

DixonBrosnan

environmental consultants

Project	Winter Bird Survey to assess bird usage of a proposed landfall site and HDD locations for the Greenlink electricity interconnector project, Co. Wexford.		
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1. Introduction

Greenlink Interconnector Limited (GIL) is proposing to develop Greenlink (an electricity interconnector), linking the existing electricity grids in Ireland and Great Britain. Greenlink will consist of two converter stations, one close to the existing substation at Great Island in County Wexford (Ireland), and one close to the existing substation at Pembroke in Pembrokeshire (Wales). The converter stations will be connected by underground cables (onshore) and subsea cables (offshore). Dixon.Brosnan was commissioned by Arup to carry out an appraisal of the potential effects of the proposed development, on birds utilising the development site and the coastal areas adjacent to it.

The land cables will be connected with the marine cables in a transition jointing bay (TJB) buried in the ground above the high-water mark. In all areas the cables will be buried below surface. TJBs are typically 25m long x 5m wide and 3m deep below ground level.

Horizontal directional drilling (HDD) is the preferred method of installation at the landfall site at Baginbun Beach. HDD is a technique whereby a hole is drilled from shore under any sea defences, cliffs, dune systems or sensitive features e.g. certain river crossings, to a point a suitable distance offshore or onshore, in the case of the Campile River Estuary crossing. The hole is usually drilled at a distance of several hundred metres from the sensitive feature. A pipe is then inserted into the drilled hole. The pipe is used as a duct into which the cables are installed.

The information in this report was used to help determine the potential effects on bird populations and also informed the conclusions of the ecological appraisal of the proposed development.

Special attention was paid to two locations within the study area (**see Figure 1**), which are likely to be of particular relevance to the proposed development. These are as follows:

- The proposed landfall site at Baginbun Beach;
- The Campile River Estuary in close proximity to Dunbrody Abbey. Due to the size of the site and the sightlines available this section of the survey was divided into three distinct survey areas;
 - South of the Disused Railway Line
 - North of the Disused Railway Line
 - West of Dunbrody Bridge.

Results from these locations are discussed in the context of the study area as a whole and in the context of available i-webs data, previous winter bird surveys and in relation to nearby Special Protection Areas (SPAs).

2. Desktop Review

A desktop review was carried out to identify designated SPAs in the surrounding landscape and any previous records of water birds (waders and wildfowl) from the study area and surrounding region. From the information identified in the desktop review and a site inspection, it was concluded that winter bird counts would be required to accurately assess any potential ecological impacts on birds which might accrue from the proposed development.

2.1. Designated sites

Ireland is required under the terms of the EU Birds Directive (2009/147/EC) to designate Special Protection Areas (SPAs) for the protection of endangered species of wild birds. Sites that meet any of the following criteria may be selected as SPAs:

- A site regularly supporting 20,000 waterbirds or 10,000 pairs of seabirds;
- A site regularly supporting 1% or more of the all-Ireland population of an Annex I species;
- A site regularly supporting 1% or more of the biogeographical population of a migratory species;
- A site that is one of the 'n' most suitable sites in Ireland for an Annex I species or a migratory species (where 'n' is a variable which is related to the proportion of the total biogeographic population of a species held by Ireland).

In Ireland a programme to identify and designate these SPA sites has been in place since 1985. It is our typical mild and wet winters that make the wetlands of Ireland such an important resource for over three-quarters of a million of these waterbirds each year. Over 50 species of waterbird migrate here either on passage to more southerly resorts or to spend the entire winter here. They seek out the relatively undisturbed wetland areas for ice-free feeding conditions and for safe roosting opportunities. In some cases, significant proportions of the biogeographic populations of waterbird overwinter here (e.g. Light-bellied Brent Goose, Black-tailed Godwit, Whooper Swan, Greenland White-fronted Goose and Ringed Plover).

Ireland's SPA Network encompasses over 570,000 hectares of marine and terrestrial habitats. The marine areas include some of the productive intertidal zones of our bays and estuaries that provide vital food resources for several wintering wader species including Dunlin, Knot and Bar-tailed Godwit. Marine waters adjacent to the breeding seabird colonies and other important areas for sea ducks, divers and grebes are also included in the network.

The majority of the breeding seabirds and wintering waterbirds are considered to be regularly occurring migratory birds; over 60% of 25 Annex I listed species that now occur in Ireland on a regular basis belong to the breeding seabird and wintering waterbird groups. This has in part led to the situation that the majority (> 80%) of Ireland's SPAs are designated for these two bird groups (NPWS, Special Protection Areas (SPA)).

The survey areas do not lie within any SPAs for Birds and the closest such site: Bannow Bay SPA (Site Code: IE004033), is located at a distance of 1.3km north of Baginbun Beach and approximately 10km southeast of the Campile River Estuary survey sites. **Table 1** below lists the qualifying interests for the Bannow Bay SPA.

The Bannow Bay SPA covers an area of 1,363 hectares in size with 92% of that being composed of marine area. Bannow Bay is a large, very sheltered, estuarine system with a narrow outlet to the sea. Very extensive intertidal mud and sand flats are exposed at low tide, with an average width of about 2 km. A number of small to medium sized rivers flow into the site, the principal being the Owenduff and the Corock which enter at the top end of the estuary. The sediments have a rich macroinvertebrate fauna, with such species as *Scrobicularia plana*, *Hediste diversicolor* and *Arenicola marina* being frequent. Salt marshes are well developed in the sheltered areas of the site. The main land use within the site is shellfish farming. The site is surrounded by agricultural land.

Table 1: Qualifying interests for the Bannow Bay SPA

Species code	Species	Scientific name	Conservation objective
A046	Light-bellied Brent Goose	<i>Branta bernicla hrota</i>	Maintain
A048	Shelduck	<i>Tadorna tadorna</i>	Maintain
A054	Pintail	<i>Anas acuta</i>	Maintain
A130	Oystercatcher	<i>Haematopus ostralegus</i>	Maintain
A140	Golden Plover	<i>Pluvialis apricaria</i>	Maintain
A141	Grey Plover	<i>Pluvialis squatarola</i>	Maintain
A142	Lapwing	<i>Vanellus vanellus</i>	Maintain
A143	Knot	<i>Calidris canutus</i>	Maintain
A149	Dunlin	<i>Calidris alpina</i>	Maintain
A156	Black-tailed Godwit	<i>Limosa limosa</i>	Maintain
A157	Bar-tailed Godwit	<i>Limosa lapponica</i>	Maintain
A160	Curlew	<i>Numenius arquata</i>	Maintain
A162	Redshank	<i>Tringa totanus</i>	Maintain
A999	Wetland and Waterbirds		Maintain

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

The selection of species listed as Special Conservation Interests for the Bannow Bay SPA was based on the following:

1. During winter the site regularly supports 1% or more of the biogeographical population of Light-bellied Brent Geese (*Branta bernicla hrota*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 561 individuals.
2. During winter the site regularly supports 1% or more of the all-Ireland population of Dunlin (*Calidris alpina*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 3,038 individuals.
3. During winter the site regularly supports 1% or more of the biogeographical population of Black-tailed Godwit (*Limosa limosa*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 546 individuals.
4. During winter the site regularly supports 1% or more of the biogeographical population of Bar-tailed Godwit (*Limosa lapponica*). The mean peak number of this Annex I species within the SPA during the baseline period (1995/96 – 1999/00) was 471 individuals.

Additional Special Conservation Interests for Bannow Bay SPA are as follows:

5. During winter the site regularly supports 1% or more of the all-Ireland population of Shelduck (*Tadorna tadorna*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 500 individuals.
6. During winter the site regularly supports 1% or more of the all-Ireland population of Pintail (*Anas acuta*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 52 individuals.
7. During winter the site regularly supports 1% or more of the all-Ireland population of Oystercatcher (*Haematopus ostralegus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 711 individuals.
8. During winter the site regularly supports 1% or more of the all-Ireland population of Golden Plover (*Pluvialis apricaria*). The mean peak number of this Annex I species within the SPA during the baseline period (1995/96 – 1999/00) was 1,955 individuals.

9. During winter the site regularly supports 1% or more of the all-Ireland population of Grey Plover (*Pluvialis squatarola*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 142 individuals.

10. During winter the site regularly supports 1% or more of the all-Ireland population of Lapwing (*Vanellus vanellus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,950 individuals.

11. During winter the site regularly supports 1% or more of the all-Ireland population of Knot (*Calidris canutus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 508 individuals.

12. During winter the site regularly supports 1% or more of the all-Ireland population of Curlew (*Numenius arquata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 891 individuals.

