12 Biodiversity

12.1 Introduction

This chapter provides an assessment of the impacts (and resulting effects) of the Indaver Ringaskiddy Resource Recovery Centre (including waste to energy facility) on terrestrial and intertidal biodiversity in the receiving environment. Full details of the proposed development can be found in **Chapter 4 *Description of Proposed Development*** and **Chapter 5 *Construction Activities***.

This chapter of the EIAR describes the existing flora and fauna in the vicinity of the proposed Ringaskiddy Resource Recovery Centre and surrounding area, reviews the likely significant effects and proposes measures for the mitigation of these effects, where appropriate. Impacts on designated sites are also addressed by this chapter.

It is noted that an Appropriate Assessment Screening and Natura Impact Statement (AA Screening Report and Natura Impact Statement for an Industrial Emissions Licence at Ringaskiddy Resource Recovery Centre at Ringaskiddy, Co. Cork, DixonBrosnan, 2019) is provided as a standalone document. The AA screening and NIS specifically addresses potential effects on European sites as required under the Habitats Directive.

The potential impacts on biodiversity in this Chapter should be read in conjunction with the Chapters on **Air Quality (Chapter 8), Climate (Chapter 9), Noise and Vibration (Chapter 10)** and **Chapter Soils, Geology, Hydrogeology, Hydrology and Coastal Recession (Chapter 13**).

12.2 Methodology

12.2.1 Introduction

This appraisal is based on surveys of the entire Indaver site and surrounding area and a review of desktop data. A flora and fauna report were prepared previously by the Aquatic Services Unit, University College Cork in 2001 for an EIS for the Indaver Ireland planning application for a Waste Management Facility at this location. DixonBrosnan previously prepared the Flora and Fauna chapters for a similar Indaver EIS submitted in 2008 and an addendum to the EIS prepared in 2010. These reports were consulted during the preparation of this chapter of the EIAR. The following surveys were carried out in 2014/2015:

- Habitat mapping;
- Surveys of wintering birds;
- Breeding birds surveys;
- Common tern breeding survey;
- Mammals, with a particular emphasis on badger, otter and bats;
- Intertidal survey.

Further surveys were carried out in October and November 2018 and May 2019 as follows:

- Habitat mapping;
- Mammals, with a particular emphasis on badger, otter and bats;
- Non-native invasive plant species;
- Breeding birds.

It is noted that certain surveys were not repeated in 2018/2019. In respect of winter bird counts, it was concluded by previous surveys that the habitats in proximity to the site are not of high value for wintering birds and in the absence of any changes in such habitats, as determined by a walk over survey, it was concluded that no significant changes in usage by winter birds will have occurred. Likewise, in respect of intertidal surveys no significant changes in habitat type will have occurred since the previous surveys and a repeat survey was not considered necessary. It is also noted that no direct impacts on intertidal habitats are proposed. It is also noted that a previous survey of Common Tern breeding at Cork Port was previously carried out. This colony is located 750m from the proposed development area, will not be affected and no repeat survey for this species was considered necessary.

12.2.2 Relevant Legislation

Flora and fauna in Ireland are protected at a national level by the Wildlife Acts, 1976 to 2000 and the European Communities (Birds and Natural Habitats) Regulations 2011. They are also protected at a European level by the EU Habitats Directive (92/43/EEC) and the EU Birds Directive (79/409/EEC) amended in 2009 as the Directive 2009/147/EC.

Under this legislation, sites of nature conservation importance are then designated in order to legally protect faunal and floral species and important/vulnerable habitats.

The categories of designation are as follows:

- Special Areas of Conservation (SAC) are designated under the European Communities (Birds and Natural Habitats) Regulations 2011 to comply with the EU Habitats Directive (92/43/EEC);
- Special Protection Areas (SPAs) and designated under the EU Birds Directive (79/409/EEC) amended in 2009 as the Directive 2009/147/EC; and
- Proposed Natural Heritage Areas (pNHA) are listed under the Wildlife (Amendment) Act, 2000. They have limited legal protection under Local Authority Development Plans.

12.2.3 Desktop Review

A desktop study was carried out to collate the available information on the local ecological environment. The purpose of the desktop study was to identify features of ecological value occurring within the development site and those occurring in close proximity to it.

A desktop review also allows the key ecological issues to be identified early in the appraisal process and facilitates the planning of surveys. Sources of information utilised for this report include the following:

- National Parks & Wildlife Service (NPWS) - www.npws.ie;
- Environmental Protection Agency (EPA) – www.epa.ie;
- National Biodiversity Data Centre – www.biodiversityireland.ie
- County Cork Biodiversity Action Plan 2009-2014 (Cork County Council, 2009);
- Ringaskiddy Port Redevelopment EIS (Port of Cork/RPS, 2015);
- Bat Conservation Ireland - http://www.batconservationireland.org;
- Birdwatch Ireland;
- British Trust for Ornithology (BTO)-www.BTO.ie;
- Scottish Natural Heritage Guidelines (Winter Bird Survey Method), 2014;
- Natura Impact Statement (Screening Stage 1) at Haulbowline, Ringaskiddy, Co. Cork for proposed bridge remediation works (Dixon Brosnan, 2014);
- Natura Impact Statement for an Industrial Emissions Licence at Ringaskiddy Resource Recovery Centre at Ringaskiddy, Co. Cork (DixonBrosnan, 2019);
- Best Practice Guidance for Habitat Survey and Mapping (Heritage Council, 2011);
- Guidance on integrating climate changes and biodiversity into environmental impact assessment (EU Commission, 2013);
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (National Roads Authority (2009);
- Cork lower Harbour Energy Group EIS and NIS (ARUP, 2011);
- Waste-to-Energy Facility, Ringaskiddy Addendum to Environmental Impact Statement (ARUP, 2010);
- National Biodiversity Action Plan 2017-2021;
- Threat Response Plan: Otter 2009-2011 (DEHLG, 2009);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018);
- Guidelines on the information to be contained in Environmental Impact Assessment Reports (Draft August 2017);
- Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) European Union, 2017.

12.2.4 Guidance

This chapter of the EIAR follows the Environmental Protection Agency's Draft *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2017).

It also takes account of the draft *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (Department of Environment, Community and Local Government, July 2012), Chartered Institute of Ecology and Environmental Management *Guidelines on Ecological Impact Assessment in the UK and Ireland, 2nd edition* (CIEEM 2016) and Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition (CIEEM, 2016). Reference were also made to the following key legislation and documents where relevant:

<u>European</u>

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive);
- Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (codified version of Directive 79/409/EEC as amended) (The Birds Directive);
- Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (The Water Framework Directive);
- Directive 2006/44/EC of the European Parliament and of the Council of 6 September 2006 on the quality of fresh waters needing protection or improvement in order to support fish life (The Fish Directive (consolidated)).

<u>Republic of Ireland</u>

- The Wildlife Act 1976 as amended by the Wildlife Act 1976 (Protection of Wild Animals) Regulations, 1980, the Wildlife (Amendment) Act 2000, the Wildlife (Amendment) Act 2010, European Communities (Wildlife Act, 1976) (Amendment) Regulations 2017. (The Wildlife Act);
- European Communities (Conservation of Wild Birds) Regulations 1985 (S.I. 291/1985) as amended by S.I. 31/1995;
- European Communities (Natural Habitats) Regulations, S.I. 94/1997 as amended by S.I. 233/1998 & S.I. 378/2005 (The Habitats Regulations);
- Fisheries (Consolidation) Act, 1959 (as amended), hereafter referred to as the Fisheries Act;
- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011);
- The Flora (Protection) Order, 1999 (S.I. No. 94/1999).

12.2.5 Consultation

Meetings were held with Dr. Jervis Good and Danny O' Keefe (National Parks and Wildlife Service of the Department of Arts, Heritage and the Gaeltacht) on May 27, 2015 and September 8, 2015. In its letter dated 11 September 2015 the Development Application Unit specifically requested that the following be addressed:

1. Effects on otters (including coastal protection measures and bioaccumulation of pollutants).
2. Effects on Annex 1 bird species and regularly occurring migratory birds, to which the conservation objectives of the SPA do not apply, e.g. little egret (a piscivorous species), whimbrel (in terms of collision risk) etc.
3. Effects on red listed and amber listed bird species (e.g yellow-hammer (habitat removal), barn owl (rodenticide use), etc.
4. Effects of any blasting or pile driving (if required during construction) on marine mammals occurring in the Lower Harbour.
5. Effects of coastal protection measures on the fauna and flora of the shingle beach; a survey for protected flora should be undertaken.

It is noted that issues raised during those pre-application meetings that relate specifically to the Cork Harbour SPA are examined separately in the NIS.

During the 2016 planning oral hearing for the Strategic Infrastructure Development application for a Resource Recovery Centre at Ringaskiddy, Co. Cork, supplemental information was requested by Dr. Jervis Good of the National Parks and Wildlife Service (NPWS, Department of the Arts, Heritage and the Gaeltacht) in relation to possible impacts from engineered nanoparticles. This issue is specifically addressed in the An Appropriate Assessment Screening and Natura Impact Statement (AA Screening Report and Natura Impact Statement for an Industrial Emissions Licence at Ringaskiddy Resource Recovery Centre at Ringaskiddy, Co. Cork, DixonBrosnan, 2019) which is provided as a standalone document.

12.2.6 Surveys Overview

Field surveys of the habitats on the construction site and immediate surround were undertaken between June 2014 and May 2019 to describe and evaluate the terrestrial and intertidal habitats (including flora and fauna) in the vicinity of the development site.

The following surveys were carried out at the site:

- Habitat mapping and flora surveys were carried out over several visits in the period from June 2014 to May 2019. (See **Appendix 12.1**- Flora Surveys)
- Six separate winter bird counts were carried out from November 2014 to March 2015. (See **Appendix 12.2** - Bird Surveys)
- A survey for otters and badgers was carried out over several visits in the period from June 2014 to May 2019. (See **Appendix 12.3** - Mammal Surveys)

- Bat surveys using standard detectors were carried out in September 2014, August 2015 and May 2019. (See **Appendix 12.3** - Mammal Surveys)
- Breeding bird surveys were carried out in the period from May 2015 to June 2015 and in May 2019. (See **Appendix 12.2** - Bird Surveys)
- Breeding bird counts at a common tern colony at Ringaskiddy were carried out from May 2015 to June 2015. (See **Appendix 12.2** - Bird Surveys)
- An intertidal survey was carried out on June 18-19, 2015. (See **Appendix 12.4** - Intertidal Survey)
- A survey for Japanese Knotweed and other invasive plant species was undertaken on site in October and November 2018 and May 2019. The survey findings are included in this chapter.

This ecological assessment relates to the same site and its effects will be broadly similar to that described in the 2016 planning application for the Ringaskiddy Resource Recovery Centre.

This report was prepared by Carl Dixon MSc Ecology and Ian McDermott MSc Ecology. Bird surveys, general mammal surveys and habitat mapping in 2014/2015 were carried out at the site by Vincent Murphy MSc (Ecology and Landscape Management and in 2018/ 2019 by Carl Dixon MSc Ecology and Ian McDermott MSc Ecology. Bat surveys were carried out in 2014 by Mark Donnelly BSc and by Carl Dixon MSc in 2019. The intertidal survey was carried out by Dr. Stiofan Creaven, who has extensive experience in marine biology including surveys in Ireland and internationally.

12.3 Receiving Environment

12.3.1 General Landscape

The Indaver site is approximately 13.55 hectares in size and surrounds the Hammond Lane Metal Company facility. The main development area is located in the eastern section of the site. Field levels will be raised in the western section of the site.

The Indaver site runs east-west parallel to the L2545 Ringaskiddy Road, an extension of the N28, which leads to Haulbowline Island and runs along the northern boundary of the site. To the south, the study area is bordered by agricultural land dominated by intensive pasture. A Martello Tower is located on the crest of a small hill (43m approx.) in agricultural land to the south of the study area.

To the east, the site extends towards the edge of the Cork Harbour West Channel that separates the mainland from Spike Island. The shoreline here is characterised by shingle beach with steep earthen cliffs. To the west, the site adjoins agricultural land (tillage and pasture) and a small group of residential dwellings.

The development area is located in the eastern section of the study area, between the coast and the Hammond Lane facility. A small walkway will be created along the eastern boundary between the public car park and the Martello tower facilitate recreational users. A rectangle of land, used as a public car park, to the northeast of the site is not included in the development area, but is included in the study area.

A high proportion of the study area, including the development site, is covered in scrub, which has become more dominant over time. The remainder of the site consists of pasture and tillage fields that remain under conventional agricultural management. The Indaver site and the development are shown in **Chapter 1, Figures 1.1, 1.2** and **1.3**.

12.3.2 Designated Conservation Areas

Special Areas of Conservation (SACs) and candidate SACs are protected under the Habitats Directive 92/43/EEC and the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Special Protection Areas (SPAs) are protected under the Birds Directive 2009/147/EC and European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Collectively, these sites are referred to as Natura 2000 or European sites. Natural Heritage Areas (NHAs/pNHAs) are national designations under the Wildlife Act 1976, as amended.

There are no environmental designations pertaining to the study area. Thus, the site of the development does not form part of any Natural Heritage Area (NHA), Special Protection Area (SPA), Special Area of Conservation (SAC) or candidate Special Area of Conservation (cSAC), Nature Reserve, or National Park.

The development site is located within 20km of a number of these designated sites. Designated sites, along with their distance from the site of the development, are listed in **Table 12.1** and are shown in **Figure 12.1.** Site synopses for the closest Natura 2000 sites (Cork Harbour SPA and Great Island Channel cSAC) are provided in **Appendix 12.5.**

Table 12.1 Designated sites within a 20km radius

Designated site	Distance from site of development
cSAC sites	
Great Island Channel candidate Special Area of Conservation and proposed Natural Heritage Area (Site code 001058)	Approximately 5.6 km north
SPA sites	
Cork Harbour Special Protection Area (Site code 004030)	Approximately 0.5 km south
Ballycotton Bay Special Protection Area (Site code 004022)	Approximately 18.4km east
Sovereign Islands SPA (Site code 004124)	Approximately 19.7km southwest
pNHA sites	
Lough Beg proposed Natural Heritage Area (Site code 001066)	Approximately 0.3 km south
Monkstown Creek proposed Natural Heritage Area (Site Code 001979)	Approximately 1.5 km northwest

Designated site	Distance from site of development
Whitegate Bay proposed Natural Heritage Area (Site Code 001084)	Approximately 2.8 km east
Owenboy River proposed Natural Heritage Area (Site Code 001990)	Approximately 3 km southwest
Cuskinny Marsh proposed Natural Heritage Area (Site code 001987)	Approximately 3.5 km northeast
Fountainstown Swamp proposed Natural Heritage Area (Site code 000371)	Approximately 6 km south
Rostellan Lough, Aghada Shore and Poulnabibe Inlet proposed Natural Heritage Area (Site Code 001076)	Approximately 5 km east
Minane Bridge Marsh proposed Natural Heritage Area (Site code 001966)	Approximately 8.5 km southwest
Ballynaclashy House, North of Midleton proposed Natural heritage area (Site code 000099)	Approximately 14.2 km northeast
Templebreedy National School, Crosshaven proposed Natural heritage area (Site code 000107)	Approximately 3.3 km south
Lough Aderry and Ballybutler proposed Natural Heritage Area (Site code 000446)	Approximately 15.3km northeast
Carrigahane Hill proposed Natural Heritage Area (Site code 001042)	Approximately 13.1km northeast
Douglas estuary proposed Natural Heritage Area (Site code 001046)	Approximately 6.3 km north
Glanmire Wood proposed Natural Heritage Area (Site code 001054)	Approximately 11.1km N
Great Island Channel proposed Natural Heritage Area (Site code 001058)	Approximately 5.6km N
Leamlara Wood proposed Natural Heritage Area (Site code 001064)	Approximately 13.4 km northeast
Rock farm Quarry, Littleisland proposed Natural Heritage Area (Site code 001074)	Approximately 7.5 km north
Cork Lough proposed Natural Heritage Area (Site code 001081)	Approximately 14km northwest
Dunkettle Shore proposed Natural Heritage Area (Site code 001082)	Approximately 9.6 km north
Carrigacrump Cave proposed Natural Heritage Area (Site code 001408)	Approximately 10.8km east

Important areas for birds within Cork Harbour are interrelated, with bird populations moving between different areas at different times. The closest Natura 2000 sites are the Cork Harbour SPA, which is located 0.5km to the south of the development site and the Great Island Channel cSAC, which is located 5.6km to the north. The closest pNHA is Lough Beg, 0.3km to the south and Monkstown Creek pNHA, 1.5km northwest. These sites are part of a network of sites which support important bird numbers within Cork Harbour and are considered relevant to this development. The remaining sites are located a considerable distance from the development and no potential effect on these sites has been identified.

12.3.3 Ramsar Sites

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. Cork Harbour is listed as a Ramsar site, which is a non-statutory designation.

12.3.4 Important Bird Areas – Cork Harbour

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 programmes. 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 development site lies adjacent to the Cork Harbour IBA (Site Code: IE088).

