the aquaculture activities.

Section 4 Identifies the screened in SPAs, lists their SCIs and describes their Conservation Objectives and the attributes and targets that have been defined for the SCIs.

Section 5 Contains a description of the aquaculture activity – in this case the cultivation of shellfish using the bag and trestle method within the intertidal zone – and reviews the potential for such activities to affect the SCIs of the relevant SPA.

Sections 6 Conducts a detailed assessment of the potential effects of aquaculture activity Ballymacoda Bay on the SCIs of the Ballymacoda Bay SPA. For each SCI the assessment considers the species status, distribution patterns within the SPA; the response of the SCI to the aquaculture activity and an evaluation of potential impacts.

Section 7 Contains an assessment of potential in-combination effects of aquaculture with other relevant activities.

Section 8 Provides the conclusion of the assessment of the impacts of the aquaculture activities, and any in-combination effects with other activities, on the conservation objectives of the SCIs of the Ballymacoda Bay SPA.

Section 9 References

1.4 Limitations and constraints to this assessment

The detailed stage of the assessment relies on the low tide counts of the NPWS BWS conducted in the winter of 2010-11. There were four low tide counts in this winter but a consequence is that the assessment is based on data on bird distribution from a single winter. The I-WeBS counts have been conducted over a longer timespan but are conducted at high tide. Over the last five winters (2010-11 to 2014-15) the site was not counted by I-WeBS in 2013-14 and the count for 2010-11 is noted as being of poor quality. The I-WeBS counts provide more limited information to inform the detailed assessment beyond the important role that they have in identifying SPA populations and in identifying long terms trends in populations.

The resolution of the location of intertidal feeding birds is only to the NPWS BWS count sub-site level. Since the precise bird locations are not known then it is not feasible to assess the potential effects of any one renewal or new application licence to any specific group or individual bird. As a result the assessment is made on the basis of the area that the aquaculture activity occupies in proportion to the sub-site and renewal and new application licences are assessed on a collective, rather than individual, basis within the NPWS BWS sub-sites.

There is a strong information base for the assessment of displacement impacts for some types of the aquaculture activities, particularly intertidal oyster cultivation, as a result of the detailed studies of the relationship between waterbird distribution and intertidal oyster culture published in Gittings and O'Donoghue (2012).

The assessment is based on the results of detailed studies that have quantified the response that birds have shown to aquaculture and other human activities. The quantification of such effects does not mean that an impact has been confirmed at the population scale. The assessment based on the spatial overlap of birds and aquaculture activities and any measured bird responses is a precautionary one. Quantifying population impact is beyond scope the scope of this assessment.

The assessment of in-combination effects provides a general assessment of pressures such as recreational activities, but without detailed information on other activities it is not possible to quantify these potential impacts. A qualitative assessment is undertaken.

2. Methodology

2.1 Overarching framework

The overarching method applied in this assessment follows the stepwise requirements of Article 6 of the Habitats Directive. The steps (stages) required are illustrated in the flowchart in Figure 1 reproduced from Figure 7 of the European Commission guidance on aquaculture activities and the Natura 2000 network (European Commission, 2012). The Natura 2000 network in Ireland includes classified SPAs, proposed SPAs, Special Areas of Conservation (SACs) and candidate SACs.

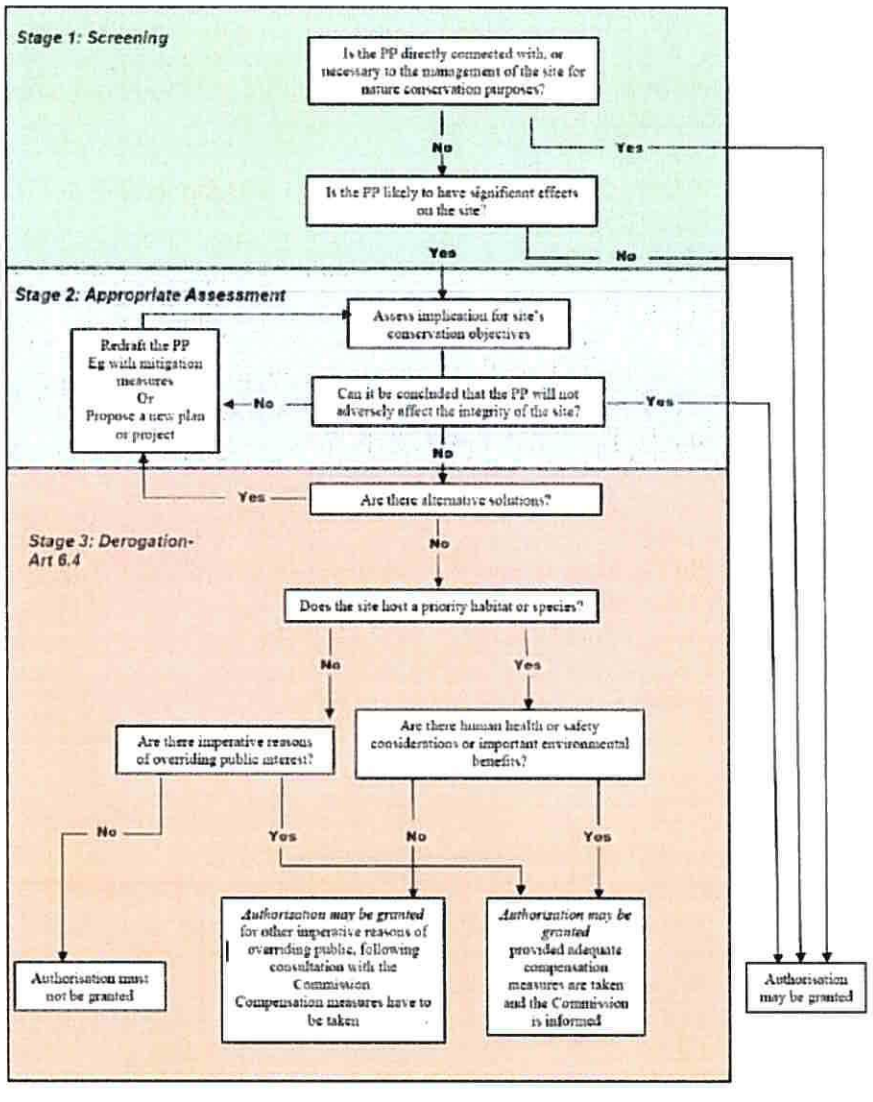

Figure 1 Flowchart of the Habitats Directive Article 6(3)-(4) procedure[1].

[1] This Figure is reproduced from EC 2012.

The first step (within stage 1 of Figure 1) is to identify if the activity or proposal is related, or not, to the management of the Natura 2000 site for nature conservation purposes. If it is not then the second step (within stage 1 of Figure 1) is to identify if the activity or proposal, alone or in combination with other plans and projects, is likely to have significant effects on the Natura 2000 site. This second step identifies if an appropriate assessment is required and is frequently referred to as the 'screening stage', 'screening for likely significant effect (LSE)' or 'test of likely significant effect' (ToLSE). This screening is carried out while following the precautionary principle and where doubt exists about the risk of a significant effect, an appropriate assessment must be carried out (DEHLG, 2010). Activities or proposals that are screened in are the subject of an appropriate assessment (Stage 2 of Figure 1). Guidance from the European Commission identifies that the purpose of an appropriate assessment is to determine whether adverse effects on the integrity of a Natura 2000 site can be ruled out as a result of the activity or proposal, either alone or in-combination with other plans and projects (European Commission, 2000). If the conclusion of the appropriate assessment is that the activity or proposal results in an adverse effect on the integrity of the Natura 2000 site then it moves through to those steps listed in Stage 3 of Figure 1.

This report addresses potential effects of aquaculture activities on SPAs only and not all sites that are part of the Natura 2000 network.

2.2 Spatial scope of screening

A preliminary 'coarse' screening is carried out based on distance from the aquaculture activities. The purpose of this is to screen out SPAs that are so distant from the location of the aquaculture activities being assessed that detailed consideration of such SPAs and their SCIs is not required. The distance for such 'coarse' screening is based on a worst case evaluation of how far a zone of potential effects from the particular type of activity might be. This has to be considered on a case-by-case basis (DEHLG, 2010). For small projects on terrestrial sites this distance might be quite small (e.g. <1 km) but for activities or proposals that are based within or adjacent to water there is the potential for some types of impacts to travel greater distances. Since aquaculture is a water based activity, but in this case not one taking place along a river where water might be flowing many tens of kilometres, a distance of 15 km has been identified, a selection supported by the guidance in DEHLG (2010).

2.3 Data sources

2.3.1 SPAs, their SCIs, conservation objectives and boundaries

Information about the SPAs, their SCIs, conservation objectives and boundaries was sourced from the relevant part of the National Parks & Wildlife Service website: https://www.npws.ie/protected-sites/spa. Additional information was sourced from the Natura 2000 Standard Data Form (N2K SDF) for each site and the spatial relationship between Natura 2000 sites from the Natura 2000 Network Viewer: http://natura2000.eea.europa.eu/#.

2.3.2 Aquaculture activities

A description of the aquaculture activities and a more detailed Aquaculture Profile, prepared by Bord Iascaigh Mhara (BIM), was provided by the Marine Institute (BIM, 2016). The spatial extent of these activities was described in shapefiles provided by the Marine Institute.

2.3.3 *Waterbird numbers and distribution*

Information on waterbird numbers and distributions has primarily been drawn from two sources – the BirdWatch Ireland (BWI) Irish Wetland Bird Survey (I-WeBS) annual programme of surveys and the National Parks and Wildlife Service (NPWS) Baseline Waterbird Survey (BWS). The data that these surveys gather are summarised below.

BWI I-WeBS

The I-WeBS scheme (BWI, website undated) aims to monitor wintering waterbirds in Ireland. Its objectives are to:

1. Determine the size of waterbird populations.
2. Monitor trends in their numbers and distribution.
3. Identify important sites for waterbirds.
4. Provide information in relation to decision-making regarding developments near wetlands.

The survey involves monthly counts each winter (September to March inclusive) on predefined count days. It seeks to monitor the waterbird populations of wetlands of all types and sizes, including estuaries, coastlines, bays, rivers, turloughs, lakes, streams and flooded fields. I-WeBS is jointly run by BWI and the NPWS.

Currently more than 250 wetland sites are monitored throughout the country. Large sites are counted by a team of counters with recording of the site divided into smaller sub-sites. Coastal sites are counted in a three hour period around high tide. The key statistic generated by these regular winter counts and used in establishing population size and trends is, for each species, the mean of the peak counts from the most recent five year period available (henceforth shortened to the 5 year peak mean). A guidance manual for counters has been published (BirdWatch Ireland, 2008). The sought for regularity and intensity of coverage is not always achieved. The minimum that is sought is three counts with one of those in January. Where there are significant gaps in coverage in any of the sites assessed in this report then that is noted in the relevant site account.

For use in this assessment the Site Summary Tables and site boundaries have been downloaded from the BWI website and the detailed sub-site counts generated by BWI were supplied by the Marine Institute.

Intertidal feeding waterbirds can be expected to occur at different locations during other tidal states and additional counts have been made at some sites around low tide. These were commissioned by NPWS and are described separately below.

NPWS BWS

NPWS commissioned BWI to manage a programme of waterbird counts at SPAs over the low tide period during the winters 2009/10, 2010/11 and 2011/12. A total of 33 SPAs were surveyed. The surveys sought to gain information to understand how waterbirds are distributed across a site at low water when they are feeding, to identify important foraging areas and to inform the conservation management of the SPAs.

The survey programme was for four low tide counts each winter, in the months October, November, December and February. Counts were undertaken by a team of observers

during the period two hours either side of low tide. Sites were divided into sub-sites and where this involved the sub-division of an existing I-WeBS sub-site then the outer boundary of the I-WeBS sub-site was left intact. As well as bird species, number and location, bird behaviour (feeding or roosting/other) was also recorded. A detailed description of the methodology used to collect the low tide data and guidance on data interpretation and use is given in Lewis & Tierney (2014).

For use in this assessment the detailed sub-site counts and maps of flock location were supplied by the Marine Institute.

Although counts of feeding and roosting birds were recorded separately, it is considered that roosting behaviour over the low tide period is usually for a short period before birds resume feeding (for instance oystercatchers go through a 'digestive bottleneck' and cease feeding in order to digest the food they have already swallowed (Zwarts *et al.*, 1996)) and as a result this division was not used in the site assessment. Lewis & Tierney (2014) discuss the limitations in the accuracy with which flocks can be located and in the site assessment the location within the sub-site is the finest detail of bird distribution that is considered.

2.3.4 Other designations

Information on related natural heritage and nature conservation designations e.g. Ramsar sites and Special Area of Conservation, were taken primarily from the NPWS website with information on Ramsar sites being taken from the Ramsar Sites Information Service (https://rsis.ramsar.org/).

2.3.5 Biotopes

Biotope information for each site was taken from the biotope map contained within the relevant NPWS Site-specific Conservation Objectives report or, in the absence of such a biotope map, from the Natura 2000 Standard Data Form or from the report of a survey of biotopes in estuaries in Ireland (Falvey *et al.*, 1997).

2.3.6 Other activities taking place within and adjacent to the site

Information on other activities taking place within and adjacent to the site e.g. recreation and boat activity, was taken from the accounts of sources of disturbance in the NPWS BWS reports, the summary of that provided in the Ballymacoda Bay SPA Conservation Objectives supporting document (NPWS, 2014) and the 'threats, pressures and activities' section of the Natura 2000 Standard Data Form for the relevant site. Additional information on the extent of fisheries activities was provided by the Marine Institute.

2.4 Analysis of waterbird distribution

The main potential impacts on the SPA SCIs are expected to be through effects on the availability and / or the quality of the feeding resource (the food source itself or the ability of the habitat to support that food source). Accordingly the analysis of waterbird distribution focuses on the distribution patterns of feeding, or potentially feeding, birds. Birds roosting at high tide on the shoreline or in terrestrial areas have less potential to be affected by the aquaculture activities. The analysis of waterbird distribution has been primarily of the low tide period distribution at the sub-site level drawn for the NPWS BWS survey dataset. At the sub-site level percentage distributions have been calculated from that data which has not been identified in the dataset as being from counts with poor coverage or low numbers for

other specific reasons. This analysis has been supported by an examination of the I-WeBS dataset and the NPWS BWS flock map data.

2.5 Aquaculture assessment methodology

2.5.1 General approach

The general approach has been to take an activity and pressure pathway approach, analogous to that developed by ABPmer (2013) for the assessment of fisheries and aquaculture activities on habitats within Natura 2000 sites. The approach adopted examines pressures that arise from particular activities and the presence / absence of potential routes / pathways of impact to waterbirds. These pathways may be direct or act indirectly through the quality and availability of food resources (prey) for birds.