13. During winter the site regularly supports 1% or more of the all-Ireland population of Redshank (*Tringa totanus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 377 individuals.

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

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

2.2 NPWS Winter bird survey – Bannow Bay SPA

During 2009/2010 a waterbird survey programme was conducted by the NPWS within Cork Harbour. This waterbird survey programme was designed to investigate how waterbirds are distributed across coastal wetland sites during the low tide period. The surveys ran alongside and are complementary to the Irish Wetland Bird Survey (I-WeBS) which is a nationwide survey undertaken primarily on a rising tide or at high tide. This survey consisted of four low tide counts (October, November and December 2009 and February 2010) and one high tide count (January 2010), where waterbirds were counted within a series of 8 count subsites within the SPA. The behaviour of waterbirds during counts was attributed to one of two categories (foraging or roosting/other) while the position of the birds was recorded as per one of four broad habitat types (intertidal, subtidal, supratidal and terrestrial). In addition to the main survey programme described above, an additional high tide roost survey was completed on 25/02/2010.

A total of 42 waterbird species were recorded during the 2009/10 survey programme at Bannow Bay SPA. All SCI species were recorded within all counts undertaken with the exception of Pintail, which was not recorded in any count.

Low tide counts are useful in assessing the use of the estuary by foraging waterbirds. For example, certain species are recorded sporadically during high-tide counts yet can occur in

high numbers during low-tide counts. Certain species may move onto fields for example to forage and roost during period of high-tide and thus are not recorded during site surveys.

2.3 Wading Birds & Wildfowl

Bannow Bay supports an excellent diversity of wintering waterfowl and is one of the most important sites in the south-east. Of particular note is an internationally important population Light-bellied Brent Goose. It also supports nationally important numbers of a further 12 species, which includes 3.4% of the national total for Shelduck, 3.0% of the total for Black-tailed Godwit, 2.6% of the total for Bar-tailed Godwit and 2.6% of the total for Pintail. The intertidal sand and mud flats provide excellent feeding for waterfowl species, while suitable roosts are provided by the salt marshes and other shoreline habitats. Habitats are generally of good quality. Part of site is a Wildfowl Sanctuary. The site has been well monitored since the 1970s.

2.4 Ramsar Site

The Convention on Wetlands, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. A key commitment of Ramsar Contracting Parties is to identify and place suitable wetlands onto the List of Wetlands of International Importance. Bannow Bay is listed as a Ramsar site, which is a non-statutory designation.

2.5 Important Bird Areas – Bannow Bay

Important Bird and Biodiversity Areas (IBAs) are sites selected as important for bird conservation because they regularly hold significant populations of one or more globally or regionally threatened, endemic or congregator bird species or highly representative bird assemblages. The European IBA programme aims to identify, monitor and protect key sites for birds all over the continent. It aims to ensure that the conservation value of IBAs in Europe (now numbering more than 5,000 sites or about 40% of all IBAs identified globally to date) is maintained, and where possible enhanced. The programme aims to guide the implementation of national conservation strategies, through the promotion and development of national protected-area programs. Through their designation they aim to form a network of sites ensuring that migratory species find suitable breeding, stop-over and wintering places along their respective flyways.

The function of the Important Bird Area (IBA) Programme is to identify, protect and manage a network of sites that are important for the long-term viability of naturally occurring bird populations, across the geographical range of those bird species for which a site-based approach is appropriate. The proposed landfill site at Baginbun Beach lies in proximity to the Bannow Bay IBA (Site Code: IE096).

The Bannow Bay IBA is an extensive, sheltered sea bay and estuary, situated in County Wexford, 20 km east of Waterford city. At low tide over 75% of the bay is exposed mud and sand with some saltmarsh. The Ownduff and Corock rivers discharge into the head of the bay which is constricted at its mouth by sandbars and a dune system on either side. This wetland supports a wide range of wintering waterfowl. Several additional species occur in numbers of national importance.

There is intertidal shellfish cultivation within the site, which is a possible threat to habitat quality, while wildfowling causes disturbance to birds. Habitat quality is reduced by the spread

of non-native cord-grass *Spartina*. In 1997 unauthorized mechanical cockle-harvesting caused damage to the intertidal mudflats.

The site qualifies for designation under the following IBA Criteria (2000):

- B1i - The site is known or thought to hold $\geq 1\%$ of a flyway or other distinct population of a waterbird species
- C3 - The site is known to regularly hold at least 1% of a flyway population or of the EU population of a species threatened at the EU level (not listed on Annex 1 of The Birds Directive).
- C6 - The site is one of the five most important in the European region (NUTS region) in question for a species or subspecies considered threatened in the European Union (i.e. listed in Annex I of the EC Birds Directive).

Table 2: Provides a summary of the Bannan Bay IBA trigger species.

Species	Current IUCN Red List Category	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Brent Goose (<i>Branta bernicla</i>)	Least Concern (LC)	Winter	2002-2006	577-1,045 individuals	B1i, C3
Little Egret (<i>Egretta garzetta</i>)	Least Concern (LC)	Winter	2003-2007	12-51 individuals	C6

2.6 Review of the Irish Wetland Bird Survey (I-WeBS) & waterbird survey programme

Most species which occur in Ireland migrate from the north and northwest (principally Canada, Greenland and Iceland) or from the northeast (northern continental Europe, including Scandinavia, Russia and Siberia), moving south to winter predominantly in west and northwest Europe and west Africa (Wetlands International, 2006, Wernham *et al.*, 2002). Estuaries and other wetlands of north-west Europe support vast numbers of these migratory wading birds and wildfowl each winter. These wetland habitats along with the mild climate, provide ample feeding throughout the winter period, particularly when many other parts of northwest Europe are frozen over. It is the high densities of benthic macroinvertebrates and easy access which are the main attraction of these wetland sites. Disturbance free roosting and resting areas are additional important ecological requirements. It is a combination of these factors which make Ireland particularly attractive for wintering waterbirds.

The Irish Wetland Bird Survey (I-WeBS) is the scheme that monitors wintering waterbirds in Ireland. The survey runs from September to March each winter. Wetlands of all types and sizes are monitored, including estuaries, coastlines, bays, rivers, turloughs, lakes, streams and flooded fields. I-WeBS is traditionally a high-tide survey and at large, complex estuarine sites with extensive intertidal areas that require some time to cover, counts are typically made within three hours either side of the high tide. A review of the Irish Wetland Bird Survey (I-WeBS) data shows that the landfall site at Baginbun Beach is not monitored as part of the Irish Wetland Bird Survey.

In relation to the study sites around the Campile River Estuary crossing, it is noted that the 'South of the Disused Railway Line' vantage point site falls within a larger subsite of the I-

Webs program namely, Subsite Barrow Bridge – Passage East (Code: 0M496). The ‘North of the Disused Railway Line’ and ‘West of Dunbrody Bridge’ vantage points are not monitored as part of I-Webs programme. The vantage point ‘South of the Disused Railway Line’ covers approximately 1% of the total area of subsite 0M496.

A review of the Irish Wetland Bird Survey (I-WeBS) data for the period 2013-2014 season (only data available) for the subsite 0M496 is detailed in **Table 3** below. It is noted that the table only presents data from a single month i.e. February 2014.