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

- A4iii - The site is known or thought to hold, on a regular basis, ≥ 20,000 waterbirds or ≥ 10,000 pairs of seabird of one or more species.
- B1i - The site is known or thought to hold ≥ 1% of a flyway or other distinct population of a waterbird species.
- B2 - The site is one of the most important in the country for a species with an unfavourable conservation status in Europe and for which the site-protection approach is thought to be appropriate.
- 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).
- C4 - The site is known to regularly hold at least 20,000 migratory waterbirds and/or 10,000 pairs of migratory species of one or more species.
- C6 - The site is one of the five most important in the European region in question for a species or subspecies considered threatened in the European Union.

Table 12.2 Provides a summary of the Cork Harbour IBA trigger species

Species	Current IUCN Red List Category	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Eurasian Curlew (*Numenius arquata*)	NT	winter	1995	1,669 individuals	B2
Bar-tailed Godwit (*Limosa lapponica*)	NT	winter	1996	456 individuals	B2
Black-tailed Godwit (*Limosa limosa*)	NT	winter	1996	1,399 individuals	B1i, C3
Dunlin (*Calidris alpine*)	LC	winter	1995	12,050 individuals	B1i, B2, C3
Common Redshank (*Tringa tetanus*)	LC	winter	1996	1,344 individuals	B1i, C3
Common Tern (*Sterna hirundo*)	LC	breeding	1995	102 breeding pairs	C6
A4iii Species group - waterbirds	n/a	winter	-	20,000 individuals	A4iii, C4

12.3.5 Habitats

Terrestrial habitat mapping was carried out in line with the methodology outlined in the Heritage Council publication *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011) in 2014 and 2015. The habitat map was then updated following surveys in 2018 and 2019. All habitats within the study area were classified to level 3 of the classification scheme outlined in *A Guide to Habitats in Ireland* (Fossit, 2000) and cross-referenced with habitats listed under Annex I of the Habitats Directive. Surveys were carried out on the 22nd of November 19th of December 2018 and the 13th of May 2019. The natural grassland habitat (Dry meadow and grassy verge GS2/Wet grassland GS4) recorded during the 2014 and 2015 surveys, is now significantly reduced in size due to the continual encroachment of scrub and clearance of construction tracks. Given that detailed surveys were carried out previously at the site and given that more natural grassland habitats are very limited in extent, the present of rare or uncommon species is highly unlikely. No rare or uncommon species were noted. A flora species list is included in **Appendix 12.1.**

Previous surveys at the site are referred to where relevant. A current habitat map is included as **Figure 12.2** and the habitats recorded on site are described below in **Table 12.3.** The ecological value of habitats is defined by the classification scheme outlined in *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (National Roads Authority, 2009) which is included in **Appendix 12.6.**

Table 12.3 Terrestrial Habitat Values

Habitat	Description/ Habitats Directive Annex I Status	Ecological value (NRA guidelines)
Hedgerow WL1/Treelines WL2	The southern boundary of the site consists of native hedgerow dominated by Hawthorn and Blackthorn, with Gorse and Bramble also noted. The width of the hedge ranges from approximately 1-4m. The western boundary, which is more sheltered, consists primarily of semi-mature Ash and Elm. A treeline of semi-mature Sycamore occurs in the north-eastern section of the site.	Local importance (Low value)
Dry meadow and grassy verge GS2/Wet grassland GS4	The survey in 2008 recorded Neutral Grassland GS1 and Wet Grassland GS4 in a mosaic with scrub in the eastern section of the site. Since then, in the absence of active management, scrub has come to dominate most of this area. Grey Sedge, which is classified as having an occasional occurrence in Ireland (Webb *et al*., 1996), was recorded within the development area in 2001 and 2008 but was absent in 2014/2015. In 2014/2015 it was noted that this habitat was now confined to small pockets. Dry Meadows and Grassy Verge GS2 habitat occurred primarily on an old track and was dominated by tall tussocky species such as False Oat Grass and Yorkshire Fog. Herb species include Knapweed, Yellow-wort, Cat's Ear, Meadow, Goat Vetchling and Birds-foot Trefoil. In places dry meadow and grassy verge occurs with remnants of wet grassland with Soft Rush, Rosebay Willowherb and Mint. Bee orchid was also recorded within this habitat for the first time during the 2014/2015 surveys. The survey in 2018 recorded small pockets of Dry meadow and grassy verge GS2/Wet grassland GS4. However due primarily to the encroachment of scrub the area of these habitats within the site boundary has been significantly reduced. It was noted during the site survey in May 2019 that Dry meadow and grassy verge GS2 habitat is no longer present within the site. An area of low value wet grassland, which has been grazed to a short sward, remains within the site boundary. This is a low value habitat.	Local importance (Low value)
Scrub WS1	The development will be concentrated in the eastern section of the study area. This area which previously supported grassland communities during previous surveys is now almost entirely dominated by scrub. The scrub has developed due to the absence of grazing or other forms of agricultural management. Species noted include Gorse, Bramble, Hawthorn, Blackthorn, Willow and Elder. The encroachment of scrub has resulted in the loss of grassland habitat and will continue in the absence of changes in management. During the May 2019 site survey, it was noted that sections of scrub habitat have been removed within the site to provide access to various parts of the site.	Local importance (Low value)
Broadleaved woodland WD1	An area of semi-mature broadleaved woodland occupies the north western part of the site along an escarpment. The woodland has developed because this area has not been grazed for a number of years. The area has been colonised by a number of species from the surrounding hedges including Sycamore, Ash and Elm. A number of large mature trees were recorded within this habitat.	Local importance (Higher value)

Habitat	Description/ Habitats Directive Annex I Status	Ecological value (NRA guidelines)
	Pockets of woodland are developing elsewhere within the site as the process of succession from scrub to woodland continues. Situated along the north eastern boundary of the site is a band of woodland dominated by Willow and Hornbeam. Hornbeam once formed a treeline along the northern boundary of the site but stands of Willow have encroached on the treeline, forming a narrow band of woodland A section of immature woodland noted during the 2014/2015 survey has developed into broadleaved woodland that is primarily composed of Willow species, with some oak also noted.	
Improved agricultural grassland GA1	This habitat occupies the higher, relatively level area close to the southern boundary. It is dominated by Rye Grass, Sweet Vernal Grass, Yorkshire-fog and common herbaceous species such as White Clover, Broadleaved Dock, Common Mouse-ear and Creeping Buttercup. It also occurs along the border of the L2545 Ringaskiddy Road. This habitat is species poor and is of low ecological value. Due to lack of management a pattern of succession has taken place with scrub naturally encroaching into this habitat. Species noted include Bramble, Nettle, Gorse, Creeping Thistle and immature Willow.	Local importance (Low value)
Conifer woodland WD3	A small area of planted conifers was recorded, which consists of Sitka Spruce and Monterey Cypress. The trees are approximately 15-20 years old.	Local importance (Low value)
Dense bracken HD1	Bracken occurs scattered throughout the study area as a minor component of scrub and hedgerows. However, there are significant areas of dense bracken to the west of the Hammond Lane facility and at the south east corner of the Indaver site. In places trees are starting to become established within this dense bracken including Elder and Hawthorn.	Local importance (Low value)
Arable crops BC1 / Recolonising bare ground Habitats (ED3)	Situated north of the Hammond Lane facility is a field that was until recently used for the production of arable crops. Cultivation and management of the field has since ceased. As a result, the field is being colonised by a number of weed species. Species noted include Ragweed, Scentless Mayweed, Willowherbs, Butterfly Bush, Spear Thistle, Figwort, Docks and sapling Sycamore. This habitat is of low ecological value.	Local importance (Low value)
Recolonising bare ground (ED3)	Two sections of recolonising bare ground can be found within the site. This habitat has arisen from areas of former disturbance, which have been invaded by grasses and herbaceous species. Species noted include Nettle. Dandelion, Willowherbs, Butterfly-bush and Daisy. This is highly modified habitat with low species diversity and little value for wildlife.	Local importance (Low value)
Spoil & Bare Ground (ED2)	Scattered throughout the eastern part of the development site are a number of recently cleared construction pathways.	Local importance (Low value)

12.3.6 Flora

The site of the development lies within Ordnance Survey National Grid 10km square W76. The National Parks and Wildlife Service (NPWS) rare plant database notes the presence of four protected plant species within W76; Meadow Barley *Hordeum secalium*, Penny Royal *Mentha pulegium*, Lesser Snapdragon *Misopates orontium* and *Annual Knawel Scleranthus annus.* These species are protected by the Flora Protection Order 2015 (S.I. No. 356 of 2015)). These species were not recorded within study area during site surveys.

Grey Sedge (*Carex divulsa*), which is classified as having an occasional occurrence in Ireland (Webb *et al.*, 1996), was recorded within the site on previous occasions (2001 and 2008) but was not recorded on the site during 2014/2015. Bee Orchid (*Ophrys apifera*) has a scattered distribution in Ireland and was recorded in the study area in 2014/2015. Neither of these species are protected by the Flora Protection Order 2015 (S.I. No. 356 of 2015).

The National Biodiversity Data Centre (NBDC) online database provides data on the distribution of mammals, birds, and invertebrates within the 10km grid squares. Some 298 flowering plants are listed by the NBDC as present in the grid square W76. **Table 12.4** lists threatened species, designations and 10km grid square. No rare species were recorded during the site survey, nor are they expected to occur given that the habitats within the study area are relatively common.

Table 12.4 NBDC listed flowering and endangered flowering plants for grid square W76

Grid Square	Flowering plant Species	Latin Name	Designations
W76	Sharp-leaved Fluellen	*Kickxia elatine*	Endangered
W76	Penny Royal	*Mentha pulegium*	Protected Species: Flora Protection Order & Threatened Species: Endangered
W76	Round-leaved Crane's-bill	*Geranium rotundifolium*	Endangered
W76	Little-robin	*Geranium purpureum*	Endangered
W76	Meadow Barley	*Hordeum secalinum*	Flora Protection Order & Endangered

12.3.7 Non-native invasive plant species

Non-native plants are defined as those plants which have been introduced outside of their native range by humans and their activities, either purposefully or accidentally. Invasive non-native species are so-called as they typically display one or more of the following characteristics or features: (1) prolific reproduction through seed dispersal and/or re-growth from plant fragments; (2) rapid growth patterns; and, (3) resistance to standard weed control methods.

Where a non-native species displays invasive qualities and is not managed it can potentially: (1) out compete native vegetation, affecting plant community structure and habitat for wildlife; (2) cause damage to infrastructure including road carriageways, footpaths, walls and foundations; and, (3) have an adverse effect on landscape quality.

There is a statutory obligation under S.I. 477 of 2011 of the European Communities (Birds and Natural Habitats) Regulations 2011 to address invasive species in Ireland. In relation to this project the high-risk invasive species Japanese knotweed (*Fallopia japonica*) and Rhododendron (*Rhododendron ponticum*) are of particular concern. These species are listed under the *3rd Schedule: Part 1 – Plants; Non-native species subject to restrictions under Regulations 49 & 50*. Regulation 49 deals with the '*Prohibition on introduction and dispersal*' while Regulation 50 deals with the '*Prohibition on dealing with and keeping certain species*'. Regulation 50 has yet to be brought into Irish law. Regulation 74 is a transitional provision in relation to Regulation 49 and 50. The Wildlife (Amendment) Act 2000 states that anyone who plants or otherwise causes to grow in a wild state in any place in the State any species of (exotic) flora, or the flowers, roots, seeds or spores of (exotic) flora shall be guilty of an offence.

The NBDC lists a number of both aquatic and terrestrial high impact invasive species which have been recorded within grid square W76 (**Table 12.5**).

Table 12.5 NBDC list of high impact invasive species

Common Name	Latin Name
Flora	
Japanese Knotweed	*Fallopia japonica*
Cherry Laurel	*Prunus laurocerasus*
Rhododendron	*Rhododendron ponticum*
Common Cord-grass	*Spartina anglica*
Insect - Beetle (Coleoptera)	
Harlequin Ladybird	*Harmonia axyridis*
Terrestrial Mammal	
American Mink	*Mustela vison*
Brown Rat	*Rattus norvegicus*
Coypu	*Myocastor coypus*
Fallow Deer	*Dama*
Sika Deer	*Cervus nippon*
House Mouse	*Mus musculus*
Bird	
Rose-ringed Parakeet	*Psittacula krameri*
Tunicate (Urochordata)	
Leathery Sea Squirt	*Styela clava*

The non-native invasive species Japanese Knotweed, Rhododendron, Montbretia, Snowberry, Buddleia, Winter Heliotrope, Cotoneaster, Sycamore and Travelers' Joy were recorded within and adjacent to the study area.

Of these species Japanese Knotweed is listed on both the “Most Unwanted: Established Threat” and on the “High Risk: Recorded Species” list compiled by Invasive Species Ireland a joint initiative by the Northern Ireland Environment Agency and NPWS. Sycamore, Montbretia, Snowberry, Cotoneaster are on the “Amber List: Recorded Species” (which under the right conditions could represent a significant impact on native species or habitats) while Buddleia, Travelers’ Joy and Winter Heliotrope are on the “Amber List: Uncertain Risk” (their ecological impact remains uncertain due to lack of data showing impact or lack of impact).

Japanese Knotweed, Rhododendron, Montbretia, Buddleia, Winter Heliotrope, Cotoneaster and Travellers’ Joy are also included in the *NRA Guidelines on the Management of Noxious Weeds and Non-native Species on National Roads* (NRA, 2010) as these species have been shown to have an adverse impact on landscape quality, native biodiversity or infrastructure; and are likely to be encountered during road schemes.

Montbretia, Cotoneaster, Snowberry were recorded in the verge/ roadside hedgerow on the southern side of the L2545 Ringaskiddy Road just outside the study area. These species are likely garden escapees from a derelict cottage. Winter Heliotrope was present in the immediate verge on both the northern and southern side of the L2545 Ringaskiddy Road. The southern infestation is within the study area. Cotoneaster, Buddleia and Sycamore were recorded from the scrub areas within the development site, while Travelers’ Joy, Sycamore and Buddleia were found to have invaded hedgerows throughout the study area. Sycamore and Travellers’ Joy were observed in the broadleaved woodland on the escarpment while Buddleia was noted on the steep earthen cliffs at the coast within the study area.

Japanese Knotweed (*Fallopia japonica*)

Japanese Knotweed occurs within the overall Indaver site but does not occur within the proposed works area. A treatment programme for Japanese Knotweed within Indaver lands is on-going. A number of mature stands and scattered emerging shoots of Japanese Knotweed were recorded within and adjacent to the western end of the study area during the 2019 site survey. One mature dense stand of Japanese Knotweed was recorded in a hedgerow on the boundary of the study area between two fields and the adjoining roadside hedgerow while two younger stands were recorded within scrub just inside the study area. The remaining infestations are located outside of the study area within hedgerows adjoining the former beet crop field and along the southern and northern boundaries of L2545 Ringaskiddy Road. Approximately 200 emerging Japanese knotweed sapling plants were recorded within the former beet crop field. Japanese Knotweed was also recorded in the headlands and towards the centre of the beet crop field.

Japanese knotweed is a highly invasive, non-native species which was originally introduced as an ornamental plant but has since spread along transport routes and rivers to become a serious problem. From an ecological viewpoint it out-competes native species by forming dense stands which suppresses growth of other species. It grows extremely vigorously and can penetrate through small faults in tarmac and concrete and thus can damage footpaths, roads and flood defence structures. As it can survive in poor quality soils, including spoil, it often thrives in brownfield sites and in urban areas. The key features of the plant are summarised below:

- Produces fleshy red tinged asparagus like shoots when it first breaks through the ground in an established stand.
- Has large, heart or spade-shaped green leaves which are approximately the size of your hand.
- Has leaves arranged in a zig-zag pattern along the stem.
- Grows up to 3 metres in height.
- Yellow / cream flowers in late summer (Typically the start forming from late July onwards).
- Hollow bamboo like stems which have distinctive ring like nodules at regular intervals along it.
- Brown stem remain in winter once it has died back.
- Extensive rhizome system (roots) (7m radius x 3m depth approximately).
- Orange centred rhizome.
- Spread entirely via the movement of plant and rhizome fragments.

The plant has woody underground rhizomes which can extend 7m laterally from a parent plant. The leaves and stems die back during winter, but growth is extremely rapid during spring. The plants spread mainly through fragments of rhizomes -as little as 0.7g of material or the size of a small fingernail is sufficient- and through cut stems. Stem material cannot regenerate once it has dried, but rhizome material may be viable for up to 20 years in the soil. Thus, control of this species is very difficult. The characteristics of this species is shown in **Photograph 12.1.**



Photograph 12.1 Key identification features of Japanese Knotweed

Given statutory obligations in relation to Japanese Knotweed, the extent of this species within the study area is shown on **Figure 12.3** with details of the infestations provided below in **Table 12.6.** Specific measures relating to the control of this species are included in the mitigation measures section (**Section 12.8.3)**.