To assess impacts on waterbirds the ideal approach to the assessment would be to consider how impacts become manifest at the level of the population supported by the particular site through some form of modelling. Such models have been developed for waterbirds, including species dependent on intertidal mud dwelling invertebrates, through an individual based modelling approach such as that for oystercatcher specifically (Stillman *et al.*, 2003) and wading bird species generally (West *et al.*, 2011). These models examine the balance between energy intake and energy expenditure to predict the likelihood that any particular individual will survive. When the intake of food is not sufficient to maintain body condition then this can lead to mortality during that winter or on return migration to the breeding site or it might lower reproductive output in the following breeding season. All these outcomes can in the long term lower the population present at an overwintering site. Recent application of such a model to wintering waterbirds in an estuary subject to experimental disturbance identified that the energetic costs of individual bird responses were low relative to daily requirements (Collop *et al.*, 2016). The study concluded that disturbance events were unlikely to be frequent enough to seriously limit foraging time, that the populations were not significantly affected by that disturbance and that the conclusion had general applicability to other estuarine sites with comparable disturbance levels, invertebrate food availability and environmental conditions. Such models though require information on food resources and feeding rates, bird densities and levels of, and responses to, disturbance that are rarely available for an individual site and it is not an approach that is feasible for inclusion in this appropriate assessment.

The approach that has been used in other appropriate assessments of aquaculture activities (e.g. Atkins, 2014; Atkins, 2016; informed by Gittings and O'Donoghue, 2012) and that is applied in this appropriate assessment is firstly to examine the extent of spatial overlap between aquaculture activities and bird distribution at low tide. This approach focuses on the potential for the displacement of a significant proportion of the SPA population and is based on the premise that if the activities are not predicted to cause significant displacement, then the activities are not likely to affect the long term population trends. In the cases where the activities, based in high spatial overlap, are predicted to cause significant displacement, the impacts on distribution and population size are considered further. This spatial overlap approach is considered to be precautionary because any site and population level consequences of the assumed displacement will be less than predicted in those cases where suitable habitat remains available and is not occupied by birds to its carrying capacity. That is, there is the potential for locally displaced birds to move and feed elsewhere and survive in good condition but this is not accounted for in the assessment.

As this is an appropriate assessment, it is concerned solely with those bird species that are the SCIs of the relevant SPAs and the conservation objectives that have been set for those bird species. The conservation objectives for waterbirds are framed in terms of two attributes and related targets:

Population trend: Long term population trend stable or increasing

Distribution: No significant decrease in the range, timing and intensity of use of areas other than that occurring from natural patterns of variation.

2.5.2 *Structure of the assessment*

There are three steps in the process of identifying potential impacts on particular bird species of any individual SPA:

- The first step is the 'coarse' screening exercise, described above, which is at the site level and considers which SPAs have the potential to be affected, based on distance from the aquaculture activities.
- This is followed by consideration of the SCI species for each screened in SPA to assess if their habitat requirements and feeding ecology are such that there is no potential for impacts e.g. species that feed and / or nest on terrestrial habitats away from the aquaculture activities.
- The third step examines finer scale bird distribution in relation to aquaculture activities and is the application of the approach based on assessing spatial overlap using in particular the NPWS BWS low tide bird data described above. It also applies the knowledge of individual bird species response to shellfish cultivation on trestles obtained through the study of Gittings and O'Donoghue (2012). At this stage the potential for in-combination effects between aquaculture activities and other activities was assessed. The assessment at this stage considers the potential for any adverse effects identified to impact upon the achievement of the conservation objectives and related targets.

2.5.3 *Identification of potential pressures and impacts*

The European Commission guidance on aquaculture and Natura 2000 sites (EC, 2012) identifies the following issues that can arise from the different types of shellfish culture practised across the EU from northern waters to the Mediterranean:

- Sedimentation
- Infrastructure impact
- Disturbance
- Predator control
- Pathogen transmission
- Alien species

The pressures that have been identified that are particular to waterbirds of intertidal and coastal habitats, and that result from the type of aquaculture activities that are being assessed in this case, are:

- A reduction in food availability through
  - removal of prey species e.g. bivalves, as part of the harvesting process;

  - causing mortality of non commercial invertebrate prey species during aquaculture activities; or
  - alteration of the habitat and the invertebrate communities it supports.

- A reduction in access to food through
  - disturbance to feeding birds reducing their time available to feed; or
  - inter- and intra- species competition as birds are displaced in to areas already occupied by others.

- An increase in energy expenditure through
  - flights away from a source of disturbance.

Through either a decrease in energy intake or an increase in energy expenditure these pressures can lead to the potential impacts of decreasing fitness of individual birds that can then result in reduced survival over-winter or on migration and / or reduced productivity on the breeding grounds.

2.5.4 Assessment of impact magnitude

Potential impacts on SPA SCI species from the aquaculture activity are identified through the spatial overlap between the distribution of the species and the spatial extent of the activity. The percentage overlap is considered to represent the potential magnitude of the impact as it represents the maximum potential displacement in those circumstances where the particular species has a negative response by moving away and is not able to satisfy its feeding requirements elsewhere.

2.5.5 Assessment of impact significance

The significance of any potential impacts identified is assessed against the SCI species conservation objectives and related the attributes and targets. Conservation objectives and favourable conservation condition for non-breeding waterbirds in the relevant SPAs are defined in terms of:

- **The long term population trend** – the trend should be stable or increasing to be deemed favourable (waterbird populations are deemed to be unfavourable when they have declined by 25% or more over a 12-year period)
- **The use of areas within the site** – there should be no significant decrease in the range, timing or intensity of use of areas (other than that occurring from natural patterns of variation) to be deemed favourable.

In relevant SPAs, wetland habitat (as a resource for the waterbirds that utilise it) also has a conservation objective defined. Conservation objectives and favourable conservation condition for wetland habitats are defined in terms of:

- **The area of wetland habitat** – the area should be stable and not significantly less than that defined by designation (other than that occurring from natural patterns of variation) to be deemed favourable.

Impacts have been assessed as potentially having a significant negative impact on a species' long-term population trend if they are predicted to cause:

- Displacement of 25% or more of the population of any particular SCI species in the SPA; or
- Displacement at a level of 5% or greater where the current long-term population trend of any particular SCI species in the SPA is already equal to or greater than 25%; or
- Displacement at a level of 5% or greater that combined with current long-term population trend of any particular SCI species in the SPA could result in a long-term population decline of 25% or more.

Impacts have been assessed as potentially having a significant negative impact on a species' use of areas within the SPA if they are predicted to cause:

- Displacement of 5% or more of the population of any particular SCI species in the SPA.

3. Initial screening

3.1 Is the activity related, or not, to the management of any Natura 2000 site?

The first step in the process applied here is to identify if the activity is directly connected with or necessary to the management of any Natura 2000 site for nature conservation purposes. In this case the activity is aquaculture and it can be concluded that it is not for the management of any Natura 2000 site.

3.2 Screening by spatial scope

A preliminary 'coarse' screening has been applied based on the distance from the aquaculture activities to SPAs with an initial threshold set at 15 km. The purpose of this is to screen out SPAs that are so distant from the location of the aquaculture activities being assessed that detailed consideration of such SPAs and their SCIs is not required.

Those SPAs that are within 15 km of the aquaculture activities in Ballymacoda Bay are (in order of increasing distance):

- Ballymacoda Bay SPA (Site code 004023)
  The aquaculture activities that are the subject of this assessment are located within the SPA.

- Blackwater Estuary SPA (Site code 004028)
  The aquaculture activities that are the subject of this assessment are located ca 4 km to the south west of this SPA.

- Ballycotton Bay SPA (Site code 004022)
  The aquaculture activities that are the subject of this assessment are located ca 7 km to the north east of this SPA.

- Helvick Head to Ballyquin SPA (Site code 004192)
  The aquaculture activities that are the subject of this assessment are located ca 13 km to the south west of this SPA.

It is also noted that Ballycotton Bay, Ballymacoda Bay and the Blackwater Estuary are also Ramsar sites listed for their migratory waterbird populations but that designation does not form part of this assessment.

3.3 Screening by habitat requirements and feeding ecology

This stage considers the SPAs that have been identified above because of spatial proximity and assesses if the habitat requirements and feeding ecology of the SCI species of any of those SPAs are of such a nature that there is no potential for adverse effects. For instance species that feed and / or nest on terrestrial habitats away from the shoreline will not have any routes / pathways to any of the pressures generated by aquaculture activities.

The SCI bird species, grouped by breeding / feeding ecology, of those SPAs that are within 15 km of the aquaculture activities in Ballymacoda Bay are listed below. An evaluation has

been made of any routes / pathways to any of the pressures generated by aquaculture activities.

- Ballymacoda Bay SPA (Site code 004023)
  - SCI species that are intertidal habitat feeders: Wigeon, Teal, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Turnstone, Black-headed Gull, Common Gull and Lesser Black-backed Gull.
    - These species are exposed to the pressures generated by aquaculture activities through identifiable routes / pathways since the aquaculture activities take place within the SPA.
  - There are no other SCI bird species.

- Blackwater Estuary SPA (Site code 004028)
  - SCI species that are intertidal habitat feeders: Wigeon, Golden Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew and Redshank.
    - These species feed on intertidal habitats and there is the potential for them to be exposed to the pressures generated by aquaculture activities if there is an effective route / pathway. In this site specific instance the distance between the two sites means that there is no effective route / pathway for the pressures that have been identified. There is the potential for birds to interchange between this site and Ballymacoda Bay but in that instance those birds become part of the Ballymacoda Bay SPA population and are assessed on that basis.
  - There are no other SCI bird species.

- Ballycotton Bay SPA (Site code 004022)
  - SCI species that are intertidal habitat feeders: Teal, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Turnstone, Common Gull and Lesser Black-backed Gull.
    - These species feed on intertidal habitats and there is the potential for them to be exposed to the pressures generated by aquaculture activities if there is an effective route / pathway. In this site specific instance the distance between the two sites means that there is no effective route / pathway for the pressures that have been identified. There is the potential for birds to interchange between this site and Ballymacoda Bay but in that instance those birds become part of the Ballymacoda Bay SPA population and are assessed on that basis.
  - There are no other SCI bird species.

- Helvick Head to Ballyquin SPA (Site code 004192)
  - There are no SCI species that are intertidal habitat feeders.
  - SCI species that are cliff nesting and feed on marine resources (live fish and discards): Cormorant, Herring Gull and Kittiwake.
    - These species are not exposed to the pressures generated by aquaculture activities because they breed on cliffs away from the location of aquaculture activities and their food resource will not be significantly adversely affected by aquaculture activities.
  - SCI species that are cliff nesting and feed on other birds: Peregrine.
    - This species is not exposed to the pressures generated by aquaculture activities because it breeds on cliffs away from the location of aquaculture activities and its food resource consists of a wide range of bird species found on both terrestrial and coastal habitats.

- SCI species that are cliff nesting and feed on terrestrial invertebrates: Chough.
  - This species is not exposed to the pressures generated by aquaculture activities because it breeds on in caves and redundant buildings away from the location of aquaculture activities and its food resource consists of terrestrial invertebrates gathered from grasslands and above the tideline.

3.4 Conclusion of the initial screening

The site that has been screened in for detailed assessment at the individual SCI bird species level because the aquaculture activity is within the SPA and the species have a habitat use or feeding ecology that makes adverse effects likely is:

Ballymacoda Bay SPA

The sites that have been screened out for detailed assessment at the individual SCI bird species level because the aquaculture activity is distant from the SPA and / or there is not a route / pathway through which any of the pressures generated by aquaculture activities will become manifest are set out in Table 1.

Table 1: SPA and reason for screening out from detailed assessment

Site	Reason for screening out for detailed assessment
Blackwater Estuary SPA	SCI species not exposed to the pressures generated by aquaculture activities because the distance between the two sites means that there is no effective route / pathway for the pressures that have been identified.
Ballycotton Bay SPA	SCI species not exposed to the pressures generated by aquaculture activities because the distance between the two sites means that there is no effective route / pathway for the pressures that have been identified.
Helvick Head to Ballyquin SPA	SCI species not exposed to the pressures generated by aquaculture activities because of the nature and location of their breeding sites and their feeding ecology.

4. Interest features, conservation objectives and bird populations of screened in SPAs

4.1 Ballymacoda Bay SPA

4.1.1 Site overview

Ballymacoda Bay SPA (Site code 004023) stretches north-east from Ballymacoda to within several kilometres of Youghal, Co. Cork. The boundary of the site is illustrated in Figure 2 in Appendix 2. It comprises the estuary of the Womanagh River, a river draining a large agricultural catchment. Part of the tidal section of the river is included in the site and on the seaward side the boundary extends to the low tide mark. The inner part of the estuary is well sheltered by the Ring peninsula, a stabilised sand spit with sand dunes at its northern end and salt marshes on the landward side. Sediment types vary from muds to muddy sands in the inner part to fine rippled sands in the outer exposed part. The intertidal flats are up to one kilometre wide in places. Saltmarsh habitat is well developed in several areas of the site including on the landward side of the sand dunes on the eastern side of the estuary, and along the western side of the estuary and northwards into 'The Duck'. There are also several saltmarsh 'islands' within the estuary at Clonpriest East. A substantial area of the land adjacent to the estuary has resulted from reclamation over the past 150 years. These grassland fields are now used by foraging waterbirds. Common Cord-grass *Spartina anglica* has spread within the estuary since the late 1970s.

The site supports over 20,000 wintering waterbirds, including an internationally important population of Black-tailed Godwit. In addition, it supports nationally important populations of a further 15 species.

Ballymacoda Bay is also a Ramsar site, listed for its migratory waterbird populations.

4.1.2 Special Conservation Interests

The species that are the SCI (qualifying interest features) are set out in Table 2 and total 16 species. The species list has been drawn from the NPWS Conservation Objectives document (Version 1 dated 19 February 2015). The populations are from the 'baseline population' listed in the NPWS Conservation Objectives supporting document (Version 1 dated May 2014) that are based on I-WeBS data for the winters 1995-96 to 1999-00 and from the Natura 2000 Standard Data Form (Version date 2014-09) for which no source years of data is stated. All these species are listed for their wintering (non-breeding) presence.