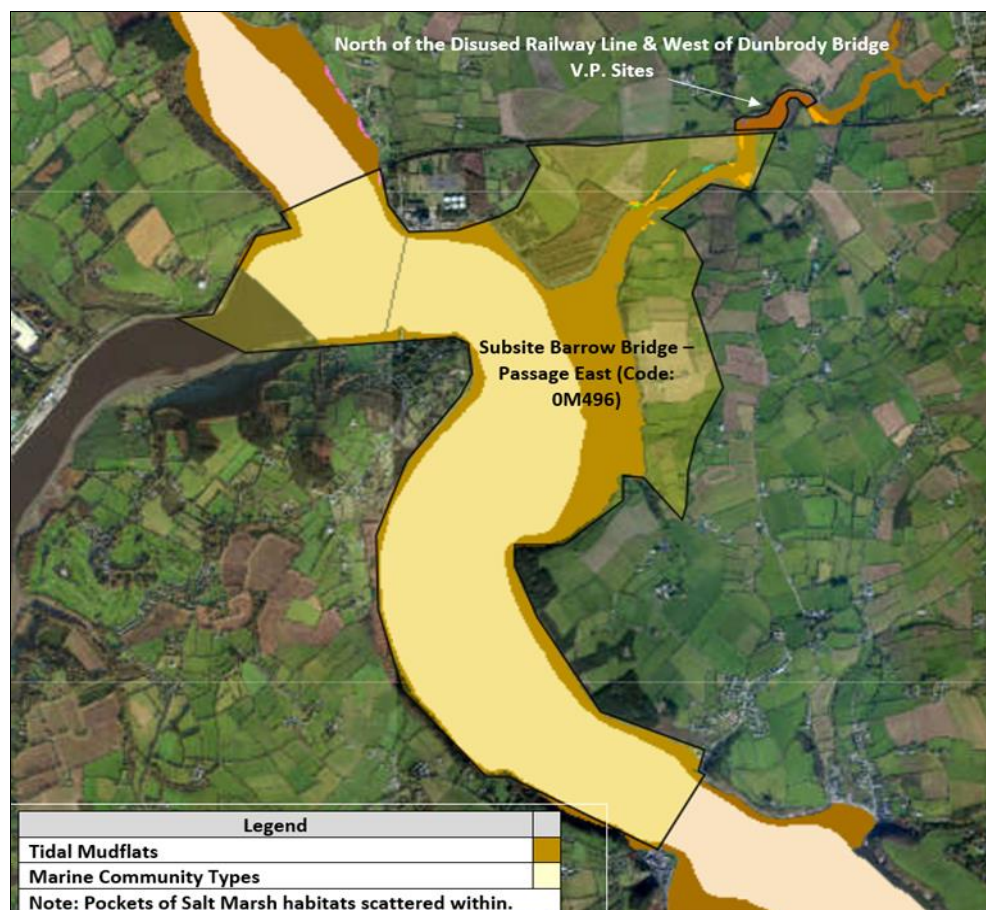


Figure 1: General overview of habitats recorded within Subsite 0M496 and North of the Disused Railway Line and West of Dunbrody Bridge vantage point sites. Source: NPWS Site Specific Conservation Objectives (SSCO) mapping system.

Table 3. Irish Wetland Bird Survey (I-WeBS) data for the period 2013-2014 season (only data available is for February 2014) for the subsite 0M496

Species	Annual peak of each species	Species	Annual peak of each species
Wigeon	38	Curlew	25
Teal	45	Redshank	4
Mallard	71	Black-headed Gull	40
Cormorant	9	Lesser Black-backed Gull	20
Little Egret	3	Herring Gull	10
Grey Heron	7	Great Black-backed Gull	29

Of the species recorded Little Egret is listed on Annex I of the Birds Directive. Wigeon, Curlew, Redshank, Black-headed Gull and Herring Gull are classified as Red Listed species (high conservation concern) by BirdWatch Ireland and the Royal Society for the Protection of Birds (Colhoun. K. et al 2013).

However, it is noted that none of the species recorded during the 2013-2014 survey period were recorded in high numbers and numbers were low in-comparison to the figures which would be considered nationally significant (i.e. 1% or more of the all-Ireland population of an Annex I species or 1% or more of the bio-geographical population of a migratory species).

3. Previous winter bird counts 2015 - DixonBrosnan Environmental Consultants

3.1 Winter Bird surveys (2015/2016) of potential landfall sites for the proposed Greenlink project in Co. Wexford

Winter bird counts were carried out in 2015/2016 season to assess winter bird usage of coastal sites which were proposed as landfalls for the proposed Greenlink project. Three sites were initially chosen (Booley Bay, Boyces Bay and Baginbun Bay) with an additional site (Sandeel Bay) added in December 2015. Results relating to the Baginbun Bay are shown below in **Tables 4 and 5**.

The winter bird surveys were undertaken on the following dates: 23th November 2015, 15th December 2015, 20th January 2016, 10th February 2016, 3rd March 2016 and 23rd March, 2016. The survey methodology was based on that used by the British Trust for Ornithology (BTO), Wetland Bird Survey (WeBS) and also that for the Irish Wetland Bird Survey (I-WeBS), as outlined in Gilbert et al. (1998).

The winter bird survey was undertaken using Nikon ProStaff-7 10X42 binoculars and a Safari 20-60 X 80 spotting scope. Ninety-minute counts were undertaken at either high tide, mid tide or low tide. Tides and weather conditions for each day were recorded.

It is noted that many of these birds were recorded overflying the channel and that the survey covered a radius of approximately 300m from each vantage point. Trawlers fishing for sprat offshore attracted large numbers of sea birds and seals. Thus, during the periods when trawlers were present numbers were elevated above the expected normal level. A total of 48 bird species were recorded during the site surveys. Two species listed as qualifying interests for the Bannoy Bay SPA i.e. Oystercatcher and Redshank, were recorded at Baginbun Beach. Both were recorded in low numbers.

None of the waterbirds recorded by vantage point counts in proximity to Baginbun Bay were recorded in high numbers and numbers were low in-comparison to the figures which would be considered nationally significant (i.e. 1% or more of the all-Ireland population of an Annex I species or 1% or more of the bio-geographical population of a migratory species).

Table 4 - Bird survey results (2015/2016)	1% National	1% International	Baginbun Beach					
			23/11/2015	15/12/2015	20/01/2016	10/02/2016	03/03/2016	23/03/2016
Species								
Black-headed Gull		20000	3			12		
Common Gull		16400	5					
Herring Gull		10200	2	4	2	1	6	3
Great Black-backed Gull		4200		7			1	
Lesser Black-backed Gull		5500	2					
Kittiwake				103				
Little Gull		1230	1					
Gannet					3			
Cormorant	120	1200	1	1				1
Shag		2000		19	1	3	3	2
Black Guillemot			1					
Oystercatcher	690	8200	1					
Redshank	300	3900		8				
Mallard	290	20000						1
Great Crested Grebe	40	3500				1		
Great Northern Diver	20	50			1	4	1	

Table 5: Species recorded within Baginbun Beach survey area, along with relevant conservation status		Birds Directive Annex			BOCCI		European Birds of Conservation Concern - Ireland		
Species		I	II	III	Red List	Amber List	SPEC 1	SPEC 2	SPEC 3
<i>Larus ridibundus</i>	Black-headed Gull				X				
<i>Larus canus</i>	Common Gull					X			
<i>Larus argentatus</i>	Herring Gull				X			X	
<i>Larus marinus</i>	Great black-backed Gull					X			
<i>Larus fuscus</i>	Lesser black-backed Gull					X			
<i>Rissa tridactyla</i>	Kittiwake					X			X
<i>Larus minutus</i>	Little Gull	X				X			X
<i>Morus bassana</i>	Gannet					X			
<i>Phalacrocorax carbo</i>	Cormorant					X			
<i>Phalacrocorax aristotelis</i>	Shag					X		X	
<i>Cephus grylle</i>	Black Guillemot					X		X	
<i>Haematopus ostralegus</i>	Oystercatcher					X	X		
<i>Tringatotanus</i>	Redshank				X			X	
<i>Anas platyrhynchos</i>	Mallard		X	X					
<i>Podiceps cristatus</i>	Great Crested Grebe					X			
<i>Gavia immer</i>	Great Northern Diver	X				X			
Symbol	Description								
I	Annex 1: species and sub-species are particularly threatened. Member States must designate Special Protection Areas (SPAs) for their survival and all migratory bird species.								
II	Annex 2: bird species can be hunted. However, the hunting periods are limited and hunting is forbidden when birds are at their most vulnerable: during their return migration to nesting areas, reproduction and the raising of their chicks.								
III	Annex 3: overall, activities that directly threaten birds, such as their deliberate killing, capture or trade, or the destruction of their nests, are banned. With certain restrictions, Member States can allow some of these activities for species listed here.								

4. Winter bird survey 2018/2019 - methodology

A winter bird survey was undertaken by DixonBrosnan at each vantage point location on six separate occasions; October 2018 to March 2019. The survey methodology was based on that used by the British Trust for Ornithology (BTO), Wetland Bird Survey (WeBS) and also that for the Irish Wetland Bird Survey (I-WeBS), as outlined in Gilbert et al. (1998) and the low tide waterbird surveys (Lewis, L. J. et. al. 2014). The winter bird survey was undertaken using 8.5x45 binoculars and a Swarovski ATX30-70x95 spotting scope. Ninety-minute counts were undertaken at each survey location at either high tide, mid tide and low tide.

The vantage point locations for the winter bird counts are shown in **Figure 2**. The survey locations were based on information gathered during the original site walkover and the location of the proposed works. Boundaries of the count areas were selected primarily to delineate patches of relatively homogenous habitat within the study area in order to compare bird usage of these habitats and spatial areas; but were also selected to be easily perceived by the observer. This was done by use of sight-lines to prominent landmarks such as permanent marker buoys, coastal features and features on the horizon.