Table 12.6 Infestations of Japanese Knotweed (See Figure 12.3)

Japanese Knotweed	Description
Infestations which are fully accessible for treatment by Indaver	
Area 1 (on boundary of Indaver site)	Small semi-mature stand within an area of scrub habitat, just inside the boundary of the Indaver site. Stand covers an area of approximately 1.5x4m. Plants viable.
Area 2 (on boundary of Indaver site)	Small semi-mature stand within an area of scrub habitat, just inside the boundary of the Indaver site. Stand covers an area of approximately 2x2m. 5 to 7 viable plants noted.
Infestations which are not fully accessible for treatment by Indaver	
Area 3	Large mature dense linear stand within a hedgerow boundary shared by a derelict cottage and a former arable crop (beet fodder) field. Past treatment regime evident, however a number of viable plants remain.
Area 4	Large fragmented mature dense stand within a roadside hedgerow boundary along the southern side of the L2545 Ringaskiddy Road behind which is the former arable field. A dense mature stand was recorded adjacent to the north-eastern corner of the site boundary, within a hedgerow/treeline habitat. This is the most mature infestation recorded and probably the source of the infestation. Scattered emerging shoots within the immediate verge on the southern side of the L2545 Ringaskiddy Road. Likely sources are shoots emerging from lateral rhizome growth from parent plant and plant fragments distributed by recent mechanical methods during maintenance of the adjacent roadside hedgerow.
Area 5	Scattered numerous emerging shoots recorded in abundance towards the centre of the crop field. Approximately 200 recorded. Likely sources are shoots emerging from lateral rhizome growth from parent plant and plant fragments from the mature stands in the hedgerow which were distributed by mechanical methods during crop cultivation.

<u>Rhododendron (Rhododendron ponticum)</u>

The high-risk invasive species Rhododendron (Rhododendron ponticum) was recorded to the southeast of the Hammond Lane facility, within scrub habitat. A single plant was noted. This species is listed on both the “Most Unwanted: Established Threat” and on the “High Risk: Recorded Species” list compiled by Invasive Species Ireland a joint initiative by the Northern Ireland Environment Agency and NPWS.

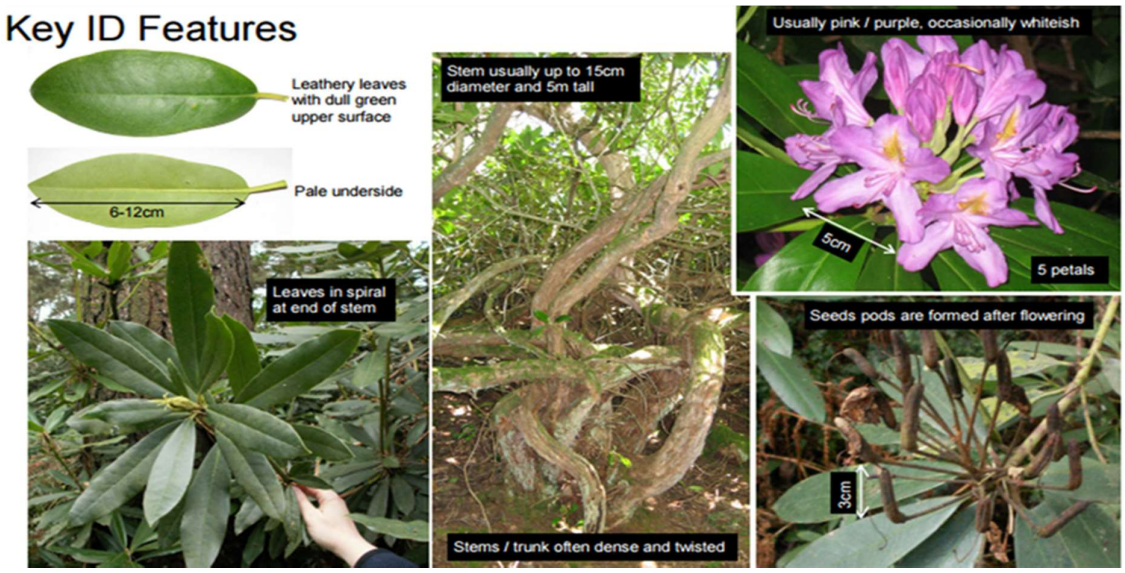
Rhododendron is a large evergreen shrub (growing up to 8m tall) that was introduced to Ireland as an ornamental plant in the 18th Century from Asia and north-west China. Rhododendron can regenerate via seeds, suckers or rootlets. Once rhododendron has invaded an area, few native plants survive.

It forms extensive dense thickets which cast a very deep shade, leading in woodland to loss of ground flora, epiphytic bryophytes and lichens, modifying the fauna and preventing regeneration of trees.

The species is unpalatable and likely toxic to mammals and probably invertebrates due to the presence of 'free' phenols and diterpenes. It is avoided by grazing animals, thus giving it significant advantages over native species.

The deep shadow cast by the plants and toxic leaf litter accumulating underneath Rhododendron produces a dark sterile environment, which suppresses regeneration of native species and supports little wildlife. Changes in soil chemistry induced by Rhododendron have also been reported. Animal populations can also be negatively influenced by Rhododendron e.g. bird numbers are lower in mature oak woodlands dominated by Rhododendron. There is also evidence for the prevention of mycorrhizal development in the roots of seedlings of competing plant species.

R. ponticum is identified as a serious threat to upland oakwood. Rhododendron in Ireland hosts a serious plant health pathogen Phytophthora ramorum. This is a fungus that has the potential to attack a wide variety of native woody plants and is the causative agent of 'Sudden Oak Death'. It is also identified as a threat for several lower plants and fungi including Acrobolbus wilsonii, Arthothelium macounii, Lejeunea mandonii. The characteristics of this species are illustrated in **Photograph 2.**



Photograph 2 Key identification features of Rhododendron

12.3.8 Mammals

The NPWS species record database notes the presence of five protected mammal species in 10km Grid square W76. These species are Hedgehog, Stoat, Red Squirrel, Otter and Pygmy Shrew. Of these species Otter, Hedgehog, Pygmy Shrew could potentially occur. Badger and Common Pipistrelle Bat were previously recorded from the site and Grey and Harbour Seal are known to occur within Cork Harbour. Cetaceans have also been recorded from Cork Harbour. Relevant species are discussed in more detail below.

12.3.8.1 Badgers

Badgers and their setts are protected under the provisions of the Wildlife Act 1976, as amended, and it is an offence to intentionally, knowingly or unknowingly kill or injure a protected species, or to willfully interfere with or destroy the breeding site or resting place of a protected wild animal.

Badger setts are formed by a complex group of interlinked tunnels, and therefore works in proximity to setts can potentially cause damage.

Badger is known to occur within the wider area (NBDC records). Badger road kill has been documented along the National Primary Road N28 which becomes the L2545 along the northern boundary of the site. The closest record was located 3.0km west of the Indaver site in 2012. As noted in Mammals of Ireland 2016-2025 dataset, a live animal was recorded approximately 5.8km west of the site. It is unlikely, given the normal foraging range of a badger of 1-2km, that this individual originated from a sett within or in close proximity to the development site.

A survey of the study area in 2001 recorded an active badger sett in the northern section of the site adjoining an area of pasture. A survey by DixonBrosnan in 2008 found that this sett remained in active use although the adjoining field had been changed from pasture to arable land. Evidence of activity was recorded at this sett, with one large latrine located in close proximity to an active burrow entrance. A short distance to the west of the active sett, there are further entrances close to a small thicket. A disused sett entrance was also located to the south of the active sett, and signs of badger activity including tracks, feeding signs and a latrine were recorded in pasture in the southern section of the site.

Surveys in 2014, 2015, 2018 and 2019 did not record any signs of badger activity, and the previously identified sett is no longer in active use (refer to **Appendix 12.3 Mammal surveys**). The reasons for this change are uncertain. However, it is possible that over time the site has become less valuable for badgers due to the incremental change from large areas of grassland to a predominance of tillage and scrub, which is of less value as feeding habitat. It is noted that only one active sett entrance was recorded at the site in 2008; this may have been a subsidiary sett which is no longer used. Lack of usage does not necessarily mean that this population of badgers is no longer present in the wider landscape.

12.3.8.2 Bats

In Ireland, nine species of bat are currently known to be resident. These are classified into two Families: the Rhinolophidae (Horseshoe bats) and the Vespertilionidae (Common bats). The lesser horseshoe bat *Rhinolophus hipposideros* is the only representative of the former Family in Ireland. All the other Irish bat species are of the latter Family and these include three pipistrelle species: Common *Pipistrellus*, Soprano *P. pygmaeus* and Nathusius' *P. nathusii*, four *Myotids*: Natterer's *Myotis nattereri*, Daubenton's *M. daubentonii*, Whiskered *M. mystacinus*, Brandt's *M. brandtii*, Brown long-eared *Plecotus auritus* and Leisler's *Nyctalus leisleri*.

Whiskered and Natterer's bats are listed as 'Threatened in Ireland', while the other species are listed as 'Internationally Important' in the Irish Red Data Book 2: Vertebrates (Whilde, 1993). The population status of both Whiskered and Natterer's bats was considered 'indeterminate' because of the small numbers known of each, a few hundred and approximately a thousand respectively. Ireland is considered to be an international stronghold for Leisler's bat, whose global status is described as being at 'low risk, near threatened' (LR; nt) by the IUCN (Hutson, *et al*., 2001).

Near threatened status is applied to those taxa that are close to being listed as vulnerable (facing a high risk of extinction in the wild in the medium-term future on the basis of a range of criteria defined by the IUCN). The Irish population of the Lesser Horseshoe Bat is estimated at 14,000 individuals and is considered of International Importance because it has declined dramatically and become extinct in many other parts of Europe. Data collected shows that the species increased significantly between from the early 1990's to present.

A review of existing bat records within a 10km radius of the study site (sourced from BCIreland's National Bat Records Database) showed that the Irish bat species listed in **Table 12.7** have been recorded. It is noted that other species which have not been included within this database may also occur. Lesser horseshoe bat (*Rhinolophus hipposideros*) is the only species of bat listed on Annex II of the Habitats Directive (Directive 92/43/EEC). There are no records of Lesser Horseshoe Bat in the Ringaskiddy area nor is this species likely to occur. Lesser Horseshoe Bat has a limited distribution and is generally confined to the western counties of Ireland, the closest known roost is located in Ballincollig, County Cork (Port of Cork, 2014).

Table 12.7 Presence of Irish bat species within grid square W76

Common name	Scientific name	Presence
Lesser Noctule	*Nyctalus leisleri*	Present
Pipistrelle	*Pipistrellus sensu lato*	Present
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Present
Daubenton's Bat	*Myotis daubentonii*	Present
Natterer's Bat	*Myotis nattereri*	Present
Brown Long-eared Bat	*Plecotus auritus*	Present
Whiskered Bat	*Myotis mystacinus*	Present

All bat species are protected under the Wildlife Acts (1976 & 2000) which make it an offence to willfully interfere with or destroy the breeding or resting place of all species; however, the Acts permit limited exemptions for certain kinds of development. It is an offence to:

- Intentionally kill, injure or take a bat;
- Possess or control any live or dead specimen or anything derived from a bat;
- Willfully interfere with any structure or place used for breeding or resting by a bat;

- Willfully interfere with a bat while it is occupying a structure or place which it uses for that purpose.

All bats are listed on Annex IV of the EU Habitats Directive. The domestic legislation that implements this Directive gives strict protection to individual bats and their breeding and resting places.

It should also be noted that any works interfering with bats and especially their roosts, including for instance, the installation of lighting in the vicinity of the latter, may only be carried out under a license to derogate from Regulation 23 of the Habitats Regulations 1997, (which transposed the EU Habitats Directive into Irish law) issued by NPWS. The details with regards to appropriate assessments, the strict parameters within which derogation licenses may be issued and the procedures by which and the order in relation to the planning and development regulations such licenses should be obtained, are set out in Circular Letter NPWS 2/07 "Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997 - strict protection of certain species/applications for derogation licenses" issued on behalf of the Minister of the Environment, Heritage and Local Government on the 16th of May 2007.

Furthermore, on 21st September 2011, the Irish Government published the European Communities (Birds and Natural Habitats) Regulations 2011 which include the protection of the Irish bat fauna and further outline derogation licensing requirements. **Table 12.8** summarises the protection given to bats by national and international legislation and conventions.

Table 12.8 Legislative protection for bats in Ireland

Legislation/Convention	Relevance to Irish bats
Irish Wildlife Act (1976) & Irish Wildlife (Amendment) Act 2000.	It is an offence to wilfully interfere with or destroy the breeding or resting place of bats, (with some exemptions for certain kinds of construction development). Provides for the creation of NHAs.
EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Directive 92/43/EEC), commonly known as the 'Habitats Directive	Lists all the vesper bats in Annex IV as in need of strict protection and also encourages Member States to conserve landscape features such as river corridors, field boundaries, ponds and woodlands. It also requests that Member States establish a system to monitor the incidental capture and killing of the animals listed in Annex IV. The lesser horseshoe bat is further listed in Annex II of the EU Habitats Directive The level of protection offered to lesser horseshoe bats effectively means that areas important for this species are designated as Special Areas of Conservation.
The Convention on the Conservation of European Wildlife and Natural Habitats, commonly known as the 'Berne Convention'.	It obliges states to protect and conserve animals and their habitats, especially those listed as endangered or vulnerable. Also obliges parties to promote national policies for the conservation of wild fauna and natural habitats

Legislation/Convention	Relevance to Irish bats
The Convention on the Conservation of Migratory Species of Wild Animals, commonly known as the 'Bonn Convention'.	This led to the European Bats Agreement (EUROBATS), which lists a wide range of objectives, including promoting research programmes relating to the conservation and management of bats, promoting bat conservation and public awareness of bats, and identifying and protecting important feeding areas of bats from damage and disturbance.

Evidence of bat activity associated with potential roost sites includes bat droppings, urine staining, feeding remains and dead/alive bats. Indicators that potential roost locations and access points are likely to be inactive include the presence of cobwebs and general detritus within the apertures.

Potential roost features associated with trees include cracks, crevices and loose bark. Evidence indicating bat presence, includes dark stains running below holes or cracks, bat droppings, odours, or scratch marks.

A tree forms an essential part of an often-complex ecosystem that provides a variety of habitats for a range of different wildlife species, including bats. Trees such as oak, beech and ash are particularly suitable for bats, but any woodland or tree has potential for a bat roost – especially if it has cavities in the trunk or branches, loose bark, cracks, splits and thick ivy (Bat Conservation Trust).

Bats also often use features such as hedgerows, treelines and woodland edges as commuting pathways between roosts and foraging areas. Sheltering vegetation, such as treelines and woodland, not only acts as cover from potential predators and the weather, but also provides structure for acoustic orientation and navigation. Sheltered areas also allow insects to gather and therefore support bat forging. Activities which affect these bat flyways are likely to have consequences for bats.

Bat surveys were undertaken in 2012 for the Ringaskiddy Port Redevelopment EIS (Port of Cork/RPS, 2014). Three bat species were recorded; Common pipistrelle, Soprano Pipistrelle and Leisler's Bat. Both Pipistrelle species were recorded foraging within woodland areas at the base of a training wall and jetty and along hedgerows, tree lines and scrub habitats 1500m west from the Indaver site.

Bat activity was assessed at the DePuy site in 2011, in relation to the development of a wind turbine. This site is located approximately 240m south of the Indaver site. Three species of bat were recorded within the DePuy site, namely Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat. However, activity within the site was relatively low. (DePuy Ireland, 2011.) Bat surveys were also carried out at the DePuy site in 2015. Only Common Pipistrelle was recorded during both surveys (DePuy, 2015).

Surveys by DixonBrosnan in 2014, 2015, 2018 and 2019 did not record suitable roosting sites for bats within the Indaver site boundary. There are no structures which could potentially support roosts, and the trees are all relatively young and lack the structural complexity (i.e. rotten wood, holes etc), that would provide suitable roosting sites for bats. The EIS prepared for the Hammond Lane development (Doherty Environmental, 2012) likewise did not record any high value roosting habitat.

In conclusion, the hedgerows and tree lines on external boundaries are of some local value for feeding bats, but do not provide roosting habitat.

DixonBrosnan carried out night-time bat activity surveys using standard heterodyne bat monitors (Batbox III and Batbox Duet) at different areas within the site in May 2008. The survey recorded foraging Common Pipistrelle and commuting activity at different areas within the site, including the hedgerows/tree lines along northern, western and southern site boundaries. As expected, most activity occurred close to better quality hedgerows. No other species were detected.

DixonBrosnan resurveyed the site in September 2014, August 2015 and May 2019. A transect was walked along the perimeter of the site and bat activity monitored using a Bat Box Duet heterodyne/frequency division detector. (See **Appendix 12.3**). The following were recorded:

- Common Pipistrelle were recorded feeding along the hedgerow which runs along the southern boundary (2014 and 2015).
- Common Pipistrelle feeding along the southern boundary in the southwest corner of the site and along the woodland boundary. (2015).
- Soprano Pipistrelle fly-over along the shoreline boundary (2015).
- Common Pipistrelle flyover/feeding over the development site close to the boundary with Hammond Lane. (2015).
- Foraging by Common and Soprano Pipistrelle along the shoreline boundary (2019).
- Soprano Pipistrelle foraging along southwestern boundary (2019).