Table 2: Ballymacoda Bay SPA SCI species and listed populations

Species	NPWS Cons Obj 'baseline population'	N2K SDF listed population
Wigeon	907	1,232
Teal	887	1,170
Ringed Plover	153	236
Golden Plover	10,920	14,480
Grey Plover	535	688
Lapwing	4,063	5,893
Sanderling	98	147
Dunlin	3,192	4,410

Species	NPWS Cons Obj 'baseline population'	N2K SDF listed population
Black-tailed Godwit	765	899
Bar-tailed Godwit	581	792
Curlew	1,145	1,621
Redshank	357	511
Turnstone	137	191
Black-headed Gull	1,560	2,320
Common Gull	1,120	1,220
Lesser Black-backed Gull	5,051	6,285

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

4.1.3 Conservation Objectives

The conservation objectives for all these SCI bird species are expressed in a standard form as:

> To maintain the favourable conservation condition of [species name] in Ballymacoda Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target
Population trend	Percentage change	Long term population trend stable or increasing
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing and intensity of use of areas by [species name], other than that occurring from natural patterns of variation

The conservation objective for the SCI 'Wetlands' is presented as:

> To maintain the favourable conservation condition of the wetland habitat in Ballymacoda Bay SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. This is defined by the following attribute and target:

Attribute	Measure	Target
Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 602 hectares, other than that occurring from natural patterns of variation

4.1.4 Bird populations

The Ballymacoda Bay SPA is covered by the I-WeBS recording site OL401 Ballymacoda Bay. The site is counted as one large count unit. The area covered by the I-WeBS surveys at high tide is illustrated in Figure 3 in Appendix 2, reproduced from the I-WeBS Coverage Mapping website.

The 5 year peak mean derived from the I-WeBS counts for each of the SCI species is presented in Table 3. Over the last five winters (2010-11 to 2014-15) the site was not counted by I-WeBS in 2013-14 and as a result the 5 year peak mean has been calculated from the most recent five winters with available data.

Table 3: I-WeBS derived 5 year peak mean for the Ballymacoda Bay SPA SCI species

SCI species	5 year peak mean
Wigeon	499
Teal	495
Ringed Plover	219
Golden Plover	6,720
Grey Plover	231
Lapwing	1,150
Sanderling	191
Dunlin	805
Black-tailed Godwit	1,034
Bar-tailed Godwit	591
Curlew	453
Redshank	272
Turnstone	168
Black-headed Gull	1,302
Common Gull	633
Lesser Black-backed Gull	3,543

Ballymacoda Bay was counted for the NPWS BWS in the winter of 2010-11. The division of the site in to a series of sub-sites and their relation to the boundary of the SPA is illustrated in Figure 4 in Appendix 2. There were four low tide counts in this winter on 12th October 2010, 10th November 2010, 9th December 2010 and 7th February 2011. There were also high tide roost surveys on 1st November 2010 and 17th January 2011. The data is summarised, in the form of the peak count for the low tide and high tide surveys in Table 4.

Table 4: Ballymacoda Bay SPA SCI species summary of NPWS BWS data

SCI species	Peak number – Low tide survey	Peak number – High tide survey
Wigeon	1,037	1,100
Teal	1,011	855
Ringed Plover	64	36
Golden Plover	5,750	1,233
Grey Plover	212	381
Lapwing	1,492	1,298
Sanderling	158	85
Dunlin	1,005	1,365
Black-tailed Godwit	1,945	552
Bar-tailed Godwit	651	788
Curlew	638	570
Redshank	371	187
Turnstone	27	124
Black-headed Gull	629	76
Common Gull	418	91
Lesser Black-backed Gull	329	42

4.1.5 Bird population trends

The Ballymacoda Bay SPA Conservation Objectives Supporting Document (NPWS, 2014) presents population trends for wildfowl and waders at the site over the periods 1995/96 – 2009/10 (a 14 year period referred to as 'long-term') and over the recent period 2004/05 – 2009/10 (a five year period referred to as 'short-term'). For gulls the trend is based on the difference between 5-year mean over the period 1995/96 – 1999/00 and the 3-year mean over the period 2009/10 – 2011/12. The data presented in Table 4.2 of NPWS (2014) is reproduced in Table 5 below.

Table 5: Ballymacoda Bay SPA SCI species population trends

SCI species	Long-term trend	Short-term trend	Site trend
Wigeon	-16	-27	
Teal	+29	-16	
Ringed Plover	-7	+22	
Golden Plover	-39	-46	
Grey Plover	-15	+3	
Lapwing	-61	-35	
Sanderling	+111	+20	
Dunlin	-55	+1	
Black-tailed Godwit	+207	+42	
Bar-tailed Godwit	+28	+26	
Curlew	-51	+1	
Redshank	+1	+5	
Turnstone	+7	+16	
Black-headed Gull			-73
Common Gull			-91
Lesser Black-backed Gull			-85

4.1.6 Conservation condition of SCI species

The bird population trends set out above have been used to define the conservation condition of the SCI species in relation to Conservation Objective 1 - population trend (conservation condition in relation to Objective 2 - range, timing or intensity of use of areas – is not given in NPWS, 2014). The following criteria relate population trend to conservation condition:

Favourable population = Population is stable/increasing.
Intermediate (unfavourable) = Population decline in the range 1.0 – 24.9%.
Unfavourable population = Population decline in the range 25.0 – 49.9%.
Highly Unfavourable population = Population decline > 50.0%.

The evaluation of conservation condition from NPWS (2014), derived from the 'long-term' population trend, is presented in Table 6 below.

Table 6: Ballymacoda Bay SPA SCI species – conservation condition

SCI species	Conservation condition
Wigeon	Intermediate (unfavourable)
Teal	Favourable
Ringed Plover	Intermediate (unfavourable)
Golden Plover	Unfavourable
Grey Plover	Intermediate (unfavourable)
Lapwing	Highly Unfavourable
Sanderling	Favourable
Dunlin	Highly Unfavourable
Black-tailed Godwit	Favourable
Bar-tailed Godwit	Favourable
Curlew	Highly Unfavourable
Redshank	Favourable
Turnstone	Favourable
Black-headed Gull	Highly Unfavourable
Common Gull	Highly Unfavourable
Lesser Black-backed Gull	Highly Unfavourable

Of the seven wildfowl and wader species that are classed in one of the unfavourable categories, six of those species are also declining at the all-Ireland or international level (Wigeon, Golden Plover, Grey Plover, Lapwing, Dunlin and Curlew). This suggests that it is more widespread factors such as changes in migratory patterns in response to changing climate (Johnston *et al.*, 2013) rather than site level pressures that are the potential cause. The remaining species, where site pressures might be an issue, is Ringed Plover - it is categorised as Intermediate (unfavourable) whilst the all-Ireland trend is stable.

5. Aquaculture activities

5.1 Cultivation of shellfish using the bag and trestle method

5.1.1 History of activity

The Aquaculture Profile (BIM, 2016) notes that there have been licences issued dating back to 1997 for oysters and clams but none of these are now active.

The renewal applications and the new applications (BIM, 2016) to be considered in this assessment are listed in Table 7 with relevant details. The locations of the aquaculture activities listed in Table 7 are illustrated in Figure 5 in Appendix 2, reproduced from Map 4 of the Aquaculture Profile.

Table 7: Aquaculture activities in Ballymacoda Bay

Reference	Type	Area (Ha)	Species
T05/395	Renewal	11.5974	Oysters and mussels
T05/482A	Renewal	7.9266	Oysters
T05/482B	Application	6.2278	Oysters
T05/491A	Renewal	14.74	Oysters and mussels
T05/517A	Application	72.4636	Oysters and mussels
T05/517B	Application	32.2091	Oysters and mussels
T05/545	Application	11.2439	Oysters
T05/575	Application	21.0806	Oysters
T05/595	Application	11.7418	Oysters

All licences (applications and renewals) are within the SPA with the exception of part of T05/491A which extends beyond the eastern flank of the SPA.

5.1.2 Description of activity

The aquaculture activities relate to one method of cultivation only, the bag and trestle method within the intertidal zone. The species of shellfish licenced for cultivation are the Pacific oyster *Crassostrea gigas* and the blue mussel *Mytilus edulis*. Currently only oyster is cultivated. The existing footprint of trestles in Ballymacoda Bay (all within existing licenced areas) is illustrated in Figure 6 in Appendix 2, reproduced from Map 7 of the Aquaculture Profile.

The bag and trestle method uses steel table-like structures in the middle to lower intertidal zone. They are typically arrayed in double rows with wide gaps between the paired rows to allow for access. Trestles typically stand between 0.5 and 0.7 metre in height. In general, the trestles are positioned between mean low water spring (MLWS) and mean low water neap (MLWN). This means that trestles are mostly accessed at the time of spring tides (around 3 – 10 days per month) and on average for between 2 and 5 hours on such days, although access depends on location, tidal and weather conditions. The trestles hold plastic mesh bags fastened to the trestles. The mesh size of the bags and the number of seed per bag depends on stock size. The shellfish are thinned out and graded as they grow. General maintenance work on the trestles and bags includes shaking and turning of bags and hand removal of fouling and seaweed to ensure a flow of water flow through the bags when they are submerged. The shellfish are taken to the handling / sorting facility for

grading and re-packing, and returned to the trestles. Access is by vehicle across the intertidal at low tide. Time to harvest for oysters, depending on intake size, ranges from 2.5 to 4 years, when they will have reached 60 or 80 to the kilo.

The existing licences that are for renewal occupy 6.12% of the SPA (accounting for that part of one licence that extends outside the SPA). The footprint of the existing trestles is wholly within the renewal area and represents 63.20% of the area. The applications for new licences are wholly within the SPA and represent 31.85% of the SPA. It is estimated in the Aquaculture Profile that the trestle footprint of the new application licences would occupy 46.33% of the total new application area.

The main existing and proposed access routes by tractor to the various licence areas (renewals and applications) are illustrated in Figure 7 in Appendix 2, reproduced from Map 10 of the Aquaculture Profile.

The renewal and new application licence locations and access routes are all in the outer section of the Ballymacoda Bay SPA. In relation to the sub-sites that are used in the NPWS BWS low tide counts they only overlap with three of those sub-sites: OL571, OL572 and OL573. Table 8 describes the overlap between individual renewal and new application licence areas and the access routes and the NPWS BWS low tide count sub-sites.

Table 8: Overlap between renewal and new application licence locations and NPWS BWS count sub-sites

Reference	Type	Overlap with NPWS BWS count sub-site
T05/395	Renewal	OL572
T05/482A	Renewal	OL572
T05/482B	Application	OL572
T05/491A	Renewal	OL572
T05/517A	Application	OL571 & OL573
T05/517B	Application	OL572
T05/545	Application	OL572
T05/575	Application	OL571
T05/595	Application	OL572
Northern access route		OL571 & OL573
Southern access route		OL572

In the assessment that follows in the next section, given that the resolution of the location of birds is only to the NPWS BWS count sub-site level, then that assessment is only practical on the basis that any one renewal or new application licence or group of such licences in that sub-site has the potential to affect the birds in that sub-site in proportion to the area that it occupies. Since the precise bird locations are not known then it is not feasible to assess the scale of impact other than in this general way. Also to account for this issue of bird count data being available only at the sub-site level and no more precisely, the assessment is made of renewal and new application licences on a collective basis within the sub-sites as set out in Table 9.

Table 9: Approach to the assessment of sets of licences in relation to the NPWS BWS count sub-sites

Set of licences assessed	NPWS BWS count sub-site(s) included in assessment
All licences and access routes	OL571, OL572 & OL573
All renewal licences and southern access route	OL572
All new application licences and access routes	OL571, OL572 & OL573

5.1.3 Potential impacts

Intertidal shellfish cultivation has the potential to cause alteration to the suitability of intertidal habitat for bird usage through the placement of physical structures (the trestles) on the intertidal habitat. The potential impacts of the trestles can include:

- Alterations to food resources
  - There is the potential for negative effects on benthic invertebrates population through sedimentation and eutrophication below and around the trestles and through traffic on the access routes over the intertidal sediment. The scale of these effects in a study in Ireland was found not to be significant (Forde *et al.*, 2015)
  - There is potential for positive effects as the trestles act as an anchorage for algal species to grow and for invertebrates to then use those as a habitat. Some of the green algal species that grow on the trestles have been noted to be favoured by Light-bellied Brent Geese.
- Interference with bird sightlines, in particular the visibility of potential predators leading to increased vigilance and reduced foraging time.
- Creation of barriers to bird movement.

Intertidal shellfish cultivation has the potential to cause disturbance to birds through the associated human activity gaining access to, and maintaining, the shellfish in bags on the trestles. Such access and maintenance occurs during the low tide periods and as a result does not affect high tide roosts and waterbirds (e.g. diving ducks) that might feed over the area of the trestles when they are covered at high tide.

The study of intertidal oyster culture and potential effects on the distribution of waterbirds that in its experimental design considered the response both to the presence of the trestles and people active around them (Gittings and O'Donoghue, 2012) found that:

- The species that exhibited a neutral / positive response were all waders that will feed on a variety of substrates including mixed sediment or rocky shores and tend to feed in small flocks – Turnstone; or as widely dispersed individuals / loose flocks - Oystercatcher, Curlew, Greenshank and Redshank.
- The species that exhibited a negative response were mainly species that tend to feed on open mudflats or sandflats in large flocks of tightly packed individuals - Knot, Sanderling, Dunlin, Black-tailed Godwit and Bar-tailed Godwit, and to a lesser extent Ringed Plover.
- The response of Grey Plover did not follow the above general pattern. They exhibited a strong negative response but are a species that tends to feed as widely dispersed individuals / loose flocks. Grey Plovers can maintain feeding territories and it is possible that the oyster trestles interfere with this territorial behaviour.

It drew the following conclusions on classifying the response of waterbirds:

- Neutral/positive response: Oystercatcher, Curlew, Redshank, Greenshank and Turnstone.
- Possible neutral/positive response: Little Egret and Grey Heron.
- Variable response (response varies between sites): Light-bellied Brent Goose, Black-headed Gull, Common Gull and Herring Gull.
- Possible variable response: Lesser Black-backed Gull.
- Negative response: Shelduck, Ringed Plover, Lapwing, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Great Black-backed Gull.
- Possible negative response: Wigeon, Teal, Mallard, Pintail, Shoveler and Golden Plover.
- Exclusion (completely excluded from oyster trestles blocks): Grey Plover and Knot.

This classification has been used within the individual SCI species assessment.

6. Assessment of the Ballymacoda Bay SPA SCI species

The assessment considers each SCI species in turn, identifying its status (population in the SPA, trends and current conservation condition), its distribution across the site and in relation to the aquaculture activities, its response to the aquaculture activities and the scale and significance of any impact identified.

6.1 Wigeon

6.1.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 907 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 499 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 1,037 individuals and from the high tide count was 1,100 individuals in the non-breeding season.

The species population trend over the long term is -16 and over the short term is -27.