Where possible the survey covered a radius of approximately 300m from the proposed works area. A radius of 300m was used based information gathered by Borgmann (2011) stating that establishing set-back distances of 250 m from waterfowl, diving ducks, wading birds, and shorebirds may lessen the impacts to the most sensitive species. In addition, in most instances a visual stimulus will create a disturbance effect before any associated noise starts to have an effect e.g. a flight response might be expected by many species if approached to within c. 100-150m across a mudflat (Cutts et. Al, 2013).

All waterbirds present within the count areas other than passerines, doves and pigeons were identified to species and their behaviour was also noted. Waterbirds are defined as “birds that are ecologically dependent on wetlands” (Ramsar Convention, 1971) which are a diverse group that includes divers, grebes, swans, geese and ducks, gulls, terns and wading birds. Birds flying over the count area but not utilising the resources within it, were not included in the counts, however notes were made on any substantial movements of birds that were observed. Birds re-locating within a site were not counted twice, however there may be some overlap been the survey sites i.e. ‘South of the Disused Railway’, ‘North of the Disused Railway Line’ and ‘West of Dunbrody Bridge’, due to their close proximity.



Figure 2: vantage point location for the winter bird counts.

5. Results

Vantage point count locations were utilised for the winter bird survey as shown in **Figure 2**. Conditions experienced during the survey along with survey notes are recorded in **Table 6**. It is important to note that waterbird counts represent a ‘snapshot’ of bird numbers during a count session, so in general and taking into account all potential sources of error, resulting data are regarded to be underestimates of population size.

Table 6. Survey conditions and notes

Baginbun Beach	
Date: 11/10/2018	Tides & Weather Tide for general area: High – 07.36 (4.23m) & Low – 13.56 (0.46m). General Conditions: Overcast with light breezes of 4 - 7mph. Rain light and scattered. Temperatures of 11 Degrees Celsius. State of water – calm (rippled). Visibility good
Notes: <ul style="list-style-type: none"> • Vantage point on cliff top by car park. • Survey conducted at 12.00, tide state – low. • Shags loafing on headland to southeast i.e. Baginbun Point. Foraging trips within coastal waters within study site. • Herring Gull foraging within exposed rock pools at low tide along foreshore. 	

<ul style="list-style-type: none"> • Great black-backed Gull loafing/roosting on exposed bedrock on top of headland i.e. Baginbun Point. • Oystercatcher foraging within exposed fucoids along foreshore. • Flyby - Oystercatcher (10), Curlew (1), Cormorant (2), Great black-backed Gull (6), Herring Gull (2), Shag (1). • Human, on-foot – shoreline with dog approximately 1 hour 5 minutes into survey for a period of 10 minutes. Disturbance – High response of Oystercatcher - flew away to areas outside of survey site and did not return during the count session. • 13.20pm single Grey seal (<i>Halichoerus grypus</i>) moving through site. 	
Date: 20/11/2018	Tides & Weather Tide for general area: High – 15.25 (3.70m) & Low – 09.18 (1.15m). General Conditions: Partly cloudy with fresh to strong breezes of 19 - 31mph. No rain. Temperatures of 7 Degrees Celsius. State of water – moderate (waves present). Visibility good.
Notes: <ul style="list-style-type: none"> • Vantage point on cliff top by car park. • Survey conducted at 13.00, tide state – high. • Human, on-foot – shoreline at commencement of survey with additional dog walker arriving 5 minutes into survey and 2 further people arriving 10 minutes into survey. Remained on site for approximately 30 minutes. • Shags loafing on headland to southeast i.e. Baginbun Point with foraging trips within coastal waters within study site. • Gulls loafing – on water top and/or headland i.e. Baginbun Point • Red-throated Diver foraging. • Auks – loafing on water top to far east of survey site. • Fishing trawler working approximately 50m east of survey site. • Large numbers of Auks and gulls flying in a northerly direction outside study site. • Flyby – Cormorant (4) in a north south direction. • Tide rising throughout survey period. 	
Date: 04/12/2018	Tides & Weather Tide for general area: High – 15.22 (3.75m) & Low – 09.20 (0.94m). General Conditions: Overcast with light breezes of 1 - 3mph. Dry conditions. Temperatures of 2 Degrees Celsius. State of water – calm (rippled). Visibility good.
Notes: <ul style="list-style-type: none"> • Vantage point on cliff top by car park. • Survey conducted at 10.40, tide state – low. • Great Northern Diver foraging and loafing within water. • Shags loafing on headland to southeast i.e. Baginbun Point with foraging trips within coastal waters within study site. • Herring Gulls and Great Black-backed Gulls loafing/roosting on headland to southeast i.e. Baginbun Point. • Merlin (<i>Falco columbarius</i>) an Annex I species loafing on headland i.e. Baginbun Point. • Oystercatcher loafing on exposed rock along southern boundary of survey site. • Large vessel arrived 10minutes into survey and remained for most of survey period – weak response of birds present i.e. waterbirds move slightly away from the source of the disturbance. • Grey heron – loafing 	

<ul style="list-style-type: none"> Flyby – Herring Gull (5), Great Black-backed Gull (6), Shag (3), Oystercatcher (1), Grey Heron (2), Great Northern Diver (1). Mostly along a north south axis. Moderate numbers of Great Northern Diver foraging outside survey site. 	
Date: 15/01/2019	<p>Tides & Weather Tide for general area: High – 11.42 (3.41m) & Low – 05.38 (1.56m).</p> <p>General Conditions: Mostly cloudy with light breezes of 4 - 7mph. Dry conditions. Temperatures of 7 Degrees Celsius. State of water – calm (rippled). Visibility ok.</p>
<p>Notes:</p> <ul style="list-style-type: none"> Vantage point on cliff top by car park. Survey conducted at 10.25, tide state – high. Shags and Cormorant loafing on headland to southeast i.e. Baginbun Point with foraging trips within coastal waters within study site. Great Black-backed Gulls loafing/roosting on headland to southeast i.e. Baginbun Point. Great Northern Diver foraging and loafing within water. Razorbill – foraging Flyby – Light-bellied Brent Goose (15), Herring Gull (2), Great Black-backed Gull (3). Mostly along a north south axis. Human (x2), on-foot – shoreline with dog 10minutes before survey end. Weak response of birds present i.e. waterbirds move slightly away from the source of the disturbance. 2 Harbour Porpoise (<i>Phocoena phocoena</i>) foraging within site for a brief period. 	
Date: 13/02/2019	<p>Tides & Weather Tide for general area: High – 10.57 (3.40m) & Low – 17.16 (1.54m).</p> <p>General Conditions: Overcast with moderate to fresh breezes of 19 - 31mph. Dry conditions. Temperatures of 9 Degrees Celsius. State of water – moderate (waves present). Visibility good.</p>
<p>Notes:</p> <ul style="list-style-type: none"> Vantage point on cliff top by car park. Survey conducted at 10.45, tide state – high. Herring Gulls loafing/roosting on headland to southeast i.e. Baginbun Point. Red-throated Diver – foraging Common Gull – loafing on water Human, on-foot – shoreline with dog - (x2) – High response of Cormorant - flew away to areas outside of survey site and did not return during the count session Flyby –Light-bellied Brent Goose (5), Black-headed Gull (17), Gannet (2), Common Gull (8), Herring Gull (12), Great Black-backed Gull (1). Mostly along a north south axis. 	
Date: 27/03/2019	<p>Tides & Weather Tide for general area: High – 09.43 (3.35m) & Low – 16.10 (1.10m).</p> <p>General Conditions: Cloudless with calm wind conditions. Dry. Temperatures of 11 Degrees Celsius. State of water – calm (glassy). Visibility good.</p>
<p>Notes:</p> <ul style="list-style-type: none"> Vantage point on cliff top by car park. Survey conducted at 09.00, tide state – high. Shag loafing on headland to southeast i.e. Baginbun Point with foraging trips within coastal waters within study site. Herring Gulls and Great Black-backed Gulls loafing/roosting on headland to southeast i.e. Baginbun Point. 	