The surveys found that bat activity was low, with only limited Common and Soprano Pipistrelle activity recorded. Only small numbers of individuals were recorded. In conclusion, the hedgerows and tree lines on external boundaries are of some local value for feeding bats, but do not provide roosting habitat.

12.3.8.3 Otters

Otters, along with their breeding and resting places are protected under the provisions of the Wildlife Act 1976, as amended by the Wildlife (Amendment) Act, 2000. Otters have additional protection because of their inclusion in Annex II and Annex IV of the Habitats Direct which is transposed into Irish law in the European Communities (Natural Habitats) Regulations (S.I 94 of 1997), as amended. Otters are also listed as requiring strict protection in Appendix II of the *Berne Convention on the Conservation of European Wildlife and Natural Habitats* and are included in the *Convention on International Trade of Endangered Species* (CITES).

Although rare in parts of Europe they are widely distributed in the Irish countryside in both marine and freshwater habitats. Otters are solitary and nocturnal and as such are rarely seen. Thus, surveys for otters rely on detecting signs of their presence. These include spraints (faeces), anal gland secretions, paths, slides, footprints and remains of prey items.

Spraints are of particular value as they are used as territorial markers and are often found on prominent locations such as grass tussocks, stream junctions and under bridges. In addition, they are relatively straightforward to identify.

Otters occasionally dig out their own burrows but generally they make use of existing cavities as resting placing or for breeding sites. Suitable locations include eroded riverbanks, under trees along rivers, under fallen trees, within rock piles or in dry drainage pipes or culverts etc. If ground conditions are suitable the holt may consist of a complex tunnel and chamber system. Otters often lie out above ground especially within reed beds where depressions in the vegetation called “couches” are formed. (NRA, 2005b). Generally, holts or resting areas can be located by detecting signs such as spraints or tracks.

In contrast natal holts which are used by breeding females can be difficult to locate. They are often located a considerable distance from any aquatic habitats and otters may also use habitats adjoining small streams with minimal or no fish populations. In addition, natal holts are usually carefully hidden and without obvious sprainting sites. Otters do not have a well-defined breeding season.

It is noted that otters are largely nocturnal, particularly in areas subject to high levels of disturbance as evidenced by the presence of otters in the centre of Cork and Limerick City. Thus, otters are able to adapt to increased noise and activity levels; however, breeding holts are generally located in areas where disturbance is lower.

Otters are common along the Irish coastline however they are shy and generally nocturnal in areas subject to disturbance. Signs of their presence are readily identifiable, and include spraints, tracks, holts, resting areas, slides and feeding signs. Due to the proximity of the seashore, the site could potentially be used by otters.

Signs of otter activity were recorded during surveys for the Ringaskiddy Port Redevelopment EIS (Port of Cork/RPS 2014). These included the following:

- Signs of otter were noted along the ADM Training Wall, including old spraints and an active trail.
- Otter activity was widespread at the base of the ADM Jetty.
- A single sighting of an otter leaving the eastern side of the ADM Training Wall.
- A large amount of fresh spraint and three well-used sprainting sites were identified at the point where the existing ADM Jetty leaves the land.
- The spaces between boulders to the north of the existing ADM Jetty are extremely large and well-connected right down to low water level. An otter couch is likely present within these boulders.
- The most likely holt location was identified off-site, further to the west of Paddy’s Point, where boulders were larger. A potential temporary holt/lying-up site was identified here within rocks at sea level.

- It was noted in 2012 that, despite human disturbance at Ringaskiddy East (the area being regularly used for boating, swimming and dog walking), evidence of otter presence was widespread along the shoreline; however, a holt was not identified.
- It is noted that these areas are a considerable distance from the development site. Paddy's Point and the ADM jetty are located approximately 550m and 1500m respectively from the Indaver site boundary.

Surveys by DixonBrosnan in 2014, 2015 and 2019 did not record the presence of otter within a radius of 150m from the study area, although some sprainting activity was recorded 300m north of the site. A survey in 2018 did not record signs of otter within 150m of the site. It is noted that the upper shore of Gobby beach, which adjoins the site, is extensively used by the general public, and that usage is highest in proximity to the car park that is located immediately adjacent to the development site.

These circumstances, particularly where dogs are also present, may reduce usage of the area by otter. Whilst otters may use the shore areas in proximity to the site on occasions, no holts were noted in this area, nor are they likely to occur in the area affected by beach nourishment works in the future.

12.3.8.4 Seals

Harbour Seal (*Phoca vitulina*) and Grey Seal (*Halichoerus grypus*) are strictly protected in the Republic of Ireland under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000. They are also listed under Annex II of the European Union's EC Habitats Directive (92/43/EEC) as species of Community Interest, whose conservation requires the designation of Special Areas of Conservation (SACs). In the latter part of the 1990s, the National Parks & Wildlife Service (NPWS) proposed all of the major known breeding sites as candidate SACs, ten sites for the grey seal and seven for the Harbour seal.

Harbor Seals are generalist feeders that take a wide variety of fish, cephalopods, and crustaceans obtained from surface, mid-water, and benthic habitats (e.g., Pitcher 1980, Harkonen 1987, Olesiuk *et al.* 1990, Pierce *et al.* 1991). Patterns of movement have been observed at two geographical scales; while some seals travelled over 100 km, 50% of trips were within 25 km of a haul-out site (Cunningham, 2008). Harbour Seals tend to inhabit inshore bays, coves and estuaries (Lockley, 1966; Summers et al., 1980; Cronin et al., 2004).

Harbour seals come to shore during June to give birth and mate again around this time but usually in the water. Pups are capable of swimming within a few hours of being born but stay with their mother until weaned. Harbour Seals also come to shore to moult (shed their fur) during July and August often forming large groups on sheltered shores that have ready access to the sea. They are usually extremely wary and shy on land and therefore it is almost impossible to approach them when they are hauled out without stampeding them into the water. However, habituation to human activities in their vicinity can occur. Most haul-out sites are used daily, based on tidal cycles and other environmental variables, although foraging trips can last for several days (Grellier *et al.* 1996, Lowry *et al.* 2001).

Grey seals generally select more remote haul-out locations on rocky skerries, uninhabited islands, isolated mainland beaches and in sea-caves (Lockley, 1966; Summers, 1980, 1983; Kiely, 1998; Kiely et al., 2000). Pups are born with a white coat that they shed before they can take to the water, usually after about six weeks. The mother stays with the pups whilst they remain on the shore. The seals shed their fur during the spring months and remain ashore for the majority of this time.

Both species are known to occur and feed within Cork Harbour. However, there are no known haul-out sites for Grey Seal in Cork Harbour; in general, this species uses more exposed sites (Kiely, 1998).

Haul-out sites for harbour seals may occur inshore, for example on estuaries, coves, islands etc. and this species tends to forage within a relatively short distance of such haul-out sites. Over half of foraging trips may be within 5km of the haul-out sites (Cronin et al., 2007; Cronin et al., 2008). Although there is no evidence for significant haul-out sites or breeding sites in Cork Harbour, there are several small haul-out sites in this general area, as noted below.

The beach adjoining the development site is not of value as a haul-out site due to high levels of disturbance by walkers and dogs.

- A small haul-out site near Haulbowline Island (RPS, Port of Cork, 2014).
- An adult Harbour Seal occasionally uses a partially submerged tyre to haul-out on at mid-high tide approx. 10m from the shoreline adjacent to the National Maritime College in Ringaskiddy.
- Approximately six Harbour Seals were recorded using the slipway at the National Maritime College (DixonBrosnan, 2014, RPS/Port of Cork, 2014).
- During winter bird counts by DixonBrosnan in 2014/2015, four Harbour Seals were recorded in the channel between the mainland and Spike Island.

Although there is nothing to indicate that the area in the immediate vicinity of the Indaver site is of particular value for seals, it is within the feeding range for local Harbour Seal populations. Given the distance of the recorded haul-out sites from the development site, no direct disturbance of haul-out sites will occur, and any effect on feeding areas will be minimal.

12.3.8.5 Cetaceans

In Ireland, there are two groups of mammals almost exclusively inhabit the marine environment, namely cetaceans and seals. In Ireland, the 1992 EC Habitats Directive as transposed by the EC (Natural Habitats) Regulations requires that both seal species and all cetaceans occurring in Ireland are maintained at favourable conservation status. Under Article 12 of the Directive, all cetaceans should receive strict protection within the Exclusive Economic Zone. Under the Wildlife Amendment) Act 1976 as amended, all cetaceans are protected species listed on the 5th Schedule. The National Biodiversity Data Centre (NBDC) databases for grid square W76 lists the following species as present (**Table 12.9**).

Table 12.9 Cetaceans recorded within grid square W76

Marine Mammal Species	Latin Name	EU Designation/Legal Protection
Common Dolphin	*Delphinus delphis*	Protected Species: EU Habitats Directive Annex IV & Protected Species: Wildlife Acts
Harbour Porpoise	*Phocoena*	Protected Species: EU Habitats Directive Annex II & IV. Protected Species: Wildlife Acts. Threatened Species: OSPAR Convention
Killer Whale	*Orcinus orca*	Protected Species: EU Habitats Directive Annex IV & Protected Species: Wildlife Acts
Northern Bottlenose Whale	*Hyperoodon ampullatus*	Protected Species: EU Habitats Directive Annex IV & Protected Species: Wildlife Acts
Risso's Dolphin	*Grampus griseus*	Protected Species: EU Habitats Directive Annex IV & Protected Species: Wildlife Acts
White Whale	*Delphinapterus leucas*	Protected Species: EU Habitats Directive Annex IV & Protected Species: Wildlife Acts

In addition, species that have also been recorded, by the Irish Whale and Dolphin Group, within the overall harbour include Bottlenose Dolphin (*Tursiops truncatus*), and Minke Whales (*Balaenoptera acutorostrata*). Both species are protected under the EU Habitats Directive (Annex IV) and the Wildlife Acts. The Bottlenose Dolphin is also listed as Annex II under the EU Habitats Directive.

Of the species recorded, it is the smaller species such as Harbour Porpoise which are most likely to occur in the channel offshore from the site. The effect on cetaceans is predicted to be imperceptible.

12.3.9 Other Mammals

Sixteen other species of terrestrial mammal have been recorded within a 10km radius of the development site (NBDC records). Eight of which are protected under the Irish Wildlife Act; namely Red Deer, Fallow Deer, Sika Deer, Hedgehog, Irish Hare, Irish Stoat, Red Squirrel and Pygmy Shrew.

During surveys of the site, rabbits were noted to be numerous and signs of fox were also recorded. Small mammal surveys in the study area in 2001 and 2008 recorded the presence of Field Mouse, Bank Vole and Brown Rat. Such species are common in the Irish countryside. Pygmy Shrew, Hedgehog and Stoat were not recorded, but may be present.

Red Deer (*Cervus elaphus*) are the largest land mammal found on the island of Ireland. Populations of red deer are found in the west, northwest, east and southwest regions of Ireland, with smaller populations found scattered throughout Northern Ireland and certain parts of the midlands.

Four Red Deer were recorded within an area of broadleaved woodland in proximity to the Novartis Pharmaceutical facility in Ringaskiddy, some 2.4km from the Indaver site in June 2015. However, Red Deer is not likely to occur within or in the vicinity of the Indaver site.

Fallow Deer (*Dama dama*) are Ireland's second largest deer species and are the most widespread of the deer, found in nearly every county. In Ireland the fallow deer mainly resides in mature deciduous or mixed woodlands which are close to open grassland. The pattern of habitat use can vary throughout the year depending on the season or the particular area in which the deer are located providing different foraging opportunities.

While the site offers some potential for Fallow Deer to occur, it is highly unlikely that the species is present. No signs of Fallow Deer have been recorded within and in close proximity to the site.

Sika Deer *(Cervus nippon)* prefer forest with dense understorey, thickets, natural woodlands and commercial plantations, but will also forage in open grassy areas with dense cover nearby. Sika Deer are highly opportunistic feeders, foraging on grasses to a range of shrubs and tree species. They have very large daily ranges, moving up to 2.5km per day and are classified as intermediate grazer-browsers due to their highly opportunistic feeding patterns. However, Sika Deer is not likely to occur within or in the vicinity of the proposed site.

Hedgehog (*Erinaceus europaeus*), also listed on Appendix III of the Berne Convention can be found throughout Ireland, with male hedgehogs having an annual range of around 56 hectares. Generally, hedgehogs prefer edge habitat and pasture but in recent years have begun to colonize urban areas. Due to the habitats recorded within the site, hedgehog could potentially occur.

The Irish hare (*Lepus timidus hibernicus*) is one of three lagomorphs found on the Island of Ireland and the only native lagomorph. It is listed on Appendix III of the Berne Convention, Annex V(a) of the EC Habitats Directive (92/43/EEC) and as an internationally important species in the Irish Red Data Book.

Irish hare is known to occur within the wider Ringaskiddy area (NBDC records) and due to the habitats recorded within and in close proximity to the site, Irish hare could occur.

Irish Stoat (*Mustela erminea hibernica*) is one of the species protected under regulations (Protection of Wild Animals) in 1980 which enabled Ireland to comply with the provisions of the Bern Convention of European Wildlife and Natural Habitats, which was ratified by Ireland in April 1982. Irish stoats occur in most habitats with sufficient cover, including urban areas. It is likely that stoat will occur in the area given the presence of prey species. A live sighting of a stoat was recorded along the shoreline just north of the Indaver site in 2011 (NBDC).

Red Squirrel (*Sciurus vulgaris*) also listed on Appendix III of the Berne Convention can be found throughout Ireland. They are found in all types of habitat but typically are in higher densities in mature mixed broadleaved forests. They can also survive in monoculture coniferous woodland. Red squirrel is known to occur in the wider area (NBDC records) however the habitats on site are suboptimal for this species and it is unlikely to occur.

Pygmy Shrew (*Sorex minutus*) is common throughout mainland Ireland and has a preference for habitats such as hedgerows and grasslands; they have also been found utilizing stone walls. Due to the habitats present within the Indaver site it is possible that pygmy shrew is present.

12.3.10 Reptiles and Amphibians

According to records held by the NBDC, Common Frog (*Rana temporaria)* is the only amphibian recorded in grid square W76. Common Frog is listed in Annex V of the EU Habitats Directive and is protected under the Wildlife Acts. The species was not recorded during the site visits. No habitat suitable for amphibians was recorded.

Two species of reptile have been listed as occurring within the grid square W76 i.e. Leatherback Turtle and an unidentified species of *Testudines* (turtle/tortoise/terrapin).

Leatherback Turtles (*Dermochelys coriacea*) are protected under EU Habitats Directive Annex IV and Wildlife Act but are also listed as a threatened Species under the OSPAR Convention. They are a deep-diving marine turtle inhabiting tropical, subtropical, and subpolar seas. Leatherbacks make extensive migrations between different feeding areas at different seasons, and to and from nesting areas. They feed predominantly on jellyfishes, salps and siphonophores. The species is unlikely to be encountered in proximity to the Indaver works site.

Common Lizard is unlikely to be present.

12.3.11 Birds

The National Biodiversity Centre online data base lists 180 species of bird recorded within grid square W76. Of these 180 species, 18 are listed under Annex I of the Birds Directive, namely, Kingfisher, Little Egret, Merlin, Peregrine Falcon, Mediterranean Gull, Little Gull, European Golden Plover, Bar-tailed Godwit, Dunlin, Hen Harrier, Short-eared Owl, Corn Crake, Great Northern Diver, Red-billed Chough, Red-throated Diver, Ruff, Sandwich Tern and Common Tern.

An additional 19 species are Red Listed Birds of Conservation Concern in Ireland; Northern Pintail, Northern Shoveler, Yellowhammer, Herring gull, Black-headed gull, Eurasian Curlew, European Golden Plover, Common Redshank, Barn owl, Northern Lapwing, Eurasian Woodcock, Grey Wagtail, Meadow Pipit, Long-tailed Duck, Dunlin, Common Goldeneye, Tufted Duck, Corn Crake, and Eurasian Wigeon.

12.3.11.1 Breeding Bird and site usage

Breeding bird surveys were carried out by DixonBrosnan during May 2008 using transect and point count methods (Bibby *et al*., 1992). A total of 35 bird species were recorded during site visits. These results were largely comparable with those from surveys carried out at the same site in 2001. In 2008 the mosaic of grassland and scrub was noted as particularly beneficial for warblers, with Blackcap, Whitethroat, Willow Warbler and Chiffchaff recorded. Stonechat was also noted and suitable habitat for ground nesting species such as Skylark and Meadow Pipit was also recorded.

A breeding bird survey was also carried out by DixonBrosnan in May and June 2010 using similar transect methods to Bibby *et al.*, (1992), covering the area of shoreline potentially affected by coastal works and adjoining areas of habitat. Areas of scrub and grassland was found to support a mixture of typical countryside birds including Chaffinch, Willow Warbler, Wood Pigeon, Blackbird and corvid species.