The current conservation condition is "Intermediate (unfavourable)".

6.1.2 Distribution

Wigeon was widely recorded during the NPWS BWS counts, occurring in 10 of the total 11 sub-sites. Two sub-sites recorded the species during all five counts: 0L573 (Pilmore (Black Rock)) and 0L574 (Clonpriest East to Ring Point); while seven sub-sites recorded the species in three or more low tide surveys: 0L350, 0L553, 0L555, 0L556, 0L572, 0L573 and 0L574. The peak sub-site count (424) was recorded within 0L574 (Clonpriest East to Ring Point) on 12/10/10.

Wigeon were recorded foraging in intertidal, subtidal, supratidal and terrestrial habitats. Intertidal foraging was recorded across seven sub-sites (0L553, 0L555, 0L556, 0L572, 0L573, 0L574 and 0L810) but all of these with the exception of 0L574, recorded foraging individuals just once during low tide surveys. 0L574 (Clonpriest East to Ring Point) supported foraging Wigeon in all surveys and peak numbers in two low tide surveys, plus the peak number (accounting for 83% of the total recorded) during the high tide survey and was therefore the clearly favoured sub-site. The outer subsite 0L572 (Ring Strand) recorded peak numbers in two low tide surveys and 0L573 (Pilmore (Black Rock)) was notable in supporting numbers ranked in the top three during three low tide surveys..

6.1.3 Response of Wigeon to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Possible negative response".

6.1.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together

along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 10.

Table 10: Potential displacement of Wigeon based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	**Peak number – Low tide survey**	**% of baseline population**
OL571	0	0.0%
OL572	214	23.6%
OL573	64	7.1%
1-3 Combined	278	30.7%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	3.8%
New licences	40.5%	12.4%
All licences	49.4%	15.1%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 3.8%, noting that this species has been identified as having a possible negative response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Wigeon population of Ballymacoda Bay SPA.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 12.4%, noting that this species has been identified as having a possible negative response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur but it is probably going to be in excess of 5% without further management measures. It is concluded that the application for the new licences alone will have an adverse impact on the Wigeon population of Ballymacoda Bay SPA and that additional measures should be considered.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 15.1%, noting that this species has been identified as having a possible negative response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the new applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate

in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur but it is probably going to be in excess of 5% without further management measures. It is concluded that the application for the renewal of the existing licences together with the new licences will have an adverse impact on the Wigeon population of Ballymacoda Bay SPA and that additional measures should be considered.

6.2 Teal

6.2.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 887 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 495 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 1,011 individuals and from the high tide count was 855 individuals in the non-breeding season.

The species population trend over the long term is +29 and over the short term is -16.

The current conservation condition is "Favourable".

6.2.2 Distribution

Teal was widely recorded during the NPWS BWS counts, occurring in ten sub-sites overall across the survey programme (all except 0L570). Five sub-sites recorded this species during all five surveys completed: 0L350, 0L555, 0L556, 0L574 and 0L810. Peak numbers were held by 0L350 (Crompaun South (Womanagh River)), 0L574 (Clonpriest East to Ring Point) and 0L553 (Crompaun Bridge) for the four low tide surveys. 0L574 also held peak numbers during the high tide survey. The overall peak sub-site count was 531 individuals within 0L574 (Clonpriest East to Ring Point) on 09/12/10.

The majority of foraging Teal were recorded in intertidal or subtidal habitat. More Teal foraged intertidally than subtidally during all surveys. Intertidal foraging was recorded in eight sub-sites (0L350, 0L553, 0L555, 0L556, 0L569, 0L573, 0L574 and 0L810) and most regularly in two (0L574 and 0L810). Peak numbers were held by 0L810 (Ballymacoda Marsh (South of Crompaun Bridge), 0L556 (The Duck) and 0L574 (Clonpriest East to Ring Point) for the four respective low tide survey dates. These three inner estuary sub-sites generally held the greatest numbers of Teal during all low tide surveys. Subtidal foraging was most regularly recorded for 0L574 (Clonpriest East to Ring Point) that held peak numbers during the first three low tide surveys. Peak numbers on 07/02/11 were held by 0L556 (The Duck). Supratidal foraging was recorded on two occasions in 0L574 (Clonpriest East to Ring Point).

6.2.3 Response of Teal to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Possible negative response".

6.2.4 *Impact assessment*

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 11.

Table 11: Potential displacement of Teal based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	**Peak number – Low tide survey**	**% of baseline population**
OL571	0	0.0%
OL572	5	0.6%
OL573	26	2.9%
1-3 Combined	31	3.5%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	0.1%
New licences	40.5%	1.4%
All licences	49.4%	1.7%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 0.1%, noting that this species has been identified as having a possible negative response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Teal population of Ballymacoda Bay SPA.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 1.4%, noting that this species has been identified as having a possible negative response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that the application for the new licences alone will not have an adverse impact on the Teal population of Ballymacoda Bay SPA.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 1.7%, noting that this species has been identified as having a possible negative response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that the application for the renewal of the existing licences together with the new licences will not have an adverse impact on the Teal population of Ballymacoda Bay SPA.

6.3 Ringed Plover

6.3.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 153 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 219 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 64 individuals and from the high tide count was 36 individuals in the non-breeding season.

The species population trend over the long term is -7 and over the short term is +22.

The current conservation condition is "Intermediate (unfavourable)".

6.3.2 Distribution

Ringed Plovers were recorded in a total of five sub-sites throughout the survey programme (0L570, 0L571, 0L572, 0L573 and 0L574), but sub-site use during individual surveys ranged from two to four sub-sites. 0L571 (Pilmore (Barrel Rocks)) was the only sub-site to record this wader in all low tide surveys but held low numbers (maximum five individuals). Peak numbers were held by 0L573 (Pilmore (Black Rock)), 0L570 (Clonard East) and 0L572 (Ring Strand) for the four respective low tide survey dates. 0L572 (Ring Strand) recorded 36 Ringed Plover during the high tide survey. The peak sub-site count was 47 individuals recorded for 0L573 (Pilmore (Black Rock) on 12/10/10.

Ringed Plovers foraged intertidally across five sub-sites (0L570, 0L571, 0L572, 0L573 and 0L574); predominately outer bay sub-sites. Peak numbers were recorded within 0L573 (Pilmore (Black Rock) (12/10/10 and 09/12/10), 0L572 (Ring Strand) (jointly on 09/12/10) and 0L570 (Clonard East) (10/11/10 and 07/02/11). Low numbers foraged in all four low tide surveys in 0L571 (Pilmore (Barrel Rocks)). The outer bay sub-sites are characterised by a sand substrate with an invertebrate community of polychaetes and bivalves.

6.3.3 Response of Ringed Plover to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Negative response".

6.3.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 12.

Table 12: Potential displacement of Ringed Plover based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	Peak number – Low tide survey	% of baseline population
OL571	5	3.3%
OL572	11	7.2%
OL573	47	30.7%
1-3 Combined	63	41.2%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	1.2%
New licences	40.5%	16.7%
All licences	49.4%	20.3%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 1.2%, noting that this species has been identified as having a negative response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Ringed Plover population of Ballymacoda Bay SPA.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 16.7%, noting that this species has been identified as having a negative response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur but it is probably going to be in excess of 5% without further management measures. It is concluded that the application for the new licences alone will have an adverse impact on the Ringed Plover population of Ballymacoda Bay SPA and that additional measures should be considered.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 20.3%, noting that this species has been identified as having a negative response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the new applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur but it is probably going to be in excess of 5% without further management measures. It is concluded that the application for the

renewal of the existing licences together with the new licences will have an adverse impact on the Ringed Plover population of Ballymacoda Bay SPA and that additional measures should be considered.

6.4 Golden Plover

6.4.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 10,920 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 6,720 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 5,750 individuals and from the high tide count was 1,233 individuals in the non-breeding season.

The species population trend over the long term is -39 and over the short term is -46.

The current conservation condition is "Unfavourable".

6.4.2 Distribution

Golden Plovers were recorded in five sub-sites overall: 0L555, 0L556, 0L571, 0L572 and 0L574 but apart from 0L555 (Ballykineely) these sub-sites recorded this species only once during low tide surveys. 0L555 recorded peak numbers on 10/11/10 and 07/02/11 and 0L572 (Ring Strand) held peak numbers on 12/10/10. The peak sub-site count of 5,750 was recorded for 0L555 (Ballykineely) on 10/11/10.

Two observations of intertidally foraging individuals were made. Three individuals foraged within 0L556 (The Duck) on 12/10/10 and 100 individuals foraged intertidally within 0L555 (Ballykineely) on 10/11/10. Tidal flats are used more as a roosting/resting habitat and the birds tend to favour large, open tidal flats. As a consequence, Golden Plovers tend to be in large aggregations when observed upon tidal flats. Intertidal roosting was recorded within 0L555, 0L556, 0L571, 0L572 and 0L574. The peak number recorded were 4,000 within 0L555 (Ballykineely) on 10/11/10. This large flock had been observed earlier in the survey roosting intertidally in the south of 0L572 (Ring Strand). 0L555 also recorded 1,190 intertidally-roosting individuals on 07/02/11 and 1,200 during the high tide count on 17/01/11. 0L572 (Ring Strand) held 700 roosting individuals on 12/10/10 accounting for 99% of all Golden Plovers recorded on this date. The high tide roost survey (01/11/10) recorded one flock of 5,000 roosting Golden Plover in the grassland of 0L350 (Crompaun South (Womanagh River)), outside of the SPA boundary.

6.4.3 Response of Golden Plover to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Possible negative response".

6.4.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together

along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 13.

Table 13: Potential displacement of Golden Plover based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	**Peak number – Low tide survey**	**% of baseline population**
OL571	189	1.7%
OL572	700	6.4%
OL573	0	0.0%
1-3 Combined	889	8.1%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	1.0%
New licences	40.5%	3.3%
All licences	49.4%	4.0%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 1.0%, noting that this species has been identified as having a possible negative response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Golden Plover population of Ballymacoda Bay SPA.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 3.3%, noting that this species has been identified as having a possible negative response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that the application for the new licences alone will not have an adverse impact on the Golden Plover population of Ballymacoda Bay SPA.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 4.0%, noting that this species has been identified as having a possible negative response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that the application for the renewal of the existing licences together with the new licences will not have an adverse impact on the Golden Plover population of Ballymacoda Bay SPA.

6.5 Grey Plover

6.5.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 535 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 231 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 212 individuals and from the high tide count was 381 individuals in the non-breeding season.

The species population trend over the long term is -15 and over the short term is +3.

The current conservation condition is "Intermediate (unfavourable)".

6.5.2 Distribution

Grey Plovers were recorded widely during the NPWS BWS counts and in all 11 sub-sites. Peak counts were recorded for 0L571 (Pilmore (Barrel Rocks)), 0L574 (Clonpriest East to Ring Point), 0L555 (Ballykineely) and 0L572 (Ring Strand) for the four respective low tide survey dates. The sub-site peak count was 141 individuals (0L572 (Ring Strand) on 07/02/11) and this sub-site also held peak numbers during the high tide survey when 345 individuals accounted for 91% of all Grey Plovers recorded on that date.

Grey Plovers foraged in all 11 sub-sites and six sub-sites recorded this species during all four low tide surveys: 0L569, 0L570, 0L571, 0L572, 0L573 and 0L574. All foraging was in intertidal habitat. 0L571 (Pilmore (Barrel Rocks)) held peak numbers on 12/10/10 and numbers ranked as second highest during all other low tide surveys. This outer estuary sub-site is characterised by a sand substrate with an invertebrate community of polychaetes and bivalves. 0L574 (Clonpriest East to Ring Point) held peak numbers on 10/11/10 and numbers ranked in the top four sub-sites during all other low tide surveys. 0L556 (The Duck) held peak numbers on 09/12/10 and 0L572 (Ring Strand) held peak numbers on 07/02/11.

6.5.3 Response of Grey Plover to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Exclusion".

6.5.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 14.

Table 14: Potential displacement of Grey Plover based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	Peak number – Low tide survey	% of baseline population
OL571	53	9.9%
OL572	141	26.4%
OL573	15	2.8%
1-3 Combined	209	39.1%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	4.2%
New licences	40.5%	15.8%
All licences	49.4%	19.3%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 4.2%, noting that this species has been identified as having a response to aquaculture trestles of 'exclusion'. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Grey Plover population of Ballymacoda Bay SPA.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 15.8%, noting that this species has been identified as having a response to aquaculture trestles of 'exclusion'. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur but it is probably going to be in excess of 5% without further management measures. It is concluded that the application for the new licences alone will have an adverse impact on the Grey Plover population of Ballymacoda Bay SPA and that additional measures should be considered.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 19.3%, noting that this species has been identified as having a response to aquaculture trestles of 'exclusion'. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the new applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur but it is probably going to be in excess of

5% without further management measures. It is concluded that the application for the renewal of the existing licences together with the new licences will have an adverse impact on the Grey Plover population of Ballymacoda Bay SPA and that additional measures should be considered.

6.6 Lapwing

6.6.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 4,063 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 1,150 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 1,492 individuals and from the high tide count was 1,298 individuals in the non-breeding season.

The species population trend over the long term is -61 and over the short term is -35.

The current conservation condition is "Highly Unfavourable".

6.6.2 Distribution

During the NPWS BWS counts Lapwings were recorded within nine sub-sites (0L350, 0L553, 0L555, 0L556, 0L569, 0L571, 0L572, 0L574 and 0L810). 0L555 (Ballykineely) supported peak numbers during three low tide surveys and the peak sub-site count of 519 Lapwings on 07/02/11. 0L810 (Ballymacoda Marsh (South of Crompaun Bridge)) held peak numbers (323) on 12/10/10.

Small numbers of Lapwings were recorded foraging intertidally across seven sub-sites (0L350, 0L553, 0L555, 0L556, 0L572, 0L574 and 0L810). The peak number was 17 individuals within 0L572 (Ring Strand) on 07/02/11. Terrestrial foraging was recorded widely and in association with seven sub-sites: 0L350, 0L553, 0L555, 0L556, 0L571, 0L574 and 0L810. The largest numbers were recorded in the terrestrial habitat (grassland) of 0L555 (outside the SPA boundary). Lapwings were recorded roosting intertidally within seven sub-sites: 0L350, 0L555, 0L556, 0L569, 0L572, 0L574 and 0L810 during low tide surveys. Peak numbers were recorded for 0L555, 0L556, 0L572 and 0L556 for the four respective low tide survey dates.

6.6.3 Response of Lapwing to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Negative response".

6.6.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 15.