<ul style="list-style-type: none"> • Great Northern Diver foraging and loafing within water. • Lesser black-backed Gull – loafing on water • Cormorant – foraging • Human, on-foot – shoreline for approximately 1 hour into survey period, including dog walker for approximately 15 minutes. Weak response, of waterbirds i.e. move slightly away from the source of the disturbance. • Single Grey seal (<i>Halichoerus grypus</i>) moving through site. • Fresh Otter (<i>Lutra lutra</i>) tracks on beach. • Flyby –Curlew (2), Lesser black-backed Gull (2), Cormorant (2), Herring Gull (4), Great Black-backed Gull (2). Mostly along a north south axis, some gulls along east west axis. • Moderate numbers of Gannet, Gulls and Divers to east of study site. 	
South of the Disused Railway Line	
Date: 11/10/2018	<p>Tides & Weather Tide for general area: High – 07.36 (4.23m) & Low – 13.56 (0.46m).</p> <p>General Conditions: Mostly cloudy with light breezes of 4 - 7mph. No rain. Temperatures of 12 - 13 Degrees Celsius. State of water – calm (rippled). Visibility good</p>
<p>Notes:</p> <ul style="list-style-type: none"> • Vantage point on flood embankment. • Survey conducted at 14.00, tide state – low. • Large number of birds flushed from site on arrival i.e. high disturbance response by wildfowl and curlew. • Black-tailed Godwit (17) noted foraging within a section of agricultural grassland to southwest of vantage point. • Numerous birds of prey noted passing through site and/or circling overhead i.e. Buzzard, Sparrow hawk and Kestrel. • Redshank and Greenshank predominately foraging along exposed mudflat habitat. • Constant movement of Redshank and Greenshank around site. • Black-tailed Godwit – foraging and loafing within exposed mudflat habitat. • Gulls and ducks – loafing prior to disturbance. • Grey heron – foraging • Curlew – loafing – prior to disturbance. 	
Date: 20/11/2018	<p>Tides & Weather Tide for general area: High – 15.46 (4.03m) & Low – 09.46 (1.05m).</p> <p>General Conditions: Cloudy with light to gentle breezes of 4 - 12mph. Light and scattered rain. Temperatures of 7 Degrees Celsius. State of water – calm (rippled). Visibility good.</p>
<p>Notes:</p> <ul style="list-style-type: none"> • Vantage point on flood embankment. • Survey conducted at 10.50, tide state – low. • Redshank and Greenshank predominately foraging along exposed mudflat habitat. • Teal – loafing • Red-throated Diver – foraging • Flock of Black-tailed Godwit (15) and Curlew (9) noted foraging within a section of agricultural grassland to northeast of vantage point i.e. around the grounds of Dunbrody Abbey. • Snipe and Curlew - loafing • Little Grebe – foraging 	

<ul style="list-style-type: none"> • Turnstone & redshank (6) flushed from site by flyby Peregrine Falcon (<i>Falco peregrinus</i>) – Annex I species. • Constant movement of Redshank and Greenshank around site. • Flyby –Curlew (2), Black-headed Gull (36), Common Gull (1), Oystercatcher (1) Little Egret (1). • Tide slowly rising throughout survey. 	
Date: 04/12/2018	<p>Tides & Weather Tide for general area: High – 15.43 (4.10m) & Low – 09.48 (0.84m).</p> <p>General Conditions: Overcast with light breezes of 1 - 3mph. Dry conditions for most of survey period with scattered moderate showers for last half hour. Temperatures of 2 Degrees Celsius. State of water – moderate (waves present). Visibility good to ok.</p>
<p>Notes:</p> <ul style="list-style-type: none"> • Vantage point on flood embankment. • Survey conducted at 12.30, tide state – mid-high (rising). • Teal – loafing and foraging • Snipe predominately foraging along mudflat habitat • Redshank and Greenshank predominately foraging along exposed mudflat habitat. • Constant movement of Redshank and Greenshank around site. • Dunlin foraging along mudflat habitat – arrived from a westerly direction to forage on small patch of remaining exposed mudflat habitat. • Flyby –Curlew (4), Black-headed Gull (45), Lesser Black-backed Gull (1), Oystercatcher (1) Lapwing (89), Teal (8). • Tide rising throughout survey. 	
Date: 15/01/2019	<p>Tides & Weather Tide for general area: High – 12.01 (3.68m) & Low – 18.38 (1.49m).</p> <p>General Conditions: Nearly overcast with light breezes of 4 - 7mph. Dry conditions. Temperatures of 7 Degrees Celsius. State of water – calm (rippled). Visibility good.</p>
<p>Notes:</p> <ul style="list-style-type: none"> • Vantage point on flood embankment. • Survey conducted at 12.25, tide state – high. • Teal – foraging – single teal roosting • Redshank and Greenshank predominately foraging along exposed mudflat habitat. • Constant movement of Redshank and Greenshank around site. • Black-tailed Godwit – foraging and loafing within exposed mudflat habitat • Black-headed Gulls – loafing • High tide roost of redshank (12) noted along exposed rock to southwest of vantage point. Birds dispersed within site as tide receded. • Flyby –Curlew (2), Black-headed Gull (31), Herring Gull (3). • Tide receding during survey. 	
Date: 13/02/2019	<p>Tides & Weather Tide for general area: High – 11.16 (3.67m) & Low – 17.44 (1.44m).</p> <p>General Conditions: Overcast with gentle breezes of 8 - 12mph. light scattered rain. Temperatures of 10 Degrees Celsius. State of water – calm (rippled). Visibility ok to good.</p>
<p>Notes:</p> <ul style="list-style-type: none"> • Vantage point on flood embankment. 	

<ul style="list-style-type: none"> • Survey conducted at 12.40, tide state – high. • Some small areas of exposed mudflat along river margins at beginning of survey. As survey precedes tide slowly falls resulting in greater areas of mudflat exposure. • Curlew – predominately loafing • High tide roost of redshank (15) noted along exposed rock to southwest of vantage point. Birds dispersed within site as tide receded. • Teal – foraging and loafing • Grey heron and Black-tailed Godwit loafing. • Redshank and Greenshank predominately foraging along exposed mudflat habitat. • Constant movement of Redshank and Greenshank around site. • Human, on-foot – railway line – high disturbance response of majority of Black-tailed Godwit i.e. fly away to areas outside of site and do not return during the count session. • Flyby –Curlew (5), Black-headed Gull (20), Cormorant (2), Wigeon (7), Mallard (3). 	
Date: 27/03/2019	Tides & Weather Tide for general area: High – 10.02 (3.64m) & Low – 16.38 (1.00m). General Conditions: Lightly cloudy with calm wind conditions. Dry. Temperatures of 12 - 13 Degrees Celsius. State of water – calm (rippled). Visibility good.
Notes: <ul style="list-style-type: none"> • Vantage point on flood embankment. • Survey conducted at 11.00, tide state – high. • Some small areas of exposed mudflat along river margins at beginning of survey. As survey precedes tide slowly falls resulting in greater areas of mudflat exposure. • Little Egret and Snipe – foraging and loafing • Redshank and Greenshank predominately foraging along exposed mudflat habitat. • Constant movement of Redshank and Greenshank around site. • Grey heron and teal – foraging • Flyby –Lesser Black-backed Gull (3), Cormorant (1). 	
North of the Disused Railway Line	
Date: 15/10/2018	Tides & Weather Tide for general area: High – 10.25 (3.72m) & Low – 16.53 (1.21m). General Conditions: Partly cloudy with calm wind conditions. Dry. Temperatures of 11 - 13 Degrees Celsius. State of water – calm (glassy). Visibility good.
Notes: <ul style="list-style-type: none"> • Vantage point behind flood embankment near southwest corner of agricultural field. • Survey conducted at 12.05, tide state – mid to low. • All waders foraging. Constant movement around site. • Tide receding throughout. • Human, on-foot – railway line – high disturbance response of some birds. i.e. fly away to areas outside of site and do not return during the count session. • Black-headed Gulls loafing. • Flyby – Black-headed Gulls (13) 	
Date: 19/11/2018	Tides & Weather Tide for general area: High – 15.01 (3.81m) & Low – 08.58 (1.24m). General Conditions: Cloudy with light breeze of 4 - 7mph. Dry. Temperatures of 8 Degrees Celsius. State of water – calm (rippled). Visibility good.