As the coastal area in proximity to the site does not have extensive mudflats, there was a preponderance of species associated with rocky/shingle shore habitats. Such species include Rock Pipit, Ringed Plover and Oystercatcher. Other species noted include piscivorous species such as Common Tern, Cormorant, Grey Heron and Little Egret. Four gull species namely Herring Gull, Greater Black-backed Gull, Common Gull and Black-headed Gull were also recorded.

Of the species recorded during the survey, six species (Oystercatcher, Cormorant, Common Tern, Grey Heron, Black-headed Gull and Common Gull) are listed as birds of special conservation interest for the Cork Harbour SPA.

Certain bird species are listed by BirdWatch Ireland as Birds of Conservation Concern in Ireland (Lynas et al., 2007). Red List bird species are of high conservation concern, and Amber List species are of medium conservation concern. Two Red Listed species were recorded (Herring Gull and Black Headed Gull) and five amber listed species were recorded. (Swallow, Starling, Greater Black-Backed Gull, Cormorant and Common Gull).

In 2015, breeding bird surveys were undertaken over three visits in May and June using an adapted version of the British Trust for Ornithology's (BTO) Common Bird Census Technique (Bibby *et al*., 2000 & Gilbert *et al*., 1998), with aspects of species specific survey methodologies employed where required (Gilbert *et al*., 1998). More detail on the methodology and the results of the survey are provided in **Appendix 12.2**.

A total of 28 species were recorded in the breeding bird survey. However, it is noted that not all of these species were breeding within the site. The results indicate that the bird community currently using the site is similar to that recorded previously. The reduction in bird species diversity (35 species in 2008 in comparison to 28 species in 2015) may be due to increased dominance of scrub and a reduction in areas of semi-natural grassland.

Although the area of semi-natural grassland within the site has reduced, Skylark was still recorded within the site boundary. Common Gull was recorded flying over the site and utilising the adjoining shore area. No high tide roosts for gulls or other waders/waterfowl were recorded within the study area. No nest sites for marine birds such as gulls or Ringed Plover were located within, or along the coast in proximity to the shore. Eight species recorded are Amber listed; of these species five are terrestrial species (Skylark, Kestrel, Starling, Swallow and Tree Sparrow). The remaining three species (Common Tern, Oystercatcher and Common Gull) are associated with marine habitats and do not breed within the study area.

A list of the bird species recorded during surveys in 2014/2015 is provided in **Table 12.10** (refer also to **Table 12.11** for the relevant BTO breeding bird survey codes).

Table 12.10 Breeding bird survey results (refer also to Table 12.4 for explanation of codes)

Bird species	Breeding status	Estimated No. of Pairs	Conservation status
Blackbird	Br-FF	2	
Blue tit	Br-FL	3	
Bullfinches	Pr- A	1	
Chaffinch	Br-FL	2	
Chiffchaff	Pr-D	2-3	
Common gull	N-F	0	Amber List
Dunnock	Po- S	1	
Goldcrest	Pr-D	1	Amber Listed
Goldfinch	PR-N	1	
Great tit	Br-DD	1	
Greenfinch	Pr-P	1	
Heron	N-F	0	
Hooded crow	N-F	0	
Kestrel	Pr-P	1	Amber Listed
Long tailed tits	Pr-P	1	
Oyster catcher	N-F	0	Amber Listed
Robin	Br-UN	1	Amber Listed
Rook	N-F	0	
Sedge warbler	Po-H	0-1	
Skylark	Po-S	1-2	Amber Listed
Song thrush	Pr-N	1	
Starling	N-F	0	Amber Listed
Swallow	N-F	0	Amber Listed
Common tern	N-F	0	Amber Listed/Annex I
Tree sparrow	Po-H	0-1	Amber Listed
Common Whitethroat	Pr-A	1	
Wood pigeon	Pr-D	2-3	
Wren	Br-ff	2	

Table 12.11 British Trust for Ornithology breeding bird survey codes

Breeding status	Confirmed breeder (Br)	Probable breeder (Pr)	Possible breeder (Po)	Non-breeder (N)
Observed behaviours	Distraction-display or injury feigning (DD)	Pair in suitable nesting habitat (P)	Observed in suitable nesting habitat (H)	Flying Over (F)
	Used nest or eggshells found from current season (UN)	Permanent Territory (T)	Singing Male (S)	Migrant (M)
	Recently fledged young or downy young (FL)	Courtship and Display (D)		Summering non-breeder (U)
	Adults entering or leaving nest-site indicating occupied nest (ON)	visiting probable nest site (N)		
	Adult carrying faecal sac or food for young (FF)	Agitated Behaviour (A)		
	Nest containing eggs (NE)	Brood patch of incubating bird (I)		
	Nest with young seen or heard (NY)	Nest Building or excavating nest-hole (B)		

A survey for breeding birds was also carried out in May 2019 to ascertain if usage patterns within the site had changed in the intervening period. A total of 28 species were recorded within the proposed development site. Three species were definitely breeding within the site (starling, song thrush and magpie) a further 10 species were probably breeding, 7 were possibly breeding, while the remaining 8 species were not breeding.

The study area provides breeding and foraging habitat that supports a diverse bird population. However, most of the species recorded during the surveys are generally considered to be common and widespread. The most important habitats within the study area, that provide resources for local populations of breeding species, are less intensively managed. These include scrub, hedgerows, tree lines and woodland.

No significant populations of breeding birds have been recorded onsite and most the species recorded are common and widespread within the county although a small number of Red and Amber listed species were recorded. However, these were recorded in low numbers.

The habitats to be affected are generally considered of local value and are not uncommon in the wider landscape. The nature conservation value of the breeding bird assemblage onsite is considered to be of 'local' value.

Table 12.12 Breeding bird survey results (refer also to Table 12.11 for explanation of codes)

Proposed Development Site			
Bird species	**Breeding status**	**Estimated no. of pairs within the site**	**No. Birds recorded per visit**
			13/05/2019
Wren	Po - S	8	13
Magpie	Br - FF	1	3
Dunnock	Po - S	2	5
Blackbird	Pr - A	1 - 3	6
Robin	Po - S	1 - 2	3
Great tit	Pr - P	1	2
Blue tit	Po - S	1	1
Goldfinch	Pr - P	1 - 2	3
Chaffinch	Pr - P	1 - 2	5
Bullfinch	Pr - P	2	4
Linnet	Pr - P	1	2
Herring Gull	N-F	0	5
Rook	N-F	0	9
Hooded Crow	Pr - A	0 - 1	2
Woodpigeon	Pr-D / N-F	0 - 3	27
Feral pigeon	N-F	0	5
Starling	Br – FL	6	15
Barn Swallow	N-F	0	2
House Martin	N-F	0	4
Chiffchaff	Po - S	2 - 3	6
Song thrush	Br - FF	1 - 2	3
Jackdaw	N-F	0	1

Proposed Development Site			
Bird species	**Breeding status**	**Estimated no. of pairs within the site**	**No. Birds recorded per visit**
			13/05/2019
Blackcap	Pr - P	1	2
Siskin	Pr - P	1	2
Meadow pipit	Po - H	0 - 1	1
Common tern	N-F	0	2
Oystercatcher	Po - H	0	8
Cormorant	N-F	0	2

12.3.12 Survey of Common tern-breeding

A breeding population of Common Tern is known to occur near the entrance to the Port of Cork approximately 750m from the development area. A previous survey for the Ringaskiddy Port Redevelopment EIS (Port of Cork/RPS, 2014) recorded 45-50 breeding pairs on concrete structures (dolphins) adjacent to the entrance of the Port of Cork. DixonBrosnan resurveyed this Common Tern breeding colony over three days in May and June 2015, as this is the most significant breeding bird colony in the surrounding landscape. Approximately 50-55 breeding pairs were recorded (mean 53 breeding pairs) (refer to **Appendix 12.2** *Bird Surveys*).

12.3.13 Winter bird surveys

The winter bird surveys were undertaken on six dates between October 2014 and March 2015 (refer to **Appendix 12.2** *Bird Surveys*). The survey methodology was based on that used by the British Trust for Ornithology's (BTO) Wetland Bird Survey (WeBS) and also that for the Irish Wetland Bird Survey (I-WeBS), as outlined in Gilbert *et al.* (1998). Ninety-minute counts were undertaken monthly at either high tide, mid tide and low tide. Survey vantage point locations for the winter bird counts are shown in **Appendix 12.2. Table 12.13** lists the bird species observed and the total number of birds recorded.

A total of 38 bird species were recorded during the 2014/2015 winter bird surveys as detailed below in **Table 12.13**. 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. The conservation status/designation of birds recorded during winter bird counts is also shown in **Table 12.13**.

Birds species listed in Annex I of the Birds Directive are considered a conservation priority. Five species (Mediterranean Gull, Dunlin, Little Egret, Great Northern Diver and Common Tern) are listed on Annex 1 of the Birds Directive. Certain bird species are listed by BirdWatch Ireland as Birds of Conservation Concern in Ireland. Red List bird species are of high conservation concern and the Amber List species are of medium conservation. Six red listed species were recorded namely Herring Gull, Curlew, Redshank, Black-Headed Gull, Dunlin and Knot. Thirteen species are Amber listed. Twenty-four bird species are listed under the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), to which Ireland is a signatory. Refer to **Table 12.5**, which gives the conservation status for each species recorded.

Table 12.13 Conservation status for species recorded

Species		**Birds Directive Annex**					**BOCCI**		**AEWA**
		I	**II(I)**	**II(II)**	**III(I)**	**III(II)**	**Red List**	**Amber List**	
Cepphus grylle	Black Guillemot							X	X
Haematopus ostralegus	Oystercatcher							X	X
Columba palumbus	Woodpigeon		II(I)		III(I)				
Larus canus	Common Gull							X	X
Larus melanocephalus	Mediterranean Gull	I						X	X
Larus argentatus	Herring Gull						X		X
Larus fuscus	Lesser black-backed Gull							X	X
Larus marinus	Great black-backed Gull							X	X
Phalacrocorax carbo	Cormorant							X	X
Numenius arquata	Curlew			II(II)			X		X
Tringa totanus	Redshank						X		X
Larus ridibundus	Black-headed Gull						X		X
Calidris alpina schinzii	Dunlin	I					X		X
Anas platyrhynchos	Mallard		II(I)		III(I)				X
Ardea cinerea	Grey Heron								X
Passer montanus	Tree Sparrow							X	
Egretta garzetta	Little Egret	I							X
Tringa nebularia	Greenshank							X	X
Anas crecca	Teal		II(I)			III(II)		X	X

Species		Birds Directive Annex					BOCCI		AEWA
		I	II(I)	II(II)	III(I)	III(II)	Red List	Amber List	
Podiceps cristatus	Great-crested Grebe							X	X
Branta bernicla	Brent Goose							X	X
Calidris alba	Sanderling								X
Arenaria interpres	Ruddy Turnstone								X
Calidris canutus	Knot						X		X
Gavia immer	Great Northern Diver	I							X
Sturnus vulgaris	Starling							X	
Hirundo rustica	Swallow							X	
Alauda arvensis	Skylark		II(II)					X	
Sterna hirundo	Common Tern	I						X	X
Falco tinnunculus	Kestrel							X	

EU habitats and birds directive annexation descriptions

Symbol	Meaning	Brief definition
I	Annex I bird species	Endangered species
II(I)	Annex II, section I bird species	Species may be legally hunted in all EU member states
II(II)	Annex II, section II bird species	Species may be legally hunted in named EU member states
III(I)	Annex III, section I bird species	Species may be deliberately killed or captured, nests disturbed, or eggs taken, and traded live or dead in all EU member states
III(II)	Annex III, section II bird species	Species may be deliberately killed or captured, nests disturbed, or eggs taken, and traded live or dead in named EU member states

The closest Special Protection Area (SPA) to the development is the Cork Harbour SPA (Site Code 004030). A total of thirteen species listed as qualifying interests for the Cork Harbour SPA were recorded, namely, Cormorant, Oystercatcher, Dunlin, Curlew, Redshank, Greenshank, Great Crested Grebe, Grey Heron, Teal, Black-headed Gull, Common Gull, Lesser Black-backed Gull and Common Tern (See **Table 12.14**) The Natura Impact Statement (NIS), which accompanies this application, provides a more detailed appraisal of the effect of the development on Natura 2000 sites including the Cork Harbour SPA.

Table 12.14 Cork Harbour SPA –Special Conservation Interests for the Cork Harbour SPA and Qualifying Populations

Cork Harbour SPA [IE0004030]			Season
[A004]	Little Grebe	*Tachybaptus ruficollis*	Wintering
[A005]	Great Crested Grebe	*Podiceps cristatus*	Wintering
[A017]	Cormorant	*Phalacrocorax carbo*	Wintering
[A028]	Grey Heron	*Ardea cinerea*	Wintering
[A048]	Shelduck	*Tadorna tadorna*	Wintering
[A050]	Wigeon	*Anas penelope*	Wintering
[A052]	Teal	*Anas crecca*	Wintering
[A056]	Pintail	*Anas acuta*	Wintering
[A065]	Shoveler	*Anas cylpeata*	Wintering
[A069]	Red-breasted Merganser	*Mergus serrator*	Wintering
[A130]	Oystercatcher	*Haematopus ostralegus*	Wintering
[A140]*	Golden Plover	*Pluvialis apricaria*	Wintering
[A141]	Grey Plover	*Pluvialis squatarola*	Wintering
[A142]	Lapwing	*Vanellus vanellus*	Wintering
[A149]*	Dunlin	*Calidris alpina*	Wintering
[A156]	Black-tailed Godwit	*Limosa limosa*	Wintering
[A157]*	Bar-tailed Godwit	*Limosa lapponica*	Wintering
[A160]	Curlew	*Numenius arquata*	Wintering
[A162]	Redshank	*Tringa totanus*	Wintering
[A179]	Black-headed Gull	*Larus ridibundus*	Wintering
[A182]	Common Gull	*Larus canus*	Wintering
[A183]	Lesser Black-backed Gull	*Larus fuscus*	Wintering
[A193]*	Common Tern	*Sterna hirundo*	Breeding
[999]	Wetlands		

* Indicates a priority species under the Habitats Directive.

12.3.14 Winter roost cormorant

A night-time tree-roosting Cormorant survey was undertaken within Monkstown Creek during the 2011/12 and 2013/14 wintering seasons as part of the Ringaskiddy Port Redevelopment, Environmental Impact Statement (Port of Cork, 2014). The surveys recorded that during both wintering periods the Monkstown Creek tree-roost regularly supported nationally important numbers of roosting Cormorants.

The number of cormorants using the Monkstown Creek tree-roost rose through late summer and autumn, peaking in October/November. The total peak number of birds recorded using the tree-roost was 334 birds, representing 2.45% of the most recently published Irish wintering population of 13,710 and 54.19% of the Cork Harbour SPA qualifying population at the time of designation (620 wintering individuals). The peak count also represents 133% of the most recently 5-year mean for Cork Harbour (252 individuals). The closest site, included within this night-time tree-roosting Cormorant survey, is located 1km from the development area within the Indaver site.

12.3.15 Birds summary

Overall, the study area is of local value for a range of terrestrial bird species that are relatively common in the Irish countryside. The study area is of more value than the intensively agriculturally managed land in this area due to the presence of a greater diversity of habitats and semi-natural habitat. These have arisen due to an absence of active management of parts of the site. However, the study area does not support a community of birds or individual species that would be considered significant conservation priorities, and the study area, which is small, does not provide critical resources for such communities and/or species.

The coastal area adjoining the site consists primarily of rock and shingle, and therefore does not support the high numbers of wintering waders that are characteristic of high value mudflats with high densities of macro-invertebrates. Some species that are considered of high conservation value (Annex I of the Birds Directive, qualifying species for the Cork Harbour SPA and Red List) were noted in this general area. Many of these birds were recorded overflying the channel, and the site itself and the shoreline adjoining the site, did not support high numbers of these species.

12.3.16 Invertebrates

The complexity and diversity of vegetation types within the site provides a mixture of habitats for insects, although encroachment by scrub has reduced the available grassland habitat.

A specialised moth survey was carried out during August 2008 using a mercury vapour lamp trap survey and butterflies were identified during walkover surveys. In total 33 moth and butterfly species were recorded. No species of particular rarity were recorded, although some of the moth species do have specialised or localised distributions. All species recorded are dependent on scrub/semi-natural grassland with the exception of Wainscot Moth, which are associated with wetland reed beds. Reedbed habitat does not occur within the development site but does occur within the vicinity of the site.

A previous survey of the site carried out by the Aquatic Services Unit in 2001 recorded 30 moth and butterfly species. A single species of Odonata (Dragonfly and Damselfly species) was recorded. None of the species recorded on the site during the 2001 survey were considered of special conservation significance, and the report concluded that “the species recorded strongly suggest that the site is of little entomological interest.”