Table 15: Potential displacement of Lapwing based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	Peak number – Low tide survey	% of baseline population
OL571	20	0.5%
OL572	56	1.4%
OL573	0	0.0%
1-3 Combined	76	1.9%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	0.2%
New licences	40.5%	0.8%
All licences	49.4%	0.9%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 0.2%, noting that this species has been identified as having a negative response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Lapwing population of Ballymacoda Bay SPA.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 0.8%, noting that this species has been identified as having a negative response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that the application for the new licences alone will not have an adverse impact on the Lapwing population of Ballymacoda Bay SPA.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 0.9%, noting that this species has been identified as having a negative response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that the application for the renewal of the existing licences together with the new licences will not have an adverse impact on the Lapwing population of Ballymacoda Bay SPA.

6.7 Sanderling

6.7.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 98 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 191 individuals in the non-breeding season. The peak count from the

NPWS BWS low tide counts was 158 individuals and from the high tide count was 85 individuals in the non-breeding season.

The species population trend over the long term is +111 and over the short term is +20.

The current conservation condition is "Favourable".

6.7.2 Distribution

The NPWS BWS identified that Sanderlings had a relatively restricted distribution, recorded in just three sub-sites (0L570, 0L572 and 0L573). Each of these supported peak numbers on different survey dates but the highest numbers on two occasions were recorded in 0L572 (Ring Strand).

Sanderlings were recorded foraging intertidally in three sub-sites: 0L570 (Clonard East), 0L572 (Ring Strand) and 0L573 (Pilmore (Black Rock)). These are all outer bay sub-sites that face the open sea and have a tide edge, a location favoured by foraging Sanderling, and have a sand substrate with an invertebrate community of polychaetes and bivalves. Peak numbers for the four low tide surveys were held by 0L572, 0L570, 0L572 and 0L573, the latter however relating to just six individuals that were recorded foraging on that date. Overall 0L572 (Ring Strand) and 0L573 (Pilmore (Black Rock)) held Sanderlings with most regularity and were the clearly favoured sub-sites, with 0L572 holding larger numbers overall. 0L572 Ring Strand supported the highest numbers recorded with 106 and 122 individuals on 12/10/10 and 09/12/10. Sanderlings were not recorded in association / near the aquaculture trestles that occur on the lower shore in this sub-site.

6.7.3 Response of Sanderling to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Negative response".

6.7.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 16.

Table 16: Potential displacement of Sanderling based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	Peak number – Low tide survey	% of baseline population
OL571	0	0.0%
OL572	122	124.5%
OL573	52	53.1%
1-3 Combined	174	177.6%

NPWS BWS count sub-site	Peak number – Low tide survey	% of baseline population
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	20.0%
New licences	40.5%	71.8%
All licences	49.4%	87.7%

The percentage of the baseline population that has been identified as occurring in certain sub-sites exceeds 100%. This is because the baseline population was set at 98 individuals based on counts at Ballymacoda Bay in the winters 1995-96 to 1999-00. The trend since then has been for increasing populations at the site (+111 in the long term). An alternative evaluation can be considered based on the most recent 5 year peak mean population from I-WeBS. This is of 191 individuals. If this population is used in the calculations presented in the Table above, the figures then become OL571: 0.0% of the I-WeBS 5 year peak mean; OL572: 63.9% of the I-WeBS 5 year peak mean; OL573: 27.2% of the I-WeBS 5 year peak mean; and OL571-3 combined: 91.1% of the I-WeBS 5 year peak mean. Accounting for the spatial overlap of aquaculture licences, the potential % bird displacement becomes Renewal licences: 10.3%; New licences: 36.9%; and All licences: 45.0%. These figures remain in excess of the 5% level that is considered significant.

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 20.0% (reducing to 10.3% if the most recent I-WeBS 5 year mean peak is considered), noting that this species has been identified as having a negative response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that renewal of the existing licences alone will have an adverse impact on the Sanderling population of Ballymacoda Bay SPA and that additional measures should be considered.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 71.8% (reducing to 36.9% if the most recent I-WeBS 5 year mean peak is considered), noting that this species has been identified as having a negative response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur but it is probably going to be in excess of 5% without further management measures. It is concluded that the application for the new licences alone will have an adverse impact on the Sanderling population of Ballymacoda Bay SPA and that additional measures should be considered.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 87.7% (reducing to 45.0% if the most recent I-WeBS 5 year mean peak is considered), noting that this species has been identified as having a negative response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring

additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the new applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur but it is probably going to be in excess of 5% without further management measures. It is concluded that the application for the renewal of the existing licences together with the new licences will have an adverse impact on the Sanderling population of Ballymacoda Bay SPA and that additional measures should be considered.

6.8 Dunlin

6.8.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 3,192 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 805 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 1,005 individuals and from the high tide count was 1,365 individuals in the non-breeding season.

The species population trend over the long term is -55 and over the short term is +1.

The current conservation condition is "Highly Unfavourable".

6.8.2 Distribution

Peak numbers during low tide surveys were recorded within 0L574 (Clonpriest East to Ring Point), 0L555 (Ballykineely) and 0L572 (Ring Strand). The low tide sub-site peak count of 316 Dunlin was recorded for 0L572 on 09/12/10. However a higher sub-site peak count was recorded by 0L572 (753 Dunlin) during the high tide survey (17/01/11).

The majority of Dunlin were recorded foraging during surveys. Peak numbers foraging intertidally during low tide surveys were recorded within 0L574 (Clonpriest East to Ring Point), 0L555 (Ballykineely) and 0L572 (Ring Strand). 0L574 (Clonpriest East to Ring Point) also recorded the large number of 753 foraging Dunlin during the high tide survey including a single flock of 680 individuals that foraged in the south of the sub-site along with a large number of other species. When the tide rose the Dunlin flew off and landed in 0L572 (Ring Strand). 0L574 (Clonpriest East to Ring Point) and 0L555 (Ballykineely) are mid-estuarine sub-sites characterised by a muddier substrate. In contrast, 0L572 (Ring Strand) is a sandier outer bay sub-site. 0L553 (Crompaun Bridge) held good numbers on occasion, for example 96 individuals on 12/10/10. 0L556 (The Duck) supported numbers ranked as second highest on two survey occasions with a sub-site peak number of 190 Dunlin recorded on 10/11/10. 0L810 (Ballymacoda Marsh (South of Crompaun Bridge)) also held good numbers on occasion with a sub-site peak count of 86 foraging Dunlin on 10/11/10.

6.8.3 Response of Dunlin to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Negative response".

6.8.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 17.

Table 17: Potential displacement of Dunlin based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	**Peak number – Low tide survey**	**% of baseline population**
OL571	152	4.8%
OL572	316	9.9%
OL573	51	1.6%
1-3 Combined	519	16.3%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	1.6%
New licences	40.5%	6.6%
All licences	49.4%	8.0%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 1.6%, noting that this species has been identified as having a negative response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Dunlin population of Ballymacoda Bay SPA.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 6.6%, noting that this species has been identified as having a negative response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur and that it will be below the 5% level identified as significant (given that currently it is marginally above at

6.6%). It is concluded that the application for the new licences alone will not have an adverse impact on the Dunlin population of Ballymacoda Bay SPA.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 8.0%, noting that this species has been identified as having a negative response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the new applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur but it is probably going to be in excess of 5% without further management measures. It is concluded that the application for the renewal of the existing licences together with the new licences will have an adverse impact on the Dunlin population of Ballymacoda Bay SPA and that additional measures should be considered.

6.9 Black-tailed Godwit

6.9.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 765 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 1,034 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 1,945 individuals and from the high tide count was 552 individuals in the non-breeding season.

The species population trend over the long term is +207 and over the short term is +42.

The current conservation condition is "Favourable".

6.9.2 Distribution

Black-tailed Godwits were recorded by the NPWS BWS counts in ten sub-sites overall (all except 0L570). Seven sub-sites held this species during all five surveys: 0L350, 0L553, 0L555, 0L556, 0L569, 0L574 and 0L810. Peak numbers during low tide surveys were held by 0L572 (Ring Strand), 0L555 (Ballykineely), 0L574 (Clonpriest East to Ring Point) and 0L553 (Crompaun Bridge) for the four respective survey dates. The sub-site peak count was 961 individuals recorded for 0L555 on 10/11/10.

Black-tailed Godwits were recorded foraging intertidally in nine sub-sites (0L350, 0L553, 0L555, 0L556, 0L569, 0L572, 0L573, 0L574 and 0L810). Peak numbers were held by 0L572 (Ring Strand) in the outer bay during October 2010 when a count of 172 individuals was recorded; the largest sub-site count recorded throughout the survey programme. The majority of these birds were located in the south of the sub-site either side of a channel that ran from the open sea inwards (westwards) then along the western boundary of the sub-site between piled seaweed and the beach. The outer bay sub-site 0L573 (Pilmore (Black Rock)) held peak numbers (50) on 09/12/10, the birds located on the lower shore, with very low

numbers on one other occasion. The outer bay sub-sites are characterised by a sand substrate with an invertebrate community of polychaetes and bivalves. On the other two low tide survey occasions peak numbers were recorded by the sub-site 0L555 (Ballykineely) which is a mid-estuarine sub-site with a muddier substrate. 0L574 (Clonpriest East to Ring Point), also a mid-estuary sub-site, was notable for always supporting numbers ranked in the top three and recording peak numbers foraging intertidally during the high tide survey (23). Terrestrial foraging was a regular occurrence, and in most low tide surveys more individuals foraged terrestrially than intertidally.

6.9.3 Response of Black-tailed Godwit to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Negative response".

6.9.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 18.

Table 18: Potential displacement of Black-tailed Godwit based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	**Peak number – Low tide survey**	**% of baseline population**
OL571	0	0.0%
OL572	351	45.9%
OL573	50	6.5%
1-3 Combined	401	52.4%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	7.4%
New licences	40.5%	21.2%
All licences	49.4%	25.9%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 7.4%, noting that this species has been identified as having a negative response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that renewal of the existing licences alone will have an adverse impact on the Black-tailed Godwit population of Ballymacoda Bay SPA and that additional measures should be considered.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 21.2%, noting that this species has been identified as having a negative response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this

assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur but it is probably going to be in excess of 5% without further management measures. It is concluded that the application for the new licences alone will have an adverse impact on the Black-tailed Godwit population of Ballymacoda Bay SPA and that additional measures should be considered.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 25.9%, noting that this species has been identified as having a negative response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the new applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur but it is probably going to be in excess of 5% without further management measures. It is concluded that the application for the renewal of the existing licences together with the new licences will have an adverse impact on the Black-tailed Godwit population of Ballymacoda Bay SPA and that additional measures should be considered.

6.10 Bar-tailed Godwit

6.10.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 581 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 591 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 651 individuals and from the high tide count was 788 individuals in the non-breeding season.

The species population trend over the long term is +28 and over the short term is +26.

The current conservation condition is "Favourable".

6.10.2 Distribution

In the NPWS BWS counts Bar-tailed Godwits were relatively widespread and recorded in 10 sub-sites overall (all except 0L553). Six sub-sites recorded the species in all four low tide surveys: 0L555, 0L569, 0L570, 0L571, 0L572 and 0L574. 0L571 (Pilmore (Barrel Rocks)) held peak numbers on 12/10/10, thereafter 0L570 (Clonard East) held peak numbers in all low tide surveys and recorded the sub-site peak count of 345 individuals on 07/02/11.

Bar-tailed Godwits were recorded foraging within 10 sub-sites overall (all except 0L553) so both outer and inner estuarine sub-sites were utilised. However, peak numbers of foraging individuals were held by the outer bay sub-sites in all four low tide surveys with 0L570 and 0L571 appearing to be most favoured. 0L571 (Pilmore (Barrel Rocks)) held peak numbers on 12/10/10 and numbers ranked as second highest in all other low tide surveys. 0L570 (Clonard East) held peak numbers on 10/11/10, 09/12/10 and 07/02/11, and recorded the sub-site peak count of 345 individuals on 07/02/11. 0L572 (Ring Strand) was notable for supporting good numbers in all surveys while 0L573 (Pilmore (Black Rock)) held numbers ranked in the top four in three surveys. The birds often foraged at the tide edge. The outer bay sub-sites are characterised by a sand substrate with an invertebrate community of polychaetes and bivalves.

6.10.3 Response of Bar-tailed Godwit to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Negative response".

6.10.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 19.

Table 19: Potential displacement of Bar-tailed Godwit based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	**Peak number – Low tide survey**	**% of baseline population**
OL571	276	47.5%
OL572	72	12.4%
OL573	34	5.9%
1-3 Combined	382	65.7%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	2.0%
New licences	40.5%	26.6%
All licences	49.4%	32.5%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 2.0%, noting that this species has been identified as having a negative response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Bar-tailed Godwit population of Ballymacoda Bay SPA.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 26.6%, noting that this species has been identified as having a negative response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur but it is probably going to be in excess of 5% without further management measures. It is concluded that the application for the new licences alone will have an adverse impact on the Bar-tailed Godwit population of Ballymacoda Bay SPA and that additional measures should be considered.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 32.5%, noting that this species has been identified as having a negative response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the new applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur but it is probably going to be in excess of 5% without further management measures. It is concluded that the application for the renewal of the existing licences together with the new licences will have an adverse impact on the Bar-tailed Godwit population of Ballymacoda Bay SPA and that additional measures should be considered.

6.11 Curlew

6.11.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 1,145 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 453 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 638 individuals and from the high tide count was 570 individuals in the non-breeding season.

The species population trend over the long term is -51 and over the short term is +1.

The current conservation condition is "Highly Unfavourable".

6.11.2 Distribution

In the NPWS BWS counts Curlews were widespread and occurred in all 11 sub-sites. Sub-site use during individual low tide surveys ranged from nine sub-sites to 11 sub-sites. Six sub-sites recorded Curlews in all five surveys undertaken: 0L350, 0L553, 0L555, 0L556,

0L574 and 0L810. Peak numbers in October 2010 were held by 0L556 (The Duck) and this sub-site recorded numbers ranked as second highest in all other surveys (including the high tide survey). 0L555 (Ballykineely) supported peak numbers on 10/11/10 and 07/02/11 while 0L553 (Crompaun Bridge) held peak numbers on 09/12/10. 0L555 (Ballykineely) recorded the sub-site peak count of 263 Curlew (10/11/10).

Intertidally foraging Curlews were recorded in all 11 sub-sites. 0L572 (Ring Strand) held peak numbers foraging intertidally in all low tide surveys with birds reasonably well distributed across the sub-site. This outer bay sub-site is characterised by a sand substrate with an invertebrate community of polychaetes and bivalves. 0L556 (The Duck) held joint peak numbers on 07/02/11. 0L555 (Ballykineely) and 0L574 (Clonpriest East to Ring Point) recorded good numbers in all surveys, with numbers ranked in the top five in all. These three sub-sites occur in the inner/mid estuary and are characterised by a muddier substrate. Terrestrial foraging was recorded widely and in association with five sub-sites: 0L350, 0L553, 0L555, 0L556 and 0L571, often outside of the SPA boundary.