Notes: <ul style="list-style-type: none"> • Vantage point behind flood embankment near southwest corner of agricultural field. • Survey conducted at 11.00, tide state – low. • Redshank and Greenshank predominately foraging along exposed mudflat habitat. • Constant movement of Redshank and Greenshank around site. • Approximately 40 Black-headed Gulls noted foraging within agricultural grassland around Dunbrody Abbey, to south of survey site. • Teal – foraging • Black-tailed Godwit – foraging. • Tide rising throughout survey period. • Flyby – Black-headed Gulls (33), Curlew (1), Greenshank (1) 	
Date: 10/12/2018	Tides & Weather Tide for general area: High – 07.24 (4.22m) & Low – 13.43 (1.00m). General Conditions: Nearly overcast with light breezes of 1 - 3mph. Dry conditions. Temperatures of 5 Degrees Celsius. State of water – calm (rippled). Visibility good.
Notes: <ul style="list-style-type: none"> • Vantage point behind flood embankment near southwest corner of agricultural field. • Survey conducted at 10.15, tide state – low. • Redshank and Greenshank predominately foraging along exposed mudflat habitat. • Constant movement of Redshank and Greenshank around site. • Teal, Little Egret and Curlew – foraging • Snipe – loafing and foraging • Cormorant – foraging • Flyby – Black-headed Gulls (3) 	
Date: 10/01/2019	Tides & Weather Tide for general area: High – 08.16 (4.13m) & Low – 14.30 (1.11m). General Conditions: Overcast with light breezes of 1 - 3mph. Light scattered rain. Temperatures of 9 Degrees Celsius. State of water – calm (rippled). Visibility ok.
Notes: <ul style="list-style-type: none"> • Vantage point behind flood embankment near southwest corner of agricultural field. • Survey conducted at 08.00, tide state – high • Curlew, Redshank and Snipe – loafing. Some sporadic foraging by redshank. • Teal and Wigeon loafing on water. • Tide receding during survey. • Kingfisher (<i>Alcedo atthis</i>) – Annex I species foraging within site • Flyby – Black-headed Gulls (63), Curlew (1), Common Gull (1) 	
Date: 14/02/2019	Tides & Weather Tide for general area: High – 12.22 (3.54m) & Low – 06.26 (1.44m). General Conditions: Overcast with light breezes of 1 - 3mph. Dry. Temperatures of 10 Degrees Celsius. State of water – calm (rippled). Visibility good.
Notes: <ul style="list-style-type: none"> • Vantage point behind flood embankment near southwest corner of agricultural field. • Survey conducted at 11.00, tide state – mid to high • Redshank and Greenshank predominately foraging along exposed mudflat habitat. 	

<ul style="list-style-type: none"> • Constant movement of Redshank and Greenshank around site. • Teal and Curlew – foraging • Kingfisher (<i>Alcedo atthis</i>) – Annex I species foraging within site • Tide slowly rising throughout survey period. Moderate areas of mudflat exposed at beginning of survey. As tide rises and area of mudflat habitat reduces, some birds leave the survey site. • Flyby – Black-headed Gulls (23), Herring Gull (3) • Pair of Buzzard constantly present. 	
Date: 28/03/2019	Tides & Weather Tide for general area: High – 10.51 (3.34m) & Low – 17.33 (1.25m). General Conditions: Scattered cloud to nearly overcast at times. Light breezes of 1 - 3mph. Dry. Temperatures of 10 Degrees Celsius. State of water – calm (rippled). Visibility good.
Notes: <ul style="list-style-type: none"> • Vantage point behind flood embankment near southwest corner of agricultural field. • Survey conducted at 09.00, tide state – low • Redshank and Greenshank predominately foraging along exposed mudflat habitat. • Constant movement of birds around site. • Teal, Black-tailed Godwit and Grey heron – foraging • Kingfisher (<i>Alcedo atthis</i>) – Annex I species foraging within site • Tide slowly rising throughout survey period. However, large area of exposed mudflat still available at end of survey period. • Flyby – Shelduck (2) • Pair of Buzzard constantly present. 	
West of Dunbrody Bridge	
Date: 15/10/2018	Tides & Weather Tide for general area: High – 10.25 (3.72m) & Low – 16.53 (1.21m). General Conditions: Partly cloudy with calm wind conditions. Dry. Temperatures of 14 Degrees Celsius. State of water – calm (glassy). Visibility good.
Notes: <ul style="list-style-type: none"> • Vantage point from area of amenity grassland by Dunbrody Bridge. • Survey conducted at 13.45, tide state – low. • All waders foraging. Constant movement around site. Some sporadic loafing behaviour. • Black-headed Gull – loafing and foraging • Little Egret – loafing and foraging. • Kingfisher (<i>Alcedo atthis</i>) – Annex I species, brief foraging spell within site • Flyby – Little Egret (2) 	
Date: 19/11/2018	Tides & Weather Tide for general area: High – 15.01 (3.81m) & Low – 08.58 (1.24m). General Conditions: Mostly cloudy with gentle to fresh breezes of 8 - 24mph. Dry. Temperatures of 7 Degrees Celsius. State of water – calm (rippled). Visibility good.
Notes: <ul style="list-style-type: none"> • Vantage point from area of amenity grassland by Dunbrody Bridge. • Survey conducted at 12.45, tide state – low. 	

<ul style="list-style-type: none"> • Tide rising throughout survey. Approximately 50 minutes into survey, mudflat habitat submerged. • Redshank and Greenshank foraging within exposed mudflat habitat at beginning of survey. • Flyby – Redshank (4), Dunlin (4), Black-tailed Godwit (1), Black-headed Gull (4). • Pair of Buzzard constantly present. 	
Date: 10/12/2018	Tides & Weather Tide for general area: High – 07.24 (4.22m) & Low – 13.43 (1.00m). General Conditions: Nearly overcast with light breezes of 1 - 3mph. light scattered showers. Temperatures of 5 Degrees Celsius. State of water – calm (rippled). Visibility good.
Notes: <ul style="list-style-type: none"> • Vantage point from area of amenity grassland by Dunbrody Bridge. • Survey conducted at 11.55, tide state – low. • Redshank and Greenshank predominately foraging along exposed mudflat habitat. • Constant movement of Redshank and Greenshank around site. • Teal – loafing and foraging • Little Egret – foraging • Flyby – Black-headed Gulls (8), Herring Gull (1) 	
Date: 10/01/2019	Tides & Weather Tide for general area: High – 08.16 (4.13m) & Low – 14.30 (1.11m). General Conditions: Overcast with light breezes of 1 - 3mph. Dry. Temperatures of 9 Degrees Celsius. State of water – calm (rippled). Visibility good.
Notes: <ul style="list-style-type: none"> • Vantage point from area of amenity grassland by Dunbrody Bridge. • Survey conducted at 09.40, tide state – high. • Tide very slowly receding throughout resulting in small areas of exposed mudflat habitat along river margins. • Ducks – foraging • Redshank and Greenshank predominately foraging along exposed mudflat habitat. • Constant movement of birds around site. • Curlew – foraging • Flyby – Redshank (1), Curlew (4), Black-headed Gull (1). 	
Date: 14/02/2019	Tides & Weather Tide for general area: High – 12.22 (3.54m) & Low – 06.26 (1.44m). General Conditions: Overcast with light breezes of 1 - 3mph. Dry. Temperatures of 10 Degrees Celsius. State of water – calm (rippled). Visibility good.
Notes: <ul style="list-style-type: none"> • Vantage point from area of amenity grassland by Dunbrody Bridge. • Survey conducted at 12.40, tide state – high. • Approximately 5 -10% of mudflat habitat exposed at beginning of survey. Tide very slowly receding throughout. • Redshank and Greenshank predominately foraging along exposed mudflat habitat. • Constant movement of birds around site. • Teal – foraging • Flyby – Redshank (2), Kingfisher (1) 	

<ul style="list-style-type: none"> • Pair of Buzzard constantly present. 	
Date: 28/03/2019	<p>Tides & Weather Tide for general area: High – 10.51 (3.34m) & Low – 17.33 (1.25m).</p> <p>General Conditions: Lightly cloudy with light breezes of 1-3mph. Dry. Temperatures of 11 Degrees Celsius. State of water – calm (rippled). Visibility good.</p>
<p>Notes:</p> <ul style="list-style-type: none"> • Vantage point from area of amenity grassland by Dunbrody Bridge. • Survey conducted at 10.40, tide state – low. • Teal – foraging and loafing • Redshank and Greenshank predominately foraging along exposed mudflat habitat. • Green Sandpiper - foraging • Constant movement of birds around site. • Tide slowly rising throughout survey • Pair of Buzzard constantly present. 	

Species recorded during the surveys, along with peak abundance are summarised in **Table 7** below.