Given the above background information, specialised surveys were not considered necessary in 2014/2015, 2018 or 2019. Overall it can be concluded that the site supports a mixture of common invertebrate species that would be typical for the habitats noted within this general area. The presence of rare or uncommon species is unlikely, and some reduction in species diversity may have occurred since the previous survey in 2008 due to an increased dominance of scrub habitat.

12.3.17 Other species listed by NBDC as present within grid square W76.

Table 12.15 below lists other species recorded within grid square W76, along with any species considered under threat and provided with legal protection.

Table 12.15 Other species recorded within Grid Square W76

Species Group	Named species
Other Mammals	Wood mouse, House mouse, Red fox, Bank vole, European rabbit, Coypu, Brown rat, American mink.
Alga	60 species recorded. None protected
Annelid	10 species recorded. None protected
Bony fish (Actinopterygii)	4 species recorded. European Eel listed as a threatened species under the OSPAR Convention and also listed Critically Endangered
Cartilaginous fish (Chondrichthyes)	1 species recorded. Thornback Ray listed as a threatened species under the OSPAR Convention
Centipede	9 species recorded. None protected.
Conifer	5 species recorded. None protected.
Fern	13 species recorded. None protected.
Flatworm (Turbellaria)	1 species recorded. Not protected.
Fungus	7 species recorded. None protected.
Harvestman (Opiliones)	6 species recorded. None protected.
Hornwort	1 species recorded. Not protected.
Horsetail	2 species recorded. None protected.
Beetle (Coleoptera)	67 species recorded. *Augyles maritimus* & *Nebrioporus (Nebrioporus) depressus* listed as Data deficient. *Donacia marginata* listed as Near Threatened. *Hydraena flavipes* listed as Critically Endangered.
Butterflies	20 species recorded. Dark Green Fritillary listed as Vulnerable. Wall listed as Endangered. Gatekeeper listed as Near Threatened.
Caddis fly (Trichoptera)	7 species recorded. None protected.
Dragonfly (Odonata)	21 species recorded. Scarce Blue-tailed Damselfly listed as Vulnerable.
Earwig (Dermaptera)	2 species recorded. None protected.
Flea (Siphonaptera)	14 species recorded. None protected.
Hymenopteran	28 species recorded. Andrena (Melandrena) nigroaenea & *Andrena (Ptilandrena) angustior* listed as Vulnerable. *Andrena (Andrena) fucata*, Moss Carder-bee & Large Red-Tailed Bumble Bee listed as Near Threatened. Gooden's Nomad Bee listed as Endangered.
Louse (Phthiraptera)	3 species recorded. None protected.
Mayfly (Ephemeroptera)	1 species recorded. Not protected

Species Group	Named species
Moths	509 species recorded. None protected.
Orthopteran	4 species recorded. None protected.
Hemiptera	27 species recorded. None protected.
True fly (Diptera)	66 species recorded. None protected.
Liverwort	23 species recorded. Orobus-seed Liverwort listed as Regionally Extinct
Millipede	14 species recorded. None protected.
Mollusc	56 species recorded. Common Whorl Snail listed as Near Threatened. Brown Snail, Copse Snail, Point Snail, Tree Snail & Moss Bladder Snail listed as Vulnerable.
Moss	114 species recorded. Glass-wort Feather-moss is a protected species under the Flora Protection Order and is also listed as Endangered. Oval-leaved Pottia is listed as Regionally Extinct. Round-fruited Grimmia is listed as Vulnerable
Spider (Araneae)	4 species recorded. None protected.
Tunicate (Urochordata)	1 species recorded. Not protected.

12.3.18 Marine Ecology

As a coastal protection measure, it is intended to place approximately 1,100m^3 of imported rounded shingle of appropriate size on Gobby beach at the base of the cliff at the eastern boundary of the site. This beach nourishment scheme will extend from the car park at the northern end to the southern boundary of the Indaver site. The material will be deposited above the high-water mark.

A survey of the intertidal area in proximity to the development was carried out by Dr. Stiofan Creaven on Thursday 18th and Friday 19th June 2015. The survey report is included as **Appendix 12.4** of this EIAR. The marine flora and fauna were examined with survey effort timed to correspond with low water on a Spring tide when as much of the shore as possible is exposed. The survey consisted of the following:

- a general walkover of the shore parallel to the waterline;
- the examination of three shore transects perpendicular to the waterline extending to the low tide mark including the collection of six sediment core samples for faunal analysis;
- an excursion to a large boulder on the lower shore;
- the recording of a GPS track of the survey route;
- the creation of a photographic record of the shoreline as encountered. Two cameras were used to record details of the shore – both cameras were synchronised (to within a second) with GPS time immediately prior to the start of the survey;
- The survey classified the habitats encountered during the survey as follows:

The upper shore here can be classed as Barren Littoral Shingle (EUNIS habitat code A2.111).

This substrate typically supports virtually no macrofauna. There is often a temporary cover of the green seaweeds *Enteromorpha* spp. or *Ulva* spp. during periods of stability in the summer - as was observed during the current survey. This area is likely to be influenced by variable salinity. Energy (exposure) for the site is likely to vary considerably with the seasons.

Bedrock and boulders were found scattered throughout the mid and lower shore. Vertical surfaces on these were characterised by a barnacle-limpet community (EUNIS habitat code A1.1131) *Semibalanus balanoides* and *Patella vulgata* dominated community on bedrock. Occasional cracks and crevices in the rock provided a refuge for small individuals of the mussel *Mytilus edulis*, the winkle *Littorina saxatilis* and the dog whelk *Nucella lapillus*. This habitat was found in crevices on the prominent glacial erratic and in crevices found in the limestone bedrock outcrop seen on Transect 3 (**Appendix 12.4** of this EIAR).

Boulder tops, dominated by *Fucus spiralis*, can be classified as *Fucus spiralis* on sheltered upper eulittoral rock (EUNIS habitat code A1.312). In summer, the green alga *Ulva intestinalis* can become very common – as seen on the shore at Ringaskiddy. Vertical surfaces often lack the fucoid cover and are characterised by the barnacle-limpet community (EUNIS habitat code A1.1131) also seen on this beach.

The presence of a substantial deposit of decaying algal matter in the mid shore complicates the allocation of a habitat type to this zone though the floral and faunal community encountered closely resembles *Fucus vesiculosus* on variable salinity mid eulittoral boulders and stable mixed substrata (EUNIS habitat code A1.323). The presence of ephemeral seaweeds (green algae here) occupying available space and patches of sediment found between the hard substrata containing the lugworm *Arenicola marina* and the sand mason *Lanice conchilega*, support this classification. The exposure level of this shore probably changes seasonally from sheltered to moderately exposed/exposed during storm events.

The lower shore is characterised by littoral muddy sands with the habitat falling into a Polychaete/Bivalve-dominated muddy sand shore (EUNIS habitat code A2.24). Based on analysis of infaunal samples taken during the transects, this most closely resembles a *Macoma balthica* and *Arenicola marina* in muddy sand shores biotope (EUNIS habitat code A2.241) though with *Abra* present instead of *Macoma*. It also has elements of *Lanice conchilega* in littoral sand (EUNIS habitat code A2.245).

An attempt was made to obtain faunal samples at all stations visited. Due to the rocky nature of the substrate it was only possible to obtain samples at two stations namely at Station 5 on Transect 1 and at Station 5 on Transect 3. (**Appendix 12.4** of this EIAR). Using a spade, digovers to a depth of 30cm were carried out at those stations where coring for fauna was not possible. The assemblage recorded is close to the EUNIS LS.LSa.MuSa.Lan *Lanice conchilega* in littoral sand grouping but instead of *Macoma balthica*, *Abra* is present. (EUNIS code A2.24 – Polychaete/bivalve dominated muddy sand shores). The common cockle (*Cerastoderma edule*) was also present here.

The report concluded that these habitats are all commonly encountered in an Irish context. Samples were faunally poor with only ten taxa present. All species found are typical of fine-grained sediments of the North East Atlantic. No rare or uncommon species were recorded.

12.4 Characteristics of the Development Site

The development will be located on the Ringaskiddy Peninsula, overlooking Cork's inner harbour, approximately 800m east of the village of Ringaskiddy in County Cork. The site of the development is currently a greenfield site of approximately 13.55 hectares and is located on the northern slopes of the Ringaskiddy peninsula at its eastern end. The location of the site is shown in **Figure 1.1** of this EIAR.

The main element of the Ringaskiddy Resource Recovery Centre project is a waste-to-energy facility (waste incinerator). Other elements include an upgrade of a section of the L2545 road, coastal protection measures on Gobby beach, a connection to the national electrical grid, and raising the ground levels in part of the site. Refer to **Figure 1.3** for the overall site layout. The development is described in detail in **Chapter 4** ***Project Description*** of this EIAR.

12.5 Evaluation of Potential Effects

Annex III of the amended Directive 2014/52/EU requires that the EIAR should assess:

a) The magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);

b) The nature of the impact;

c) The transboundary nature of the impact;

d) The intensity and complexity of the impact;

e) The probability of the impact;

f) The expected onset, duration, frequency and reversibility of the impact;

g) The cumulation of the impact with the impacts of other existing and/or approved projects; and

h) The possibility of effectively reducing the impact.

The potential effects of the proposed development on terrestrial and marine biodiversity include:

- Indirect effects due to increased noise and disturbance during the construction phase of the development.
- Indirect effects on the terrestrial biodiversity due to the spreading of invasive species during site works.
- Indirect effects on the adjoining beach, effects could arise from increased noise and disturbance associated with the coastal protection works.
- Indirect effects on the marine environment could arise during construction from increased run-off of suspended solids or from inadvertent spillages of hydrocarbons during construction works.
- Direct effects due to be a net, permanent loss of an area of semi-natural terrestrial habitat.

- Direct effects on the ecology of the upper shore from the beach nourishment scheme.
- Indirect effects due to increased traffic and noise associated with the site could potentially increase levels of disturbance which could result in the disturbance/displacement of birds and mammals such as otter and seals.
- Direct effect from the stack of the main process building which could theoretically create a collision risk for birds thus leading to a risk of increased bird mortality and potential subsequent effects on bird populations.
- Indirect effect due to emissions to air could theoretically have eco-toxicological effects particularly on piscivorous birds, otters and seals due to bioaccumulation.
- Indirect effect on nesting birds as the importation of organic waste could attract increased predator numbers.
- Indirect effects from accidents during operation or during the transport of ash and flue gas residues could theoretically impact on marine ecology.

12.5.1 Impact Appraisal

When describing changes/activities and effects on ecosystem structure and function, important elements to consider include positive/negative, extent, magnitude, duration, frequency and timing, and reversibility (IEEM, 2018).

Section 3.7 of the Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports', (EPA, August 2017) provides standard definitions which have been used to classify the effects in respect of ecology. This classification scheme is outlined below in **Table 12.16.**

Table 12.16 EPA Impact Classification

Impact Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment.
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative	A change which reduces the quality of the environment.
Significance	Imperceptible	An effect capable of measurement but without significant consequences.
	Not Significant	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.

Impact Characteristic	Term	Description
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging trends.
	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound	An effect which obliterates sensitive characteristics.
Duration and Frequency	Momentary Effects	Effects lasting from seconds to minutes.
	Brief Effects	Effects lasting less than a day.
	Temporary Effects	Effects lasting less than a year.
	Short-term	Effects lasting one to seven years.
	Medium-term	Effects lasting seven to fifteen years.
	Long-term	Effects lasting fifteen to sixty years.
	Permanent	Effects lasting over sixty years.
	Reversible Effects	Effects that can be undone.
	Frequency	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents.
	'Worst Case'	The effects arising from a development in the case where mitigation measures substantially fail.

12.5.2 Do nothing scenario

In the absence of development, it is expected that the small areas which are currently managed intensively for agriculture (arable and pasture) would remain under the same management regime.

The general pattern of succession from scrub with patches of grassland to woodland would be expected to continue on areas that are not currently grazed. If sufficient time elapsed without development, the unused areas of the site would be expected to develop a covering of woodland with a mix of native and introduced species. However, on-going monitoring and management of Japanese Knotweed and Rhododendron is required to avoid further spread. Indaver will continue to manage the spread of non-native plant species on the lands within its own control regardless of whether the proposed development proceeds or not. These measures are summarised in **Section 12.6.2** below.

12.6 Predicted Effects

12.6.1 Predicted Effects on Terrestrial Habitats

Effects on terrestrial habitats are generally restricted to direct removal of habitats and possible effects from the spread of invasive species. Levels of dust during construction are predicted to be low and effectively managed by mitigation. The effect on vegetation in adjoining habitats from wind-blown dust is predicted to be not significant. Based on the criteria outlined by EPA, 2017, as described above, the predicted effects are detailed in **Table 12.17.**

Table 12.17 Affects on Terrestrial Habitats

Habitat	Description/ Habitats Directive Annex I Status	Potential Effect
Hedgerow WL1/Treelines WL2	Local importance (Low value)	Negative, slight, long term effect
Dry meadow and grassy verge GS2/Wet grassland GS4	Local importance (Low value)	Negative, slight, long term effect
Scrub WS1	Local importance (Low value)	Negative, slight, long term effect
Broadleaved woodland WD1	Local importance (Low value)	Negative, slight, long term effect
Improved agricultural grassland GA1	Local importance (Low value)	Negative, Not significant, Long term effect
Conifer woodland WD3	Local importance (Low value)	Negative, Not significant, Long term effect
Dense bracken HD1	Local importance (Low value)	Negative, Not significant, Long term effect
Arable crops BC1	Local importance (Low value)	Negative, Not significant, Long term effect
Recolonising bare ground (ED3)	Local importance (Low value)	Negative, Not significant, Long term effect

12.6.2 Non-native invasive plant species

Following best practice guidance Montbretia, Snowberry, Buddleia, Winter Heliotrope, Cotoneaster and Travellers' Joy can be readily managed through standard eradication/control methods. On the basis of their invasive qualities, the ecological value and types of habitats recorded during the walkover survey and their Amber Listing by Invasive Species Ireland, these species are unlikely to result in a significant effect. If not eradicated, however, prior to construction they are likely to further invade adjacent semi-natural habitats and disturbed ground associated with construction activities and cause long-term landscape maintenance issues relative to the development with associated costs.

Given its invasive qualities, the high risk categorisation by Invasive Species Ireland, statutory obligations and the potential for significant effects arising from this species, Japanese Knotweed and Rhododendron have the potential to be more problematic.

Introduced into Ireland in the early part of the 19th Century, Japanese Knotweed is a highly invasive herbaceous perennial which grows up to 3m tall. The leaves and stems die back during winter, but growth is extremely rapid during spring. It can grow on almost any substrate and has invaded semi-natural riparian habitats including riverbanks, roadside and railway verges, coastal habitats, disturbed ground and waste areas and gardens in both urban and rural landscapes in Ireland. From an ecological viewpoint, its early emergence, great height and density of stands combine to shade out and suppress native plants. It has been shown to reduce species diversity of invertebrate populations and is therefore likely to reduce the quality of ecosystems for amphibians, reptiles, birds and mammals, whose diets are largely composed of arthropods.

The plant can spread rapidly to form dense stands 1 to 3 acres in area by sending shoots up from an extensive radial rhizome network (root-like structures). When established the rhizomes can extend several metres (up to 7m) from the parent plant and deep into the soil up to 3m (depending on ground conditions and disturbance regimes). As plants mature plants a large central bulbous rhizome crown develops from which the main stems emerge. Spreading out from this central region are a number of radial penetrating rhizomes that twist together to form a sizeable and considerable penetrating force. It is this characteristic of the plant which gives it the ability to penetrate weak points in structures, break through bituminous materials and concrete thus damaging footpaths, hard standing areas, road surfaces, services and foundations.

Under a do-nothing scenario, if the proposed Ringaskiddy Resource Recover Centre were not to proceed, Indaver will still continue to treat the infestation on the lands within their control as they are presently. Thus, any effect from invasive species will be imperceptible.

12.6.3 Effects on Marine Habitats

Potentially, effects on marine habitats could arise due to the deposition of the shingle above the foreshore on Gobby Beach. This will impact on the physical structure of the upper shore above the high tide line and on any flora/fauna occupying this zone. Some of this material could impact on the intertidal zone if the material moves position during storm surges.

Depending on the chemical composition of the deposited material and its similarity to the existing beach material, there could be changes in floral communities. However, it is noted that no rare or uncommon species or habitats have been recorded within the area of the proposed coastal protection works and re-colonisation of this area is expected to proceed quickly. The material to be deposited will be similar to the existing material in this area and thus no changes in flora/fauna communities will occur. Similarly, if any of this material reaches the intertidal zone during storm surges, it will be rapidly re-colonised and will not have a significant impact on marine ecology. Any direct impacts on marine ecology arising from the beach nourishment scheme are predicted to be long-term and not significant.