6.11.3 Response of Curlew to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Neutral/positive response".

6.11.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 20.

Table 20: Potential displacement of Curlew based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	**Peak number – Low tide survey**	**% of baseline population**
OL571	28	2.4%
OL572	104	9.1%
OL573	10	0.9%
1-3 Combined	142	12.4%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	1.5%
New licences	40.5%	5.0%
All licences	49.4%	6.1%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 1.5%, noting that this species has been identified as having a neutral/positive response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and this species is known not to have a negative response to aquaculture trestles. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Curlew population of Ballymacoda Bay SPA.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 5.0%, noting that this species has been identified as having a neutral/positive response to aquaculture trestles. This is at the level that has been identified as a potentially significant impact and this species is known not to have a negative response to aquaculture trestles. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Curlew population of Ballymacoda Bay SPA.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 6.1%, noting that this species has been identified as having a neutral/positive response to aquaculture trestles. This is marginally above the level that has been identified as a potentially significant impact but this species is known not to have a negative response to aquaculture trestles. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Curlew population of Ballymacoda Bay SPA.

6.12 Redshank

6.12.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 357 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 272 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 371 individuals and from the high tide count was 187 individuals in the non-breeding season.

The species population trend over the long term is +1 and over the short term is +5.

The current conservation condition is "Favourable".

6.12.2 Distribution

In the NPWS BWS counts Redshanks were widespread and recorded within all 11 sub-sites and all except two of these recorded this wader in all five surveys undertaken. 0L555 (Ballykineely) held peak numbers in three low tide surveys (12/10/10, 10/11/10 and 07/02/11) and 0L572 (Ring Strand) held peak numbers on 09/12/10, with numbers ranked as second highest in two other low tide surveys. 0L555 (Ballykineely) recorded the sub-site peak count of 82 Redshank (12/10/10).

Redshanks foraged intertidally across all 11 sub-sites and all bar 0L573 (Pilmore (Black Rock)) recorded foraging individuals during all four low tide surveys. 0L555 (Ballykineely) held peak numbers in three low tide surveys (12/10/10, 10/11/10 and 07/02/11). This sub-site is in the inner estuary and is characterised by a muddy substrate. 0L572 (Ring Strand) held peak numbers on 09/12/10, plus numbers ranked as second highest in two other low tide surveys. This outer bay sub-site is characterised by a sand substrate with an invertebrate community of polychaetes and bivalves. Redshank tended to occur in the inner (shoreward) areas of this sub-site and to be widely distributed. Also of note was 0L574 (Clonpriest East to Ring Point) that supported numbers ranked in the top three during three low tide surveys, plus the peak number foraging intertidally during the high tide survey (17/01/11). 0L810 (Ballymacoda Marsh (South of Crompaun Bridge)) also supported numbers ranked in the top three during three low tide surveys. Terrestrial foraging was recorded irregularly.

6.12.3 Response of Redshank to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Neutral/positive response".

6.12.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 21.

Table 21: Potential displacement of Redshank based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	**Peak number – Low tide survey**	**% of baseline population**
OL571	19	5.3%
OL572	76	21.3%
OL573	13	3.6%
1-3 Combined	108	30.3%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	3.4%
New licences	40.5%	12.2%
All licences	49.4%	14.9%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 3.4%, noting that this species has been identified as having a neutral/positive response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and this species is known not to have a negative response to aquaculture trestles. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Redshank population of Ballymacoda Bay SPA.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 12.2%, noting that this species has been identified as having a neutral/positive response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact but this species is known not to have a negative response to aquaculture trestles. It is concluded that the application for the new licences alone will not have an adverse impact on the Redshank population of Ballymacoda Bay SPA.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 14.9%, noting that this species has been identified as having a neutral/positive response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact but this species is known not to have a negative response to aquaculture

trestles. It is concluded that the application for the new licences alone will not have an adverse impact on the Redshank population of Ballymacoda Bay SPA.

6.13 Turnstone

6.13.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 137 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 168 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 27 individuals and from the high tide count was 124 individuals in the non-breeding season.

The species population trend over the long term is +7 and over the short term is +16.

The current conservation condition is "Favourable".

6.13.2 Distribution

Across the entire NPWS BWS survey period, Turnstones were recorded in six count sub-sites (0L556, 0L570, 0L571, 0L572, 0L573 and 0L574). Peak numbers were recorded for 0L571 (Pilmore (Barrel Rocks)), 0L570 (Clonard East), 0L573 (Pilmore (Black Rock)) and 0L574 (Clonpriest East to Ring Point) for the four low tide survey dates. The peak sub-site count was 16 Turnstone recorded in 0L570 (Clonard East) on 10/11/10.

All observations of Turnstones were of foraging individuals. Foraging occurred in six sub-sites overall (0L556, 0L570, 0L571, 0L572, 0L573 and 0L574). Peak numbers were recorded for 0L571 (Pilmore (Barrel Rocks)), 0L570 (Clonard East), 0L573 (Pilmore (Black Rock)) and 0L574 (Clonpriest East to Ring Point) for the four low tide survey dates. During the high tide survey 124 Turnstones foraged within three sub-sites (0L572, 0L573 and 0L574), the majority (87%) within 0L572 (Ring Strand) and positioned on the upper shore where seaweed/kelp had accumulated.

6.13.3 Response of Turnstone to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Neutral/positive response".

6.13.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 22.

Table 22: Potential displacement of Turnstone based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	**Peak number – Low tide survey**	**% of baseline population**
OL571	11	8.0%
OL572	7	5.1%
OL573	9	6.6%
1-3 Combined	27	19.7%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	0.8%
New licences	40.5%	8.0%
All licences	49.4%	9.7%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 0.8%, noting that this species has been identified as having a neutral/positive response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and this species is known not to have a negative response to aquaculture trestles. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Turnstone population of Ballymacoda Bay SPA.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 8.0%, noting that this species has been identified as having a neutral/positive response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact but this species is known not to have a negative response to aquaculture trestles. It is concluded that the application for the new licences alone will not have an adverse impact on the Turnstone population of Ballymacoda Bay SPA.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 9.7%, noting that this species has been identified as having a neutral/positive response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact but this species is known not to have a negative response to aquaculture trestles. It is concluded that the application for the new licences alone will not have an adverse impact on the Turnstone population of Ballymacoda Bay SPA.

6.14 Black-headed Gull

6.14.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 1,560 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 1,302 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 629 individuals and from the high tide count was 76 individuals in the non-breeding season.

The species population trend at the site is -73.

The current conservation condition is "Highly Unfavourable".

6.14.2 Distribution

Black-headed Gulls were recorded during the NPWS BWS counts in all 11 sub-sites. Peak numbers were recorded by 0L555 (Ballykineely), 0L572 (Ring Strand), 0L574 (Clonpriest East to Ring Point) and 0L572, for the four respective low tide survey dates. The peak sub-site count was 385 Black-headed Gulls recorded by 0L555 (Ballykineely) on 12/10/10.

Black-headed Gulls were recorded foraging intertidally in six sub-sites (0L556, 0L570, 0L571, 0L572, 0L573 and 0L574). Peak numbers foraging intertidally in all four low tide surveys were held by 0L572 (Ring Strand) and this sub-site recorded the species with most regularity. The gulls were generally positioned on the lower shore close to the tide edge and often in / around the area of aquaculture trestles. 0L570 (Clonard East) held foraging individuals in all four low tide surveys and numbers ranked in the top three in three of these. Subtidal foraging was recorded irregularly with one-off records of less than five birds with the exception of 50 Black-headed Gulls that foraged subtidally in 0L573 (Pilmore (Black Rock)) on 12/10/10.

6.14.3 Response of Black-headed Gull to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Variable response".

6.14.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 23.

Table 23: Potential displacement of Black-headed Gull based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	**Peak number – Low tide survey**	**% of baseline population**
OL571	4	0.3%
OL572	127	8.1%
OL573	50	3.2%
1-3 Combined	181	11.6%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	1.3%
New licences	40.5%	4.7%
All licences	49.4%	5.7%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 1.3%, noting that this species has been identified as having a variable response to aquaculture trestles. This is below the level that has been

identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Black-headed Gull population of Ballymacoda Bay SPA.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 4.7%, noting that this species has been identified as having a variable response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that the application for the new licences alone will not have an adverse impact on the Black-headed Gull population of Ballymacoda Bay SPA.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 5.7%, noting that this species has been identified as having a variable response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the new applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur and that it will be below the 5% level identified as significant (given that currently it is marginally above at 5.7%). It is concluded that the application for the renewal of the existing licences together with the new licences will not have an adverse impact on the Black-headed Gull population of Ballymacoda Bay SPA.

6.15 Common Gull

6.15.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 1,120 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 633 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 418 individuals and from the high tide count was 91 individuals in the non-breeding season.

The species population trend at the site is -91.

The current conservation condition is "Highly Unfavourable".

6.15.2 Distribution

Common Gulls were widespread across the site and recorded in nine sub-sites overall. They occurred with most regularity (all four low tide surveys) within five sub-sites: 0L570, 0L571, 0L572, 0L573 and 0L574. 0L574 (Clonpriest East to Ring Point) held peak numbers in three low tide surveys and numbers ranked as second highest in another. 0L555

(Ballykineely) held peak numbers in one low tide survey and numbers ranked as second highest in another, plus peak numbers during the high tide survey. The sub-site peak of 144 individuals was recorded for 0L574 (Clonpriest East to Ring Point) on 10/11/10.

Common Gulls foraged intertidally across five sub-sites: 0L556, 0L570, 0L571, 0L572 and 0L573. 0L573 (Pilmore (Black Rock)) held peak numbers on 12/10/10 and 09/12/10. 0L572 (Ring Strand) held peak numbers on 10/11/10 and 0L571 (Pilmore (Barrel Rocks)) held peak numbers on 07/02/11. These three sub-sites dominated in terms of total numbers held. Subtidal foraging was rarely recorded.

6.15.3 Response of Common Gull to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Variable response".

6.15.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 24.

Table 24: Potential displacement of Common Gull based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	**Peak number – Low tide survey**	**% of baseline population**
OL571	13	1.2%
OL572	104	9.3%
OL573	51	4.6%
1-3 Combined	168	15.0%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	1.5%
New licences	40.5%	6.1%
All licences	49.4%	7.4%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 1.5%, noting that this species has been identified as having a variable response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Common Gull population of Ballymacoda Bay SPA.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 6.1%, noting that this species has been identified as having a variable response to aquaculture trestles. This is above the level that has been

identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur and that it will be below the 5% level identified as significant (given that currently it is marginally above at 6.1%). It is concluded that the application for the new licences alone will not have an adverse impact on the Common Gull population of Ballymacoda Bay SPA.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 7.4%, noting that this species has been identified as having a variable response to aquaculture trestles. This is above the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. Additional consideration can be given to the extent to which the full area of the new applications for which licences will be sought will be subject to the construction of trestles and there will be displacement to the extent predicted. The estimate in the Aquaculture Profile (BIM, 2016) was that the trestle footprint of the new application licences would occupy 46.33% of the total new application area. This suggests that it is likely that the full scale of the predicted displacement will not occur but it is probably going to be in excess of 5% without further management measures. It is concluded that the application for the renewal of the existing licences together with the new licences will have an adverse impact on the Common Gull population of Ballymacoda Bay SPA and that additional measures should be considered.

6.16 Lesser Black-backed Gull

6.16.1 Status

The baseline population of the SPA, as listed in the Conservation Objectives supporting document (NPWS, 2014), is 5,051 individuals in the non-breeding season. The 5 year peak mean population derived from the I-WeBS high tide counts from the most recent five winters with available data is 3,543 individuals in the non-breeding season. The peak count from the NPWS BWS low tide counts was 329 individuals and from the high tide count was 42 individuals in the non-breeding season.

The species population trend at the site is -85.

The current conservation condition is "Highly Unfavourable".

6.16.2 Distribution

Lesser Black-backed Gulls were widespread and recorded within eight sub-sites overall: 0L350, 0L555, 0L556, 0L570, 0L571, 0L572, 0L573 and 0L574. Sub-site use during low tide surveys ranged from two sub-sites to five sub-sites with the species recorded in just two sub-sites during the high tide survey. 0L555 (Ballykineely) recorded the sub-site peak of 210 on 12/10/10.

The majority of Lesser Black-backed Gulls were recorded in roosting / other behaviour. One record of intertidal foraging was made: three individuals in 0L571 (Pilmore (Barrel Rocks) on 12/10/10. Lesser Black-backed Gulls were recorded in roosting / other behaviour on intertidal habitat in seven sub-sites: 0L350, 0L555, 0L556, 0L570, 0L572, 0L573 and 0L574. 0L555 (Ballykineely) recorded peak numbers on 12/10/10 and 10/11/10, the peak number being 210 individuals on 12/10/10. 0L574 (Clonpriest East to Ring Point) held peak numbers on 09/12/10 (27 individuals) and numbers ranked as second highest in every other low tide survey. 0L572 (Ring Strand) held peak numbers on 07/02/11 (93 individuals). During the high tide survey (17/01/11) 22 Lesser Black-backed Gulls were recorded in roosting / other behaviour on intertidal habitat in 0L574. 0L572 (Ring Strand) held a further 20 individuals roosting / other subtidally. The high tide roost survey (01/11/10) recorded four flocks of roosting Lesser Black-backed Gulls across two sub-sites (0L555 and 0L572).

6.16.3 Response of Lesser Black-backed Gull to aquaculture

The study of Gittings and O'Donoghue (2012) categorised the response of this species to oyster cultivation on trestles as "Possible variable response".

6.16.4 Impact assessment

The potential for impact is only predicted to arise in relation to those waterbird count sub-sites where there are licence applications. For the renewal applications and its access route this is sub-site OL572 and for both the new application licences and all licences together along with the access routes this is sub-sites OL571, OL572 and OL573. The percentage occurrence of this species in the count sub-sites in relation to the SPA baseline population and the area of aquaculture activity is set out in Table 25.