Table 7 – Peak numbers of winter birds recorded at each vantage point.	1% National	1% International	Baginbun Beach	South of Railway	North of Railway	West of Dunbrody Bridge
Species			Peak No's High/Low Tide	Peak No's High/Low Tide	Peak No's High/Low Tide	Peak No's High/Low Tide
Black-headed Gull		20000		83 (LT)	16 (LT)	2 (LT)
Common Gull		16400	1 (HT)	2 (LT)		
Herring Gull		10200	7 (LT)			
Great Black-backed Gull		4200	15 (HT)			
Lesser Black-backed Gull		5500	1 (HT)			
Grey Heron	25	2700	1 (LT)	1 (LT & HT)	1 (LT)	1 (LT)
Little Egret	20	1300		2 (LT)	2 (LT)	1 (LT)
Cormorant	120	1200	4 (HT)		1 (LT)	
Shag		2000	15 (LT)			
Common Guillemot			4 (HT)			
Razor Bill			3 (HT)			
Curlew	350	8400		17 (LT)	22 (HT)	2 (LT)
Oystercatcher	690	8200	2 (LT)			
Black-tailed Godwit	190	610		32 (LT)	3 (LT)	2 (LT)
Greenshank	20	2300		3 (LT)	3 (LT)	3 (HT)
Redshank	300	3900		26 (HT)	14 (HT)	3 (LT & HT)
Snipe		20000		9 (LT)	4 (HT)	
Green Sandpiper		15500				1 (LT)
Turnstone	95	1400		3 (LT)		
Dunlin	570	13300		5 (LT)		
Wigeon	630	15000		15 (LT)	14 (HT)	
Teal	340	5000		15 (LT)	18 (HT)	23 (HT)
Kingfisher					1 (HT)	1 (LT)
Little Grebe	20	4000		1 (LT)		
Great Northern Diver	20	50	10 (LT)			
Red-throated Diver	20	3000	2 (HT)	1 (LT)		
Notes	HT - denotes high tide. LT - denotes low tide.					

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6. Discussion of results

Twenty-six species in total were recorded during the site survey (11 species – Baginbun Beach, 15 species – South of the Disused Railway Line, 12 species – North of the Disused Railway Line, 10 species – West of Dunbrody Bridge). Certain bird species are listed by BirdWatch Ireland as Birds of Conservation Concern in Ireland (BOCCI). These are bird species suffering declines in population size. Birds species listed in Annex I of the Birds Directive (2009/147/EC) are considered a conservation priority. Species recorded during the surveys are shown in **Table 8** along with their conservation status.

6.1 Bird Species of Conservation Concern

In addition to species listed in the EU Birds Directive (see **Section 2.1**), species of conservation concern in the Irish and European context are also classified under Birds of Conservation Concern Ireland (BoCCI) and Species of European Conservation Concern (SPEC). Both of these assessment processes are used to identify priority species in order that conservation action can be taken to improve species status.

Birds of Conservation Concern Ireland (BoCCI) 2014– 2019 (Colhoun. K. et al 2013)

BirdWatch Ireland and the Royal Society for the Protection of Birds (RSPB) have listed priority bird species suffering decline in the Irish/European and global context. The Birds of Conservation Concern in Ireland (BoCCI) list classifies birds as Red (high conservation concern) or Amber (medium conservation concern) based on their conservation status and hence conservation priority. All other regularly occurring species are classified as Green List and are not considered threatened. Listed species must meet one or more of the following criteria:

Red List: Their breeding population or range has declined dramatically in recent years, or their breeding population has undergone a significant decline since 1800, or they are of global conservation concern. Red listed species automatically qualify for Amber status.

Amber List: Their population or range has declined moderately in recent years, or they are rare or sporadically breeding species, or their breeding or wintering population is internationally important and/or localised, or they have an unfavourable conservation status in Europe.

Green List: Do not meet Red or Amber-listing criteria.

European Conservation Status (SPEC)

Species of European Conservation Concern are assessed by BirdLife International and recognised by the SPEC process:

SPEC 1: European species of global conservation concern, i.e. classified as Critically Endangered, Endangered, Vulnerable or Near Threatened at global level (BirdLife International 2016a). SPEC 1 species are automatically BoCCI Red-listed and both SPEC 2 and 3 species are Amber-listed except for those that do not breed in Ireland.

SPEC 2: Species whose global population is concentrated in Europe, and which is classified as Regionally Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened, Declining, Depleted or Rare at European level.

SPEC 3: Species whose global population is not concentrated in Europe, but which is classified as Regionally Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened, Declining, Depleted or Rare at European level.

Table 8: Species recorded along with their conservation status		Birds Directive Annex			BOCCI		European Birds of Conservation Concern - Ireland		
Species		I	II	III	Red List	Amber List	SPEC 1	SPEC 2	SPEC 3
<i>Larus ridibundus</i>	Black-headed Gull				X				
<i>Larus canus</i>	Common Gull					X			
<i>Larus argentatus</i>	Herring Gull				X			X	
<i>Larus marinus</i>	Great black-backed Gull					X			
<i>Larus fuscus</i>	Lesser black-backed Gull					X			
<i>Egretta garzetta</i>	Little Egret	X							
<i>Ardea cinerea</i>	Grey Heron								
<i>Numenius arquata</i>	Curlew		X		X		X		
<i>Phalacrocorax carbo</i>	Cormorant					X			
<i>Phalacrocorax aristotelis</i>	Shag					X		X	
<i>Alca torda</i>	Razorbill					X	X		
<i>Uria aalge</i>	Guillemot					X			
<i>Tringa ochropus</i>	Green Sandpiper								
<i>Gallinago gallinago</i>	Snipe		X	X		X			X
<i>Limosa limosa</i>	Black-tailed Godwit					X	X		
<i>Haematopus ostralegus</i>	Oystercatcher					X	X		
<i>Tringatotanus</i>	Redshank				X			X	
<i>Tringa nebularia</i>	Greenshank								
<i>Calidris alpina</i>	Dunlin	X			X				X
<i>Arenaria interpres</i>	Turnstone								
<i>Alcedo atthis</i>	Kingfisher	X				X			X
<i>Anas penelope</i>	Wigeon		X	X	X				
<i>Anas crecca</i>	Teal		X	X		X			
<i>Tachybaptus ruficollis</i>	Little Grebe					X			
<i>Gavia stellata</i>	Red-throated Diver	X				X			X
<i>Gavia immer</i>	Great Northern Diver	X				X			

6.2 Results in relation to designated sites

Only one Special Protection Area (Bannow Bay SPA, Site Code 004033) is deemed relevant to the proposed works. The qualifying interests for Bannow Bay SPA are shown in **Table 1** together with the conservation objectives for each species. A total of five species listed as qualifying interests for the Bannow Bay SPA were recorded utilising the survey sites, namely, Dunlin, Curlew, Black-tailed Godwit, Oystercatcher and Redshank. None of these species were recorded in high abundance i.e. considered important at a national level.

The peak numbers recorded by DixonBrosnan during the 2018/2019 winter bird survey (**Table 7**) represent a fraction of the mean peak number of these species within the SPA during the baseline period (1995/96 – 1999/00) (**See Section 2.1 Designated Sites**). The peak number of each species represented as a percentage in comparison to the mean peak of each species during the baseline period is as follows;

- Dunlin - <1%
- Curlew – 2.5%
- Black-tailed Godwit – 5.9%
- Oystercatcher - <1%
- Redshank – 6.9%

6.3 Results in the context of winter bird counts carried out in 2015/2016 season within Baginbun and I-Webs.

6.3.1 Baginbun Beach

As detailed in **Table 4** and **Table 7** above; 16 species were recorded during the 2015/2016 survey season. Twelve species recorded during the 2018/2019 season. Both survey periods recorded similar species within the Baginbun survey area. Of these species, Common Gull, Lesser Black-backed Gull and Shag were noted to be down in peak abundance numbers during the 2018/2019 survey period, compared to the 2015/2016 survey period.

Eight species (Kittiwake, Little Gull, Black Guillemot, Mallard, Great Crested Grebe, Black-headed Gull, Redshank and Gannet) were recorded either foraging or loafing/roosting within the survey area at Baginbun during the 2015/2016 period but were not recorded during the 2018/2019 survey period (**Table 4** and **Table 7**).

Four species (Grey Heron, Common Guillemot, Razorbill and Red-throated Diver) were recorded during the 2018/2019 period that were not recorded during the 2015/2016 survey season (**Table 4** and **Table 7**).

Three waterbird species listed as Annex I species under the EU Birds Directive i.e. Great Northern Diver, Red-throated Diver and Little Gull were recorded at 'Baginbun Beach'. Great Northern Diver was recorded during both survey seasons. There was an increase of 6 individuals in the peak abundance numbers, between the 2015/2016 and 2018/2019 survey period (**Table 4** and **Table 7**). A single Little Gull was recorded on one occasion during the 2015/2016 season. Red-throated Diver was recorded during 2 survey dates during the 2018/2019 survey season at Baginbun, with a peak number of 2 individuals.