Potentially, effects could arise from any inadvertent spills of hydrocarbons or other chemicals during construction. High levels of suspended solids in surface water run-off could potentially have localised effects on marine ecology. It is noted that such impacts are easily prevented by standard mitigation measures, which will be implemented during construction, and which are set out in detail in **Chapter 5, *Construction Activities*** of this EIAR. No habitats of high sensitivity to pollutants or high conservation value occur in close proximity to the development site and the marine environment provides a high level of dilution in relation to possible inadvertent minor spills of hydrocarbons or other chemicals. Any indirect impacts on water quality and marine ecology during construction are predicted to be short term and slight to not significant.

No significant impacts on water quality in the marine environment are predicted during operation of the facility. All trucks carrying solid waste will be covered. Aqueous waste will come in tankers. All trucks will have to comply with the road transport legislation and regulations.

Circa 2,000 tonnes per annum of boiler ash and circa 9,104 tonnes per annum of flue gas cleaning residues will be produced annually in the waste-to-energy plant.

As outlined in **Chapter 15** these residues will be sent for treatment to salt mines licensed to accept this type of waste in Northern Ireland or Germany for recovery, where the residues are solidified and used to back-fill the mine instead of using other raw materials. For both options, the regulation of the transport of the ash would be subject to Trans Frontier Shipment (TFS) licence which is a licence which must be approved by the origin/destination/transit authorities consenting to the movement/transit and acceptance of wastes between EU member states. The regulation governing this is EU Regulation 1013/2006. This licence tracks waste from origin to destination and ensures that each authority is aware of the status of the waste until final recovery when the individual TFS notification annex consigned with each shipment is signed off as having been received and treated by the receiver. This completed licence is then circulated back to Indaver as the producer as well as all relevant authorities.

Similar residues from Indaver's Meath facility are currently being shipped to salt mines in Germany where the residues are solidified and used to back-fill the mine instead of using other raw materials. The residues will be collected on the site in sealed silos. The silos are emptied into a tanker via a sealed connection. This will ensure there are no fugitive releases on the site.

It is noted that the accident risk during shipping is low. Van Den Bosch are the preferred international logistic services provider which transports such residues for Indaver. They note that in the 51 years of their history no container has ever fallen overboard, and no ship has sank with their containers on board.

The addition of water leads to the residues solidifying. Thus, in the event of a shipping accident and if the transport container were to lose integrity, the residues would solidify on contact with water and solidified residues and tanker will be salvaged from the sea bed along with the container truck.

Given the extremely low risk of an accident, the low risk of leakage from the transport containers, the fact that the residues will solidify on contact with water, the effects on marine or terrestrial ecology from the disposal of this material are expected to be not significant.

Since October 2018, Indaver's Meath facility has also been pre-treating these residues and shipping the solidified residues in 1m^3 bags to a licensed salt mine in Northern Ireland in standard curtain-sided trailers. As the residues are already pre-treated and solidified, the risk of a release to the environment from an accident during transport is negligible and thus the effect will be imperceptible.

Approximately 52,700 tonnes per annum of bottom ash is also produced. As outlined in **Chapter 15 Section 15.5.3.9**, the manner in which this material may be treated and transported is dependent upon how this material is classified and characterised which may be hazardous or non-hazardous. There are currently a number of proposed bottom ash recovery developments in Ireland. In the event that options for treatment/recovery of the bottom ash are not available in Ireland when the facility becomes operational, it is an option to export the ash in bulk form (3,000 tonnes per vessel) in ships to continental Europe to an ash recovery plant from Ringaskiddy Port. In the event that an accident happened, and 3,000 tonnes of bottom ash was spilled into Cork Harbour from the ship, the inert nature of bottom ash (whether classified administratively as hazardous or non-hazardous)and it's leachate characteristics combined with the large diluting potential of Cork Harbour, the risk to marine habitats is negligible and thus the effect will be imperceptible.

It is noted that that over 260,000 tonnes per annum of residual municipal waste is exported at present (**Chapter 2 Section 2.5.3.2** of this EIAR). Following the development of this facility then the amount of waste exported per year would drop by approximately 200,000 tonnes per annum.

Wastewater will be directed to Irish Water sewer. Any process effluent will be recycled for use in the process and will not be discharged off site. Storm water will be monitored and discharged off site only if monitoring determines that it is uncontaminated. In the unlikely event of a fire, the fire-fighting water will be captured in the storm water drainage system and will be collected in the holding tank, where it can be stored for disposal. The outlet valve from the holding tank will close if there is a fire alarm. If the holding tank has insufficient capacity, the water will overflow to the attenuation tank, in which it can be retained pending testing and disposal. Detailed information on potential effects from accidents is provided in the HAZID report (**Appendix 6.1 of this EIAR**) and in **Chapter 16 *Major Accidents and Disasters***.

The potential impacts on air quality from emissions are specifically addressed in **Chapter 8, *Air Quality*** of this EIAR, which concluded that, "*based on the results of air dispersion modelling of process emissions, the air quality effect of the proposed facility will not be significant".* Therefore, any impact from the bioaccumulation of potentially toxic compounds in macro-invertebrate and fish populations is predicted to be negligible. Likewise, the effect from dust generated during construction will be slight in the context of the dilution provided in the marine environment.

The Great Island Channel cSAC is located approximately 5km from the proposed development and is designated on the basis of marine habitats namely Mudflats and sandflats not covered by seawater at low tide and Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*). In the absence of significant emissions to air or aquatic emissions the effect on these habitats will be imperceptible.

Based on the above information, effects on the marine environment during construction and operation are predicted to be long-term and imperceptible.

12.6.4 Predicted Effects on Fauna

12.6.4.1 Otters

Surveys by DixonBrosnan in 2014, 2015, 2018 and 2019 did not record the presence of otter within a radius of 150m from the study area, although some sprainting activity was recorded 300m north of the site. No holts were recorded. It is noted that the upper shore of the beach, which adjoins the site, is extensively used by the general public, and that usage is highest in proximity to the car park that is located immediately adjacent to the development site. These circumstances, particularly where dogs are also present, may reduce usage of the area by otter.

During construction works there will be increased noise and activity associated with the site works. It is noted that this part of Cork Harbour is already subject to high levels of disturbance from traffic and human activity and otters readily habituate in these circumstances. The deposition of material on the upper shore during the beach nourishment process will be short in duration and will occur during daylight hours. Any impact on otter during the construction phase will be short-term and not significant.

No significant effects on water quality in the marine environment or significant effects on prey availability for otters have been identified. The effects on air quality from emissions are specifically addressed in **Chapter 8 *Air Quality*** of this EIAR which concluded "*based on the results of air dispersion modelling of process emissions, the air quality effect of the proposed facility will not be significant".* Therefore, the effect on otter via air emissions or subsequently via bioaccumulation of potentially toxic compounds is predicted to be imperceptible.

12.6.4.2 Seals

Harbour Seal and Grey Seal are listed on Annex II of the Habitats Directive, and both are known to occur within Cork Harbour. Harbour seals have been recorded from within the channel which adjoins the site and small haul out sites have been recorded at Haulbowline Island and at the slipway at the National Maritime College. Although there is nothing to indicate that the particular area in the immediate vicinity the study area is of particular value for seals, it is within the feeding range for local Harbour Seal populations that forage within this general area. Given that the haul out locations are at least 0.5km from the development area and that seals are mobile and can readily move away from short-term disturbance, any effect on seals will be imperceptible. The effects on air quality from emissions are specifically addressed in **Chapter 8 *Air Quality*** of this EIAR which concluded that "*based on the results of air dispersion modelling of process emissions, the air quality effect of the proposed facility will not be significant".* Therefore, the effect on Harbour and Grey Seal via air emissions or subsequently via bioaccumulation of potentially toxic compounds is predicted to be imperceptible.

12.6.4.3 Cetaceans

A number of cetacean species have been recorded within Cork Harbour. Harbour Porpoise is considered the species most likely to occur in the channel offshore from the site. It is anticipated that no significant vibration will be generated during the construction phase of the proposed development. Piling is likely to be required. It will utilise methods that will minimise the risk of vibration generation and will only be undertaken in daytime. Rock breaking, if required will use methods that will minimise noise and vibration. Effects on cetaceans during site works are predicted to be imperceptible. Further details on the construction methodology is provided in **Chapter 5 *Construction Activities***.

No significant effects on water quality in the marine environment or significant effects on prey availability for cetaceans have been identified. The effects on air quality from emissions are specifically addressed in **Chapter 8 *Air Quality*** of this EIAR which concluded that "*based on the results of air dispersion modelling of process emissions, the air quality effect of the proposed facility will not be significant".* Therefore, the effect on cetaceans via air emissions or subsequently via bioaccumulation of potentially toxic compounds will be imperceptible.

12.6.4.4 Bats

Bat surveys in 2014, 2015 and 2019 did detect limited usage of the site of the proposed development by Common and Soprano Pipistrelle within the proposed development area with most activity confined to the external boundaries. No potential roosting sites were identified within the site. The native hedgerow along the southern boundary will be retained. The tree line of Hornbeam and Sycamore along the northern boundary will be removed with replacement planting proposed. Whilst the loss of scrub and small areas of grassland will reduce the net feeding area available for bats, there will be no significant loss of the more important feeding habitat along external boundaries and of linear routes which may provide commuting routes within the wider landscape.

It is also noted that it is intended to develop semi-natural grassland habitat within the site boundary which is likely to be of value for feeding bats. Overall the effect is predicted to be permanent and slight as there will no significant loss of critical resources for bats.

12.6.4.5 Badgers

There is no longer any evidence that the Indaver site is utilised by badgers. Overall the effect on badgers is predicted to be imperceptible.

12.6.4.6 Effects on birds associated with terrestrial habitats

The terrestrial bird species recorded during bird surveys are typical of the types of habitat noted on site and are generally common. No rare or uncommon species or species of high conservation value were recorded. There will be a net loss of semi-natural habitats within the proposed development area (arable land, scrub and grassland) and the loss of scrub in particular will have a localised effect on nesting and feeding resources for these species. However, the scrub habitat is often an ephemeral habitat within the wider agricultural/industrial landscape and the scrub on the site has largely developed because sections of the site have not been utilised. Small areas of this type of scrub are commonly lost or recreated within the wider landscape. Only very small areas of semi-natural grassland will be lost and the habitat quality of improved agricultural grassland which remains within the site, will be enhanced to provide replacement habitat. Overall, the loss of habitat for breeding birds within the development site is considered a permanent slight effect.

Some disturbance/displacement of terrestrial birds may occur during construction due to increased noise and disturbance. However, this will be short in duration. The effect is therefore predicted to be short-term and of low significance.

During the operational phase, the levels of activity will stabilise and birds in the surrounding landscape will be expected to habitualise to the volume of activity proposed. The impact on birds in habitats adjoining the proposed development site is therefore predicted to be slight to imperceptible during operation.

12.6.4.7 Construction Effects on birds associated with marine/shoreline habitats

The Cork Harbour Special Protection Area (Site code 004030) is located approximately 0.5km to the south of the proposed development area. The closest Natural Heritage Area/proposed Natural Heritage Area is the Lough Beg proposed Natural Heritage Area (Site code 001066), which is located 0.3km to the south, and which is also designated on the basis of its bird populations.

The schedule for the construction and commissioning of the resource recovery centre is approximately 31 months and thus there will be works taking place during the peak season for wintering birds which runs from October to March inclusive. Deliveries of shingle and the placement of shingle for the coastal protection works will take place over a period of three weeks and will be undertaken outside of the bird wintering season.

Bird surveys were carried out to determine the degree to which the shoreline/marine habitats in proximity to the proposed development site are utilised by birds and in particular important populations of overwintering waders and waterfowl. A total of 38 bird species were recorded during the winter bird surveys carried out in 2014/2015. Birds species listed in Annex I of the Birds Directive are considered a conservation priority and five such species were recorded (Mediterranean Gull, Dunlin, Little Egret, Great Northern Diver and Common Tern). Six red listed species were recorded namely Herring Gull, Curlew, Redshank, Black-Headed Gull, Dunlin and Knot. A total of thirteen species listed as qualifying interests for the Cork Harbour SPA were recorded, namely, Cormorant, Oystercatcher, Dunlin, Curlew, Redshank, Greenshank, Great Crested Grebe, Grey Heron, Teal, Blackheaded Gull, Common Gull, Lesser Blackbacked Gull and Common Tern.

As a number of bird species were recorded feeding along the shoreline in proximity to the proposed development or overflying the channel, there is the potential for localised effects on birds, including species listed as qualifying interests for the Cork Harbour SPA where they occur outside the SPA site boundaries. Similarly, there could potentially be effects on birds which are otherwise considered of high conservation value.

Effects on birds in close proximity to the proposed development area could potentially arise during construction when levels of noise will increase. There will be increased activity during works, although only activities in close proximity to the shoreline or at height will be visible to birds along the shoreline. For the period of the coastal protection works there will be obvious disturbance along the shoreline.

It is noted that the area of shoreline adjoining the proposed development is subject to high levels of disturbance and that, to a degree, any birds which utilise this area will have habitualised to high levels of daytime disturbance. During construction on land the effect on birds is predicted to be short-term and not significant.

The coastal protection works will take place outside the main wintering season and will not have a direct effect on the intertidal habitat, thus the effect will be negative, short-term and slight.

A range of common bird species were recorded during breeding bird surveys. No nests for birds such as Ringed Plover were recorded on the upper shore adjoining the development site boundary. A breeding population of Common Tern is known to occur near the entrance to the Port of Cork approximately 750m west of the proposed development area. Given the distance of this colony from the development area, any effects on this species due to increased noise and disturbance during construction or operation is predicted to be imperceptible.

An important winter roost of Cormorants is known to occur in trees at Monkstown Creek which is located approximately 1km from the proposed development site. Given the distance of this colony from the development area, any effects on this species due to increased noise and disturbance during construction or operation is predicted to be imperceptible.

12.6.4.8 Operational Effects on birds associated with marine/shoreline habitats

During the operational phase, noise, disturbance and traffic levels will increase in the context of an area where there are already moderate levels of background noise and traffic. Any effects on birds from disturbance due to increased traffic and noise are predicted to be permanent and minor.

The effects on air quality from emissions are specifically addressed in **Chapter 8 *Air Quality*** of this EIAR which concluded that *"based on the results of air dispersion modelling of process emissions, the air quality impact of the proposed facility will not be significant"*. A literature review, which forms **Appendix 3** of the NIS which accompanies this application, looked at the potential for bioaccumulation in piscivorous birds. Based on the information provided in these assessments including the insignificant levels of potentially toxic substances in emissions and the low background levels in marine sediments, any direct impact on birds and mammals via direct emissions or from bioaccumulation are predicted to be imperceptible.

A literature review was carried out to assess the potential collision risk to birds created by the stack which will be 75m in height. This literature review forms **Appendix 4** of the NIS which accompanies this application. The review notes that, information on the potential collision risk created by such stacks is scarce, however, there is evidence to suggest that towers lower than 60m pose a lower risk to migrating birds. The review notes that a recent radar study was commissioned by the Cork Lower Harbour Energy Group in order to identify nocturnal bird movement and interconnectivity within the Cork Harbour SPA (Simms *et al.* 2011). This study did not reveal any distinct flight patterns over the proposed development site. The literature review indicates that, while any light source has the potential to attract birds and therefore increase collision risk, flashing lights are involved in significantly fewer collisions than continuous lights. There is also some indication that white lights are less attractive than red lights, although the results to date are inconclusive. While bird vision does differ from human vision on the lower UV end of the spectrum, infra-red light is also invisible to birds. Therefore, the proposal for a combination of white flashing and infra-red lights on the stack, is the most favourable choice and does not pose a significant collision risk to birds.

Based on the above, and the bird surveys carried out in relation to this application for permission, a significant collision risk to birds is considered unlikely.

Local ecological effects could arise due to increased predator activity if species such as rats or gull species were attracted into the area due to the presence of waste. Both species can prey on nests for ground nesting birds such as common tern and ringed plover. However, it is noted that, during the operational phase of the proposed development, trucks with residual municipal solid waste will discharge their loads within a sealed building (tipping hall) and that there will be no storage of waste in outside spaces. The tipping hall floor is swept into the bunker after each load is discharged to ensure that there is no waste adhering to wheels of vehicles when leaving the site. A standard pest control programme will be implemented at the site, which will include the use of standard bait boxes and ongoing monitoring as part of an annual service contract.

The stack does not create suitable perches for predatory birds and thus does not increase the predation risk for nesting birds. It is also noted that the closest nesting colony of high conservation value (Common Terns) is located approximately 750m away. Under these circumstances the effect from increased predator density or increased predator activity is predicted to be imperceptible.

Potential effects on Cork Harbour SPA, as assessed in further detail in the Natura Impact Statement, relate to disturbance during construction and operation, a possible fire in the bunker during operation, impacts on the marine environment during construction and operation, the collision risk to birds created by the stack during operation and the potential for emissions of substances with eco-toxicological effects and possible bioaccumulation through the food chain. Potential cumulative effects were also considered. Based on a detailed assessment it has been concluded the effect on the qualifying species for the Cork Harbour SPA will be imperceptible.

In relation to the pNHA, the effects due to increased noise and disturbance during the operational phase is predicted to be permanent and imperceptible.