Table 25: Potential displacement of Lesser Black-backed Gull based on occurrence in the sub-site and area of aquaculture

NPWS BWS count sub-site	**Peak number – Low tide survey**	**% of baseline population**
OL571	3	0.1%
OL572	93	1.8%
OL573	1	0.0%
1-3 Combined	97	1.9%
Aquaculture licences	**% habitat in sub-site(s) covered by aquaculture licences**	**Potential % bird displacement**
Renewal licences	16.1%	0.3%
New licences	40.5%	0.8%
All licences	49.4%	0.9%

The renewal of the existing licences alone is predicted to result in a potential displacement of the non-breeding bird population of 0.3%, noting that this species has been identified as having a possible variable response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that renewal of the existing licences alone will not have an adverse impact on the Lesser Black-backed Gull population of Ballymacoda Bay SPA.

The application for the new licences alone is predicted to result in a potential displacement of the non-breeding bird population of 0.8%, noting that this species has been identified as having a possible variable response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that the application for the new licences alone will not have an adverse impact on the Lesser Black-backed Gull population of Ballymacoda Bay SPA.

The application for the renewal of the existing licences together with the new licences is predicted to result in a potential displacement of the non-breeding bird population of 0.9%, noting that this species has been identified as having a possible variable response to aquaculture trestles. This is below the level that has been identified as a potentially significant impact and requiring additional consideration in this assessment, further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring. It is concluded that the application for the renewal of the existing licences together with the new licences will not have an adverse impact on the Lesser Black-backed Gull population of Ballymacoda Bay SPA.

6.17 Wetland habitat

The Conservation Objectives define the favourable conservation condition of the wetland habitat SCI in the Ballymacoda Bay SPA purely in terms of habitat area – that the permanent area occupied by the wetland habitat should be should be stable and not significantly less than the area of 602 hectares, other than that occurring from natural patterns of variation.

The aquaculture activity being assessed will not lead to any change in the permanent area occupied by wetland habitat. This is because the trestles are temporary structures placed over, and supported by, the wetland habitat that do not in themselves remove or destroy habitat (the displacement of SCI species from the habitat caused by the temporary presence of trestles being assessed above). Therefore, the aquaculture activity of shellfish culture using the bag and trestle method is not likely to have any significant impact on this SCI and it has been screened out from any further more detailed assessment.

7. In-combination effects of aquaculture with other activities

7.1 Introduction

This section assesses potential in-combination impacts between the identified aquaculture activities and other relevant activities that could potentially affect the Ballymacoda Bay SPA SCI species.

7.2 Disturbance generating activities identified in the Conservation Objectives supporting document

The Ballymacoda Bay SPA Conservation Objectives supporting document (NPWS, 2014) collated information on potentially disturbing activities through a desk study and through the information gathered during the NPWS BWS low and high tide counts. During those counts a record was maintained of activities that caused disturbance to waterbirds.

The collated information from the desk study divided the activities in to:

- Habitat loss, modification and adjacent land use
- Water quality
- Fisheries and aquaculture
- Recreational activities
- Others

The record of disturbance generating activities during the low and high tide counts was divided in to the following types:

- Aircraft
- Aquaculture machinery and activities associated with intertidal aquaculture
- Horse riding
- Bait-diggers
- Vehicles
- Shooting
- Walking, including with dogs
- Predators (foxes and raptors)

Disturbance was scored based on its frequency, intensity and response of the waterbirds. The peak disturbance score was assigned to 'walking (including with dogs)' which was also the most widespread activity, occurring in five count sub-sites overall. Aquaculture activities were frequent but confined to one sub-site only (0L572). Note that this activity is the subject of the main assessment as this represents activity for which the licence renewals are sought.

7.3 Assessment of relevant activities

A screening process has been applied in this in-combination section of the assessment. Consideration has been given to the potential for in-combination effects to occur based on:

- An activity that occurs on the intertidal land where the majority of the SCI species feed and the aquaculture activities occur.

- An activity that occurs frequently and has been identified as having a high disturbance score in the analysis carried out of the NPWS BWS activity recording (NPWS, 2014).
- An activity similar in form or purpose to aquaculture.
- An activity that has the potential to negatively affect waterbird food resources.

As a result of this screening process the following activities have been screened in:

- Coastal recreation
- Bait digging
- Fisheries and shellfisheries

7.3.1 Coastal recreation

The NPWS BWS activity recording noted that the sandy outer sub-sites of Ballymacoda Bay are used widely for recreational walking including with dogs. Of the four count sub-sites - 0L570, 0L571, 0L572 and 0L573 – it was particularly 0L573 and 0L571 that were used most intensively, accounted for by their proximity to a shoreline car park. A small amount of horse-riding was also recorded in some of the same sandy outer sub-sites. Recreational shore angling is carried out at a number of locations around Ballymacoda Bay including being recorded at Ring Strand (0L572). These, other than 0L570, are the same sub-sites within which the aquaculture activities occur or are part of new applications.

The most intensive recreation activity was recorded within sub-site 0L573, the location of one of the new applications (reference T05/517A). Recreation at less intensive levels across count sub-site 0L572, within which the renewal applications are located, indicates that in-combination impacts with those renewal applications alone is not likely. The new applications are spread across the three sub-sites 0L571, 0L572 and 0L573 within which there are varying levels of recreational activity and these also have to be assessed together with the renewal applications. A recent study on wintering waterbirds in an estuary subject to experimental disturbance identified that the energetic costs of individual bird responses were low relative to daily requirements (Collop *et al.*, 2016) and concluded that disturbance events were unlikely to be frequent enough to seriously limit foraging time and as a result the populations were not significantly affected by that disturbance. This conclusion may not be applicable under circumstances of adverse weather when energy demands would be higher but under such circumstances the scale and intensity of recreational activity is likely to be greatly reduced. Although site specific evidence is limited, it is considered that recreational disturbance in-combination with the new licence applications and the renewal applications together with the new licence applications will not give rise to a significant impact.

7.3.2 Bait digging

The presence of bait diggers on the intertidal area may have an effect on SCI species though disturbance and has the potential to act in-combination with any disturbance generated by the aquaculture activities. It might also act through removal of food resources which could potentially act in-combination with displacement by the trestles – this is an effective loss of access to food resources. Bait digging was recorded in the three sub-sites 0L571, 0L572 and 0L573 within which the aquaculture activities occur or are part of new applications.

At recorded levels it is considered unlikely that bait digging will have measurable impacts in terms of disturbance and removal of food resources and is not considered to give rise to a significant impact in-combination with the aquaculture activities.

7.3.3 Fisheries and shellfisheries

Fishery and shellfishery activity information in the area was supplied by the Marine Institute in the form of a risk assessment report (Marine Institute, 2015) and shapefiles of the extent of putative fisheries activities. The shapefiles were based upon local knowledge and identify potential areas only and are not based upon any hard evidence. It is considered that there is unlikely to be any fisheries in the areas, particularly any dredging. Assessment of the spatial extent of the putative fisheries and shellfisheries activity identified that only the putative cockle fishery overlapped with the aquaculture activity, all other fisheries where wholly subtidal. In spite of the overlap identified, it is important to note that the fishery data are based upon general accounts and the areas were selected on the basis of suitable shellfish habitat and have not had shellfisheries occurring at the site. Furthermore, there are no known applications for a fishery, a Classified Production Area, or proposed fishery plans for the area.

On the above basis, it is considered that there is not likely to be any in-combination impacts between fishery and aquaculture activities.

8. Conclusion of the assessment

The assessment that has been undertaken has identified the potential for significant adverse impact on a number of the SCI species of the Ballymacoda Bay SPA, with the potential for that adverse impact varying dependent on whether the renewal applications are considered alone, the new applications are considered alone and the two categories of application are considered together.

The renewal applications alone have the potential to result in significant adverse impact on the following SCI species of the Ballymacoda Bay SPA:

- Sanderling
- Black-tailed Godwit

The new applications alone have the potential to result in significant adverse impact on the following SCI species of the Ballymacoda Bay SPA:

- Wigeon
- Ringed Plover
- Grey Plover
- Sanderling
- Black-tailed Godwit
- Bar-tailed Godwit

The renewal applications and the new applications considered together have the potential to result in significant adverse impact on the following SCI species of the Ballymacoda Bay SPA:

- Wigeon
- Ringed Plover
- Grey Plover
- Sanderling
- Dunlin
- Black-tailed Godwit
- Bar-tailed Godwit
- Common Gull

The following SCI species of the Ballymacoda Bay SPA are not subject to a potential adverse impact under any aquaculture licence scenario:

- Teal
- Golden Plover
- Lapwing
- Curlew
- Redshank
- Turnstone
- Black-headed Gull
- Lesser Black-backed Gull

In addition the SCI 'wetland habitat' is not subject to a potential adverse impact under any aquaculture licence scenario.

Consideration of potential in-combination impacts has been made and the conclusions above remain as stated as no in-combination impacts have been identified

As a result of the conclusion that SCI species are potentially subject to adverse impacts as a result of the aquaculture licence applications, consideration should be given to further more detailed study, site specific mitigation measures (i.e. in addition to those applied to all licences) and monitoring.

9. References

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Appendices

Appendix 1 Scientific names of bird species mentioned in the text

The table below lists the names of birds used throughout this report and the scientific names of those birds. The bird species names that have been used are those that are in common use amongst British and Irish ornithologists. This corresponds to the "British (English) vernacular name 2012" identified by the British Ornithologists Union (BOU, 2012). The corresponding scientific names are those also listed in that BOU publication.

British (English) vernacular name	Scientific name
Brent goose (light-bellied)	*Branta bernicla hrota*
Shelduck	*Tadorna tadorna*
Wigeon	*Anas penelope*
Teal	*Anas crecca*
Mallard	*Anas platyrhynchos*
Pintail	*Anas acuta*
Shoveler	*Anas clypeata*
Cormorant	*Phalacrocorax carbo*
Little egret	*Egretta garzetta*
Grey heron	*Ardea cinerea*
Oystercatcher	*Haematopus ostralegus*
Ringed plover	*Charadrius hiaticula*
Golden plover	*Pluvialis apricaria*
Grey plover	*Pluvialis squatarola*
Lapwing	*Vanellus vanellus*
Sanderling	*Calidris alba*
Dunlin	*Calidris alpina*
Knot	*Calidris canutus*
Black-tailed godwit	*Limosa limosa*
Bar-tailed godwit	*Limosa lapponica*
Curlew	*Numenius arquata*
Redshank	*Tringa totanus*
Greenshank	*Tringa nebularia*
Turnstone	*Arenaria interpres*
Great black-backed gull	*Larus marinus*
Lesser black-backed gull	*Larus fuscus*
Herring gull	*Larus argentatus*
Common gull	*Larus canus*
Black-headed gull	*Chroicocephalus ridibundus*
Kittiwake	*Rissa tridactyla*
Peregrine	*Falco peregrinus*
Chough	*Pyrrhocorax pyrrhocorax*

Appendix 2 Figures

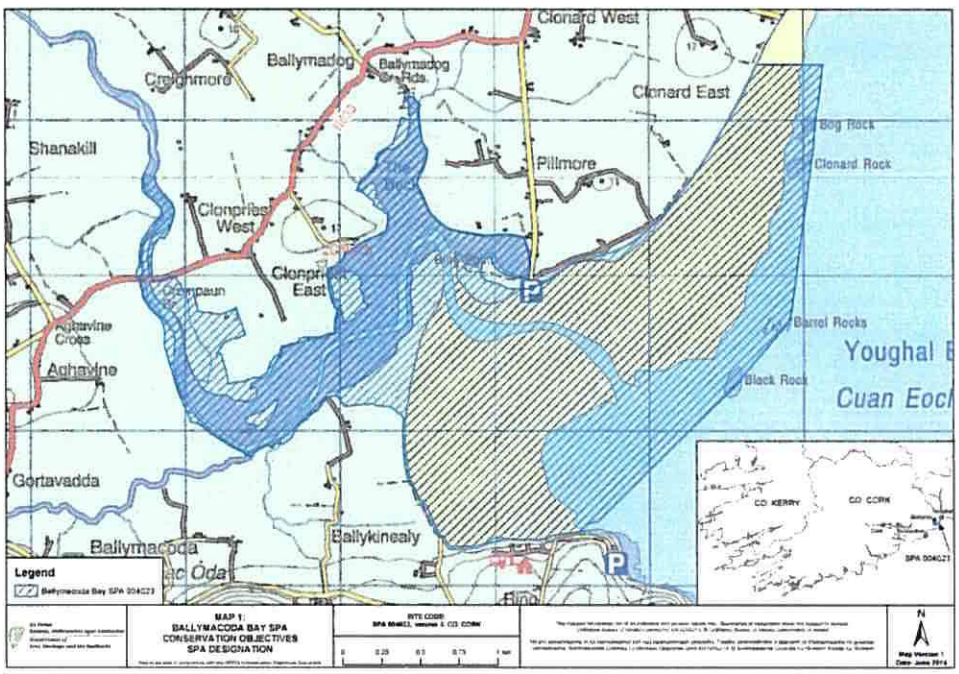

Figure 2 Ballymacoda Bay SPA boundary
This figure is reproduced from Map 1 of the Conservation Objectives document for the site (NPWS, 2015).