Overall, none of the species recorded within 'Baginbun Beach' survey area during both the 2015/2016 and 2018/2019 survey periods were recorded in numbers which would be considered nationally significant.

Of the species recorded, two are listed as qualifying interests for the Bannow Bay SPA i.e. Oystercatcher and Redshank. Both species were recorded within 'Baginbun Beach' during the 2015/2016 season. Oystercatcher was the only species of the two recorded during the 2018/2019 survey period. Both were recorded at low numbers.

Bannow Bay SPA is of high value for birds and the mudflat habitat supports high numbers of wintering birds. Based on the results of the bird counts it is concluded that the habitats at 'Baginbun Beach' i.e. in proximity to the proposed works area, are of a low value for birds listed as qualifying interests for the SPA.

6.2.2 South of Railway, North of Railway and West of Dunbrody Bridge

As detailed in **Table 7** above;

- 15 species were recorded 'South of the Disused Railway Line',
- 12 species were recorded 'North of the Disused Railway Line',
- 10 species were recorded 'West of Dunbrody Bridge'.

Seven species were recorded within all 3 survey sites i.e. Black-headed Gull, Little Egret, Curlew, Black-tailed Godwit, Greenshank, Redshank and Teal.

As seen in **Table 7** the majority of species were recorded in proximity to the railway line i.e. 'South of the Disused Railway Line' and 'North of the Disused Railway Line'. This is presumably due to the greater area of mudflat habitat available at these locations. Both the 'North of the Disused Railway Line' and 'South of the Disused Railway Line' survey sites are approximately 4 times the area of the survey site 'West of Dunbrody Bridge'.

Four Annex I species were recorded during the site surveys i.e. Little Egret, Kingfisher, Dunlin and Red-throated Diver.

- Little Egret, Dunlin and Red-throated Diver were recorded 'South of the Disused Railway Line'.
- 'Kingfisher and Little Egret were recorded North of the Disused Railway Line' and 'West of Dunbrody Bridge'

Five red listed species were recorded within the total survey area i.e. Black-headed Gull, Curlew, Redshank, Dunlin and Wigeon. A high tide roost of redshank was recorded on two occasions along the southern river bank (**Table 6**), south of the railway. Numbers ranged from 12 to 15 individuals.

7. Summary

A total 26 species were recorded from the site visits during the winter bird survey.

Five Annex I bird species were recorded i.e. Little Egret, Dunlin, Kingfisher, Red-throated Diver and Great Northern Diver. Six Red Listed species were recorded, namely Black-headed Gull, Herring Gull, Redshank, Wigeon, Dunlin and Curlew. Merlin was also recorded roosting at Baginbun Head on a single occasion.

Overall, a total of five species listed as qualifying interests for the Bannow Bay SPA were recorded either foraging or loafing/roosting within the survey sites, namely, Redshank, Curlew,

Dunlin, Black-tailed Godwit and Oystercatcher. Two species listed as qualifying interests were recorded at Baginbun Beach i.e. Redshank and Oystercatcher while four species were recorded in proximity to the Campile River crossing i.e. Redshank, Curlew, Dunlin and Black-tailed Godwit.

The mudflat habitat noted along the Campile estuary is of local value for waders e.g. Curlew, Black-tailed Godwit, Greenshank and Redshank all of which were recorded during the winter bird survey.

A high tide roost of redshank was recorded south of the railway, along the river bank.

8. Discussion

The habitats in close proximity to the proposed HDD site at Campile River Estuary and landfill site have the potential to support an array of waterbird species including those listed as qualifying interests for the Bannow Bay SPA. Although some waterbird species will be faithful to specific habitats within the SPA, many will at times also use habitats situated in proximate areas or in areas ecologically connected e.g. via coastal waters, to the SPA. These areas may be used as alternative high tide roosts, as a foraging resource or, be simply flown over, either on migration or as commuting corridors between feeding and roosting areas. (NPWS 2012).

Different habitats will vary in their sensitivity periods based around function e.g. mudflats are most important during the winter for wintering waterbirds. It must also be taken into account that numerous factors are at play when it comes to numbers and distribution of species within the survey sites e.g. prey abundance, habitat quality and disturbance factors. As wading bird distribution is highly correlated with the densities of their prey (Yates et.al. 1993) it is likely that their distribution is linked to the densities of prey items.

Both Curlew and Black-tailed Godwit were noted foraging outside the survey area, within agricultural grassland around the Campile River Estuary (**Table 6**). When tidal flats are covered at high water, intertidally-foraging waterbirds are excluded and many will move to nearby fields to feed. Terrestrial foraging is also important when environmental factors (e.g. low temperature) reduce the profitability of intertidal foraging (e.g. Zwarts & Wanink, 1996). Black-tailed Godwit and Curlew can be considered generalists, making use of a range of habitats, for example foraging across both intertidal mudflats and grassland habitats. For Black-tailed Godwit in southern Ireland for example, the feeding resources provided by grasslands have been shown to be important for the maintenance of the wintering population (Alves et al., 2013). Therefore, any disturbance events caused by the proposed project along the Campile River Estuary, will have a minimal impact on the foraging capabilities of these species due to their ability to utilise a wide array of habitats within the wider landscape that occur outside the zone of influence of the works.

The topic of alternative habitat use is also applicable to benthic-foraging divers e.g. Great Northern Diver, whose foraging distribution is highly influenced by water depth and tidal conditions. Many of these species however (e.g. Great Northern Diver and Red-throated Diver) exhibit a widespread coastal distribution during winter utilising shallow nearshore waters to a greater degree at certain times (e.g. storms, driving onshore winds). Due to the large area of coastal waters available to these species at Baginbun Beach, any potential disturbance caused by HDD works will be minimal in relation to the alternative habitat available to these species.

No works will be carried out in the vicinity of the Campile Estuary between 01 October and 31 March inclusive to eliminate the potential for impacts on migratory winter waterbirds.

A new study by BirdWatch Ireland has found that the number of waterbirds wintering in Ireland has declined by 15% over the past five years and 40% since the mid-1990's. Wading bird species, including Knot, Dunlin, Golden Plover and Redshank, have been the worst hit, suffering a combined loss of over 100,000 individuals (19%) over the past five years (Burke, et al. 2018). Oystercatcher, Dunlin, Redshank and Turnstone, four species recorded during the winter bird survey have seen a drop in numbers by more than 20%. The only species recorded to show increases were Black-tailed Godwit and Greenshank (Burke, et al. 2018). Thus, an assessment of potential disturbance of wintering birds is a high priority.

Disturbances to waterbirds can result in an interruption to normal activity and the displacement of birds over variable distances, often into sub-optimal habitats. This can be critical during severe winters and can lead to a reduction in the carrying capacities of important wintering wetland sites. However, in general, studies show that most bird species have the ability to habituate to regular and continual sources of noise and visual disturbances providing there is no large 'startling' component. It is noted that the area around the proposed works at Baginbun Beach and at the Campile River, is already subject to some background disturbance by traffic, pedestrians, village residents and tourists. HDD works in the vicinity of the Campile Estuary will be avoided during the winter season between 01 October and 31 March. Whilst there may be some temporary displacement of bird species outside of the bird wintering period, the works will not have a significant negative effect on their overall survival rate due to the close proximity of identical habitat, roosting and foraging resources e.g. high value mudflats with high densities of macro-invertebrates in relation to the Campile River Estuary (**Figure 1**).

9. Conclusions

A total of 26 bird species were recorded during the winter bird surveys. Some species that are considered of high conservation value (Annex I of the Birds Directive, qualifying species for the Bannow Bay SPA and Red List species) were recorded.

Ireland is required under the terms of the EU Birds Directive (2009/147/EC) to designate certain areas as Special Protection Areas (SPAs) for the protection of endangered species of wild birds based on several criteria (**Section 2.1** above). Bannow Bay SPA is of high value for birds and mudflat habitat supports high numbers of wintering birds. Based on the desktop review of data and the results of the bird counts it is concluded that the habitats in proximity to the proposed works areas i.e. Baginbun Beach and Campile River crossing, are of low to moderate importance for wintering bird populations. Given the level of background disturbance which already exists in these areas and the ability of birds to habituate to such disturbance, the impact on birds and in particular birds listed as qualifying interests for the Bannow Bay SPA, is predicted to be minor.

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