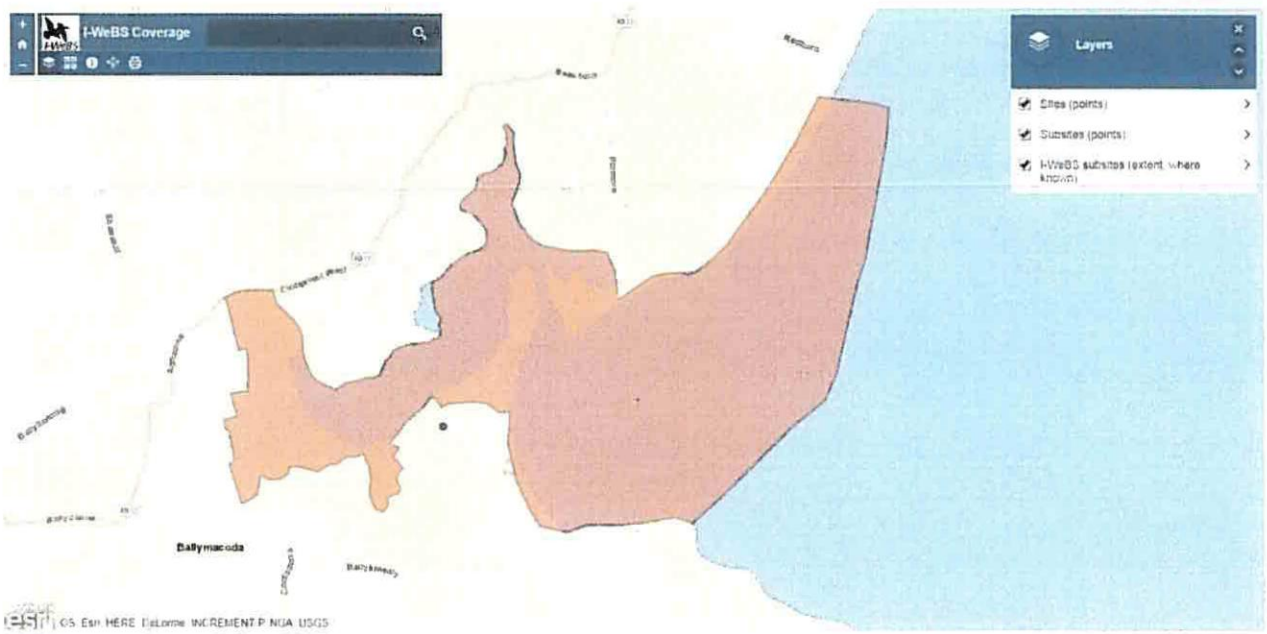

Figure 3 I-WeBS recording site OL401 Ballymacoda Bay
This figure is reproduced from the I-WeBS Coverage Mapping website https://bwi.maps.arcgis.com/apps/View/index.html

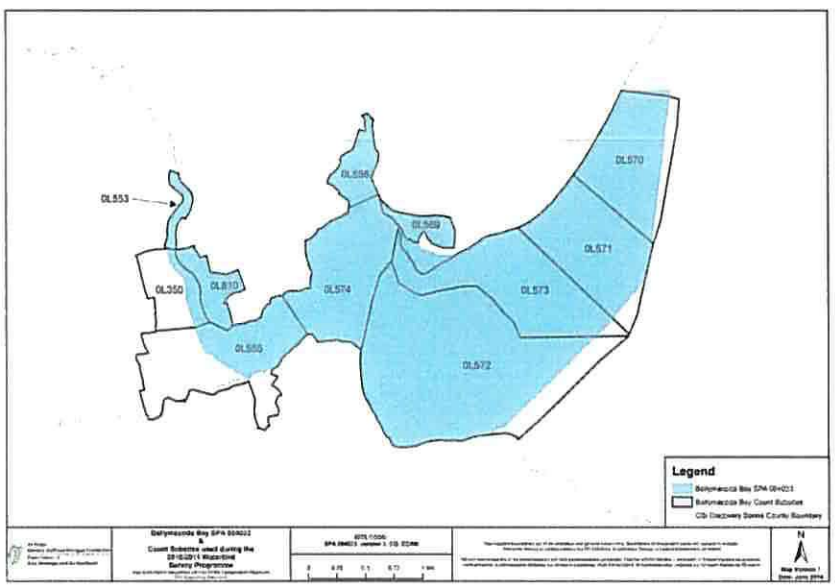

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Figure 4 NPWS BWS count sub-site boundaries in relation to the SPA boundary
This figure is reproduced from the map on page 71 of the Conservation Objectives supporting document for the site (NPWS, 2014).

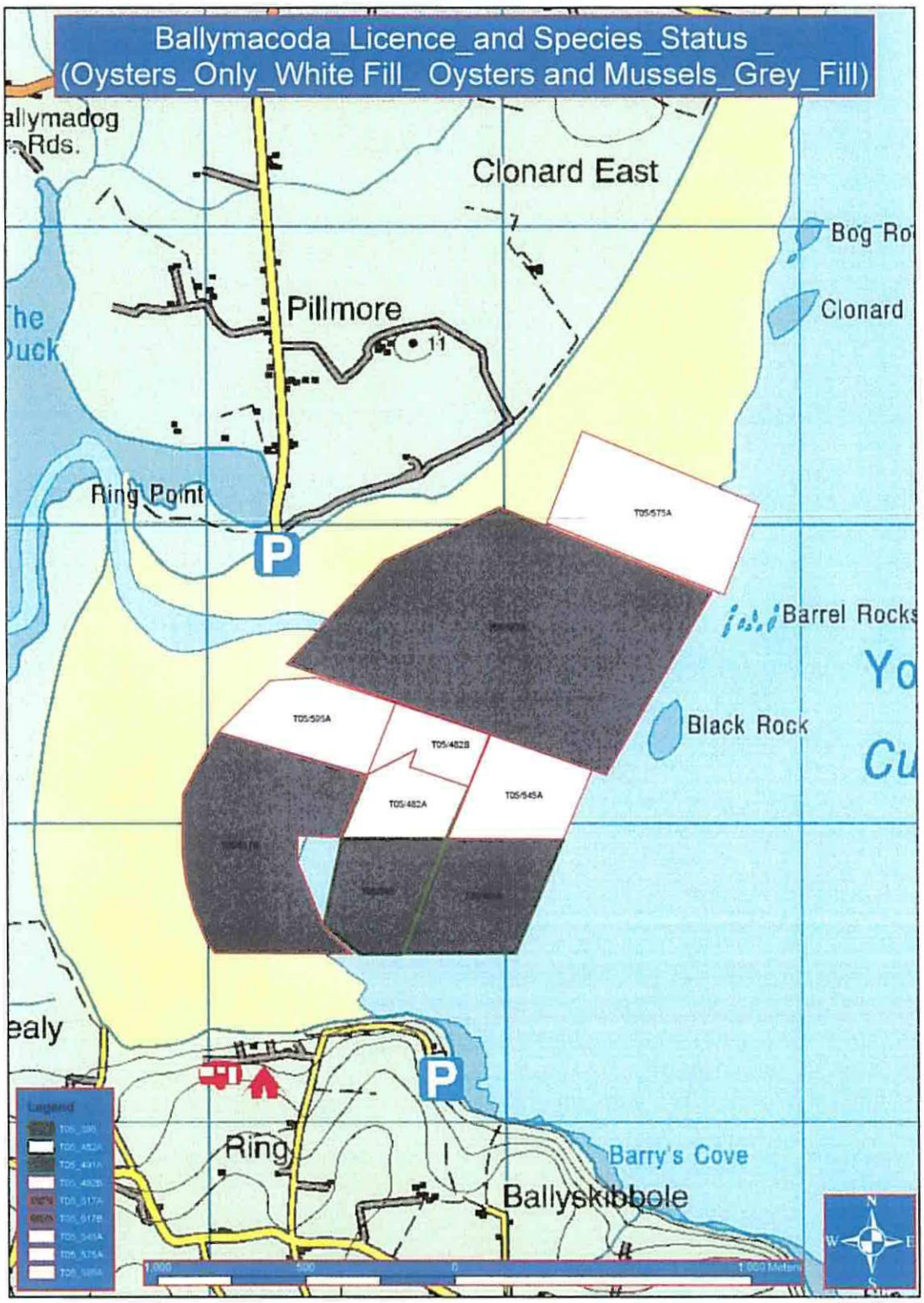

Figure 5 Renewal and new application licences and shellfish type
This figure is reproduced from Map 4 of the Ballymacoda Bay Aquaculture Profile (BIM, 2016).

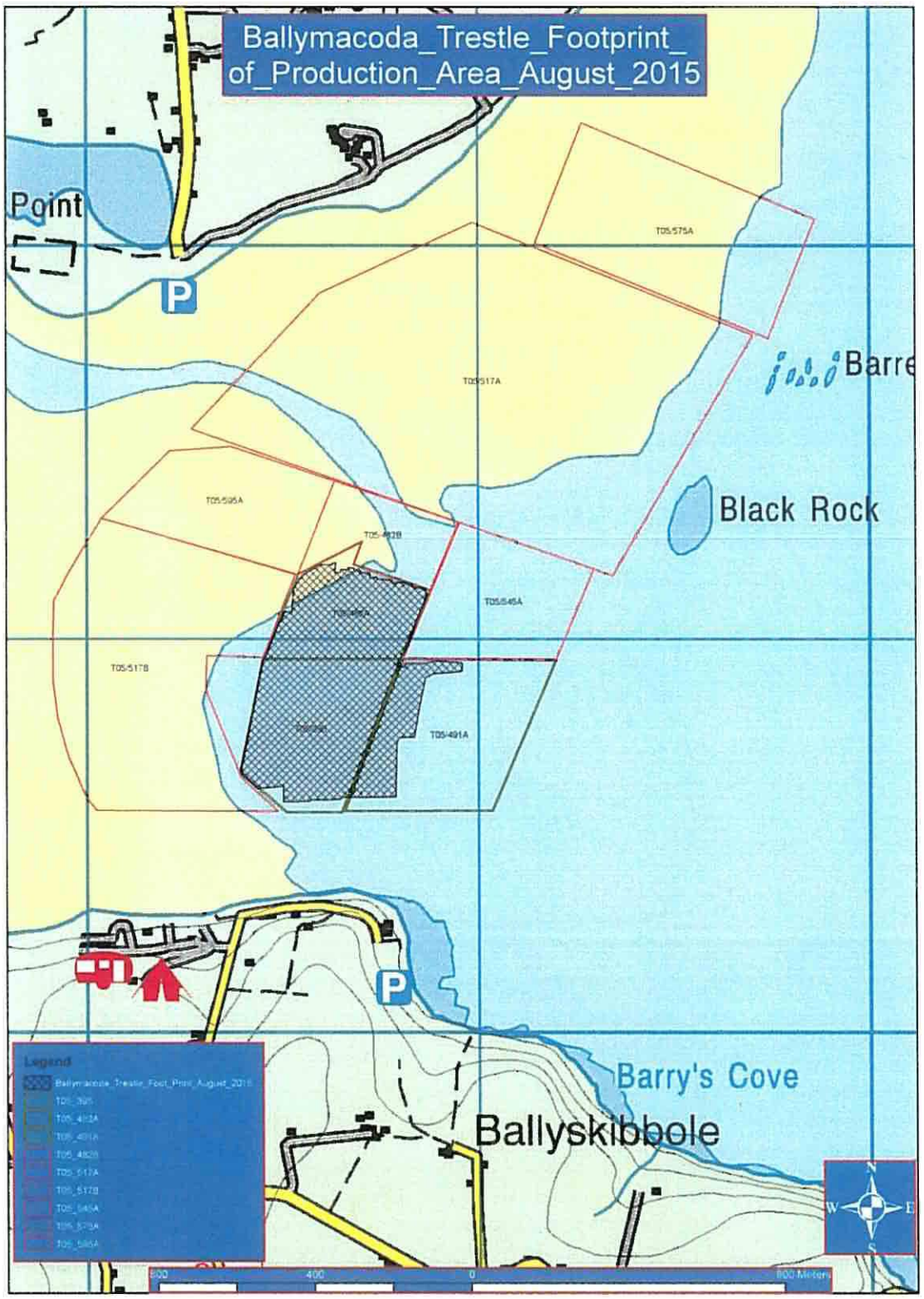

Figure 6 Trestle footprint in existing licenced areas, recorded August 2015
This figure is reproduced from Map 7 of the Ballymacoda Bay Aquaculture Profile (BIM, 2016).

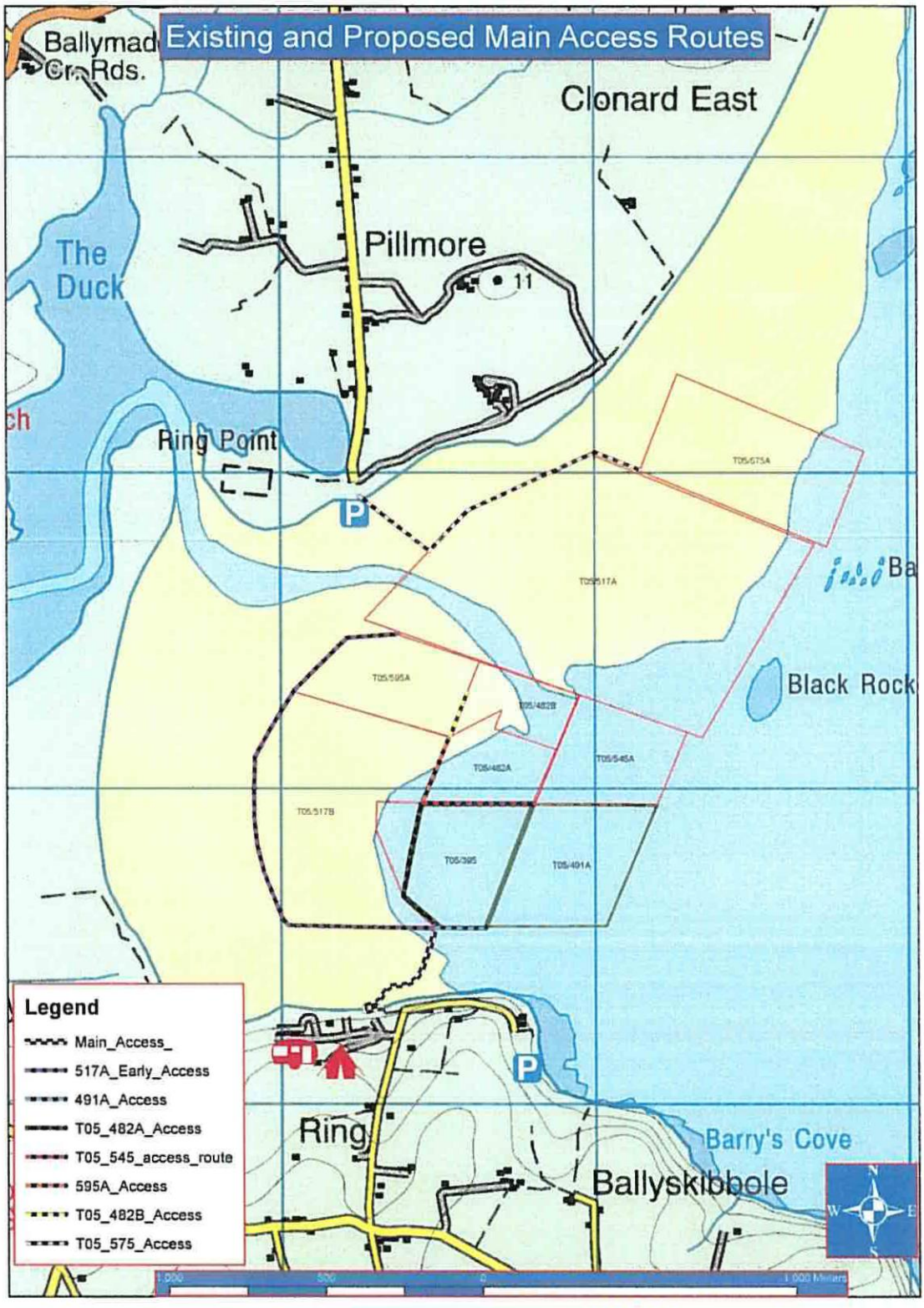

Figure 7 Existing and proposed access routes
This figure is reproduced from Map 10 of the Ballymacoda Bay Aquaculture Profile (BIM, 2016).