12.6.4.9 Effects on other fauna

Mammal species which are protected under the Irish Wildlife Act 1976, as amended, such as Pygmy Shrew, Hedgehog and Stoat could potentially occur within the proposed development site, although no signs of these species were recorded. No habitats suitable for amphibians or reptiles was recorded and a survey in 2008 for butterflies and moths did not record any rare or uncommon species. Given that no rare species were detected in 2008 and the common nature of the habitats to be removed, it was not considered necessary to repeat this survey in 2014/2015, 2018 or 2019. Given that small areas of relatively common habitats that will be affected the effect on these species will be slight.

12.6.4.10 Climate change and biodiversity

The EU Commission guidance document on integrating climate change and biodiversity into environmental impact assessment (EU Commission, 2013) aims to improve the way in which climate change and biodiversity are integrated into Environmental Impact Assessment. Key principles specified by the document when considering impacts include the following:

- Consider climate change at the outset;
- Analyse the evolving environmental baseline trends;
- Taking an integrated approach;
- Seek to avoid biodiversity and climate change effects from the start;
- For biodiversity, EIA should focus on ensuring 'no net-loss';
- Assess alternatives that make a difference in terms of climate change and biodiversity;
- Use ecosystem-based approaches and green infrastructure as part of the project design and/or mitigation measures;

- Assess climate change and biodiversity synergies and cumulative effects which can be significant.

The potential effects from the proposed development on climate have been specifically addressed by **Chapter 9 *Climate*** of this EIAR. No significant interactions between the effects on biodiversity resulting from this development and climate change have been identified.

In relation to biodiversity, it is important to adopt an "ecosystem approach which considers all of the different ecological elements and how they interact with each other. The site of the proposed development consists of a mixture of semi-natural habitats with native hedgerow along the southern boundary forming a connective element within the local landscape. Dense hedgerows can connect different ecological elements within a landscape which allows mammals, birds and invertebrates a means of moving through the landscape under cover. In this instance, the hedgerow connects a small area of woodland and scrub in the east of the Indaver site to coastal habitats. A hedgerow running at right angles from this hedge connects to the additional woodland habitat in proximity to the Lough Beg industrial estate. In addition, this boundary hedgerow provides nesting and feeding habitat for birds and other fauna and is of value as feeding habitat for bats. The retention and enhancement of this hedgerow is therefore considered important in maintaining ecological value within the site.

A review of aerial photography and surveys carried out on the site since 2001, indicates that areas which have not been managed for conventional agriculture have gradually changed over time. In particular, scrub has gradually encroached on grassland habitat within the proposed development area. Scrub is now the dominant habitat within the proposed development area, with wet grassland reduced to small fragments.

It is proposed therefore to enhance the habitat value of an area of improved grassland in the southwest corner of the site, which is approximately 3ha in size (see **Figure 12.2**). This will be achieved by introducing specialist grass seed mixes based on the naturally occurring plant species found in this area, the introduction of species such as the parasitic yellow rattle and of key species such as knapweed that are important attractors for butterflies and other invertebrates.

The species mix will include species found within the site and locality and will take into account prevailing ground conditions and the coastal environment. A specific, long-term management programme that includes a grazing and/or cutting regime to maintain diversity within the sward will be implemented. Fertiliser applications have been discontinued. In line with the "no net loss" principle of the EU commission guidance on integrating climate change and biodiversity into EIA, the long-term aim will be the establishment of a species rich grassland (i.e. a combination of Dry Meadow and Grassy Verge GS2, Wet Grassland GS4 and Neutral Grassland GS1). It is noted that the creation of a sustainable diverse grassland on high fertility grassland is a long-term process which requires specialist expertise.

It is noted that scrub will be retained within the site to the south west of the Hammond Lane site. Areas of dense bracken within this area will be treated to reduce the dominance of bracken which tends to suppress ground flora. This will also serve to increase biodiversity within the remaining areas of semi-natural habitat which will be retained within the site boundary.

12.6.5 Effects on species and habitats listed under the Annex II and Annex I of the Habitats Directive (92/43/EEC) and Annex I of the Birds Directive (2009/147/EC)

No habitats listed on Annex 1 of the Habitats Directive were recorded within or in immediate proximity to the proposed development. No species listed on Annex II of the Habitats Directive or Annex I of the Birds Directive were recorded within or in immediate proximity to the proposed development. Thus, no effects on these species and habitats within the proposed development boundary or in immediate proximity to it have been identified.

The closest Natura 2000 sites are the Cork Harbour SPA, which is located 0.5km to the south of the development site and the Great Island Channel cSAC, which is located 5.6km to the north. The impact on biodiversity and qualifying interests for these designated sites is predicted to be imperceptible.

The closest pNHA is Lough Beg, 0.3km to the south and Monkstown Creek pNHA, 1.5km northwest. These sites are part of a network of sites which support important bird numbers within Cork Harbour and are considered relevant to this development. The effect on biodiversity and qualifying interests for these designated sites is predicted to be imperceptible.

12.7 Potential Cumulative Effects

Cumulative effects on fauna chiefly relate to increased noise and activity levels and the possibility of increased collision risk. Although increases in noise/disturbance could occur arise from several different projects in-combination the effect is likely to be most pronounced during construction. This is a short-term effect which will be localised.

Given the nature of the projects proposed and distances between them, significant effects during operation are unlikely. Given the distance between the wind turbines, Aghada stack and the proposed Indaver stack the cumulative collision risk or disturbance risk are predicted to be not significant. The potential cumulative effects which are considered relevant to this proposal are listed below.

12.7.1 Hammond Lane

The existing Hammond Lane Metal Company is accessed from the L2545 and is surrounded by the Indaver site. Planning permission was granted in 2012 for demolition, new build, upgraded facilities and a new processing plant. This facility is operating under an IE license. Whilst there is some noise and traffic associated with the facility, it is set back by approximately 240m from the coastline and no potential effect on birds, otters or seals utilising coastal habitats has been identified. Effects on ecology within the Indaver site are predicted to be slight to imperceptible. Therefore, no effects have been identified arising from the Hammond Lane development which would cause an effect in-combination with the Indaver development of the proposed Resource Recovery Centre (including waste to energy facility).

12.7.2 Wind Turbines in Lower Cork Harbour

Currently in the Cork Lower Harbour there are four operational wind turbines and one with planning permission. Each turbine has a maximum rotor tip height of 150m. The closest turbine is located approximately 400m south of the proposed stack for the Ringaskiddy Resource Recovery centre at the DePuy facility (Loughbeg). The other wind turbines are located at DePuy (Loughbeg), GlaxoSmithKline (Curraghbinny) and at Janssen (Barnahely), located 1km, 1.7km and 2.5km from the proposed Indaver stack, respectively. A fifth turbine, for which Novartis site has planning permission, is similar to the four existing turbines.

The built turbines themselves are separated from each other by distances ranging from 1km to 2.5km and all four turbines are in excess of 5km from the ESB Power Station Stack at Aghada. When the Novartis Turbine is constructed, it will be approximately 700m from the closest existing turbine at Janssen and in excess of 5km from the ESB Power Station Stack at Whitegate.

Given the distance between the Indaver stack and wind turbines and the ESB Power Station Stack at Whitegate, the limited size of the proposed stack and the limited bird usage of shoreline habitats adjoining the site, there will be no significant effect on birds.

12.7.3 Aghada Power Station Stack

Approximately 5km east of the proposed development is the Aghada ESB Power Station Stack at Whitegate, with a stack height of 152m. As noted this site is considered a considerable distance from the Indaver site and no cumulative disturbance effects or collision risk in relation to the proposed Indaver Stack have been identified.

12.7.4 The Port of Cork development

The Port of Cork redevelopment will be located approximately 700m from the proposed development. Increased noise and disturbance are likely to occur during development and operation of this facility. This is due for completion in 2020. In the absence of any predicted impact on marine ecology or bird usage of the area from the Indaver development, no potential cumulative effects have been identified.

12.7.5 Haulbowline Development and Masterplan

Haulbowline Island – Remediation works complete, landscaping due to be complete in 2019 and park to be open to the public in 2019. Increased traffic levels are not having a significant effect on bird populations and no other cumulative effects have been identified.

12.7.6 Spike Island Masterplan

A masterplan has been in place since 2012 but no further planned/permitted projects are known. Increased boat traffic to Spike Island and increased activity on the island, which is separated from the Indaver site by a 770m channel, could potentially haven an effect on bird populations via a general increase in human activity levels in this general area. However, given the distance involved and the lack of any significant effects on birds arising from the Indaver development, no likely significant cumulative effects have been identified.

12.7.7 M28 Cork to Ringaskiddy Motorway Scheme

Increased noise and activity levels could arise due to the proposed N28 scheme particularly during construction. Whilst there may be localised disturbance/displacement of fauna, the cumulative effect is not predicted to be significant.

12.7.8 NMCI and UCC ERI

The National Maritime College of Ireland (NMCI) and the UCC ERI Beaufort Building are both located opposite the Indaver site. The NMCI opened in 2004 and is a public-private partnership between Cork Institute of Technology, the Irish Naval Service and Focus Education.

The UCC ERI Beaufort Building (construction completed in 2015), is located on the site to the east of the NMCI. MaREI (Centre for Marine and Renewable Energy) and the Lir National Ocean Test Facility are both located in the UCC ERI Beaufort Building. In the absence of any predicted effect on the ecology of the area from the Indaver development, no potential cumulative effects have been identified.

12.7.9 Other developments

Other developments which were considered with respect to potential cumulative effects are listed below. No potential cumulative effects in regard to these developments have been identified.

- The Island Crematorium – in operation.
- Irish Naval Service base, Haulbowline Island – in operation.
- Cork Lower Harbour Drainage Scheme – WwTP complete, other associated upgrade works (pump stations, pipelines) ongoing. Due to complete in 2019.
- Residential Developments - No planned/permitted projects.
- Amenity Developments.
- Ferry and Cruise Ship Business.
- Community Gain Fund.
- Pharmaceutical and Medical Device Manufacturers.

- BioMarin - (PA No. 186603) extension to manufacturing building. Decision due 28 Nov 2018.
- GE Healthcare Life Science BioPark – (PL04 .248154) Planning granted. To be located in Barnahely.
- Pfizer Ireland - PA Ref 16/6937: Granted in Jan 2017.
- Novartis – a number of permitted projects including the permitted wind turbine.

Field Code Changed

12.8 Mitigation Measures

The likely success of the proposed mitigation measures is high. The mitigation measures have been drawn up in line with current best practice and include an avoidance of sensitive habitats at the design stage. It is clear in what the mitigation measures are designed to achieve in lowering or reducing the risk of effects to acceptable levels. The risk that the mitigation measures will not function effectively in preventing significant ecological effects is low. The following mitigation measures will be implemented:

12.8.1 Construction Phase Mitigation Measures

A construction environmental management plan (CEMP) has been prepared and is included in **Appendix 5.1** of this EIAR. The CEMP contains all of the construction mitigation measures, which are set out in this EIAR and NIS, and any additional measures which are required by the conditions attached to the Board's decision. The principal measures which will be set out in the CEMP are summarised below:

Protection of habitats

To prevent incidental damage by machinery or by the deposition of spoil during the site clearance stage, any trees /habitats earmarked for retention will be securely fenced early in the construction phase. The fencing will be clearly visible to machine operators.

To prevent Japanese Knotweed from outside the site being inadvertently being brought in to the site, the contractor will be required to inspect vehicles before using them on site and will pay particular attention to caterpillar tracks and where trucks and dumpers are stowed. The supplier of fill will be required to provide a guarantee that the fill to be imported does not contain knotweed. In addition, the fill will be inspected for signs of knotweed, prior to importation to site.

Habitat creation/restoration

It is proposed therefore to enhance the habitat value of an area of improved grassland in the southwest corner of the site, which is approximately 3ha in size. This will be achieved by introducing specialist grass seed mixes based on the naturally occurring plant species found in this area, the introduction of species such as the parasitic yellow rattle and of key species such as knapweed that are important attractors for butterflies and other invertebrates.

The species mix will include species found within the site and locality and will take into account prevailing ground conditions and the coastal environment. A specific, long-term management programme that includes a grazing and/or cutting regime to maintain diversity within the sward will be implemented. Fertiliser applications have been discontinued. The long-term aim will be the establishment of a species rich grassland (i.e. a combination of Dry Meadow and Grassy Verge GS2, Wet Grassland GS4 and Neutral Grassland GS1). It is noted that the creation of a sustainable diverse grassland on high fertility grassland is a long-term process which requires specialist expertise.

It is noted that scrub will be retained within the site to the south west of the Hammond Lane site. Areas of dense bracken within this area will be treated to reduce the dominance of bracken which tends to suppress ground flora. This will also serve to increase biodiversity within the remaining areas of semi-natural habitat which will be retained within the site boundary.

Protection of water quality

A dedicated holding tank for storage of construction foul effluent will be constructed prior to commencement of the main construction activities. The effluent will be regularly disposed of off-site by tanker by a licensed contractor to an approved licensed facility

Storm water will be managed carefully during construction. In general, storm water will be infiltrated to ground via silt traps and managed soakaways. The laydown areas will be suitably drained and any areas which will involve the storage of fuel and refuelling will be paved and bunded and hydrocarbon interceptors will be installed to ensure that no spillages will get into the surface water or groundwater.

The employment of good construction management practices will minimise the risk of pollution of soil, storm water run-off, seawater or groundwater. The Construction Industry Research and Information Association (CIR*IA) in the UK has issued a guidance note on the control and management of water pollution fr*om construction sites, *Control of Water Pollution from Construction Sites, guidance for consultants and contractors (Masters-Williams et al 2001). Additional g*uidance is *prov*ided in the CIRIA technical guidance on *Control of Water Pollution from Linear Construction Projects* (Murnane *et al* 2006). Construction mitigation measures are further outlined in **Section 5.8** of this EIAR.

Measures, as recommended in the guidance above, that will be implemented to minimise the risk of spills and contamination of soils and waters, include:

- Training of site managers, foremen and workforce, including all subcontractors, in pollution risks and preventative measures.
- Careful consideration will be given to the location of any fuel storage facilities. These will be designed in accordance with guidelines produced by CIRIA and will be fully bunded.
- vehicles and plant will be regularly inspected for fuel, oil and hydraulic fluid leaks. Suitable equipment to deal with spills will be maintained on site.

- Where feasible, soil excavation will be completed during dry periods and undertaken with excavators and dump trucks. Topsoil and subsoil will not be mixed together. Specific measures will be implemented, as specified by the Construction Environmental Management Plan to ensure that Japanese Knotweed is not spread within the site or outside the site boundaries.
- Ensure that all areas where liquids are stored, or cleaning is carried out are in a designated impermeable area that is isolated from the surrounding area, e.g. by a roll-over bund, raised kerb, ramps or stepped access.
- Use collection systems to prevent any contaminated drainage entering surface water drains, watercourses or groundwater, or draining onto the land.
- Minimise the use of cleaning chemicals.
- Use trigger-operated spray guns, with automatic water-supply cut-off.
- Use settlement lagoons or suitable absorbent material such as flocculent to remove suspended solids such as mud and silt.
- Ensure that all staff are trained and follow vehicle cleaning procedures. Post details of the procedures in the work area for easy reference.

Air quality

The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for effect from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of dust produced will be deposited close to the generated source. A series of measures, based on best practice, have been formulated (see below and also **Section 8.6.1.1** of **Chapter 8 *Air Quality*)** for the construction phase of the project, as construction activities are likely to generate some dust emissions:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only apart from the contractor's car park which will be hardcore only.
- Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 km/h, and on hard surfaced roads as site management dictates.
- Vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust.
- Wheel washing facilities will be provided for vehicle exiting site in order to ensure that mud and other wastes are not tracked onto public roads.
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.

- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting, or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.
- Dust monitoring will also be carried out during the construction phase (Refer to **Chapter 8** for further details).

Waste management

Waste generated during the construction phase will be carefully managed according to the accepted waste hierarchy which gives precedence to prevention, minimisation, reuse and recycling over disposal with energy recovery and finally disposal to landfill. Refer to Sections **13.6.2.1** and **13.4.2.1** of **Chapter 13** which provides further details on waste management during construction

All waste removed from the site will be collected only by contractors with valid waste collection permits, under the Waste Management (Collection Permit) Regulations 2007 and 2008. All facilities to which waste will be taken will be audited in advance, to ensure that they have appropriate waste licences or permits, under the Waste Management Act 1996 as amended by the Protection of the Environment Act 2003, and the regulations thereunder, allowing them to accept the type of waste that is to be sent there. Hazardous waste generation will be minimised, and such waste will be recovered where feasible, and only disposed of if recovery is not feasible. Hazardous waste will be managed in accordance with the relevant legislation. Further details are provided in the CEMP included as **Appendix 5.1** to this EIAR under **Section 7**, ***Construction Waste Management***.

12.8.2 Mitigation - during operation

Woodland and scrub and other areas of semi-natural vegetation outside the proposed development area will be retained.

The boundary landscape planting will be predominantly of Irish native species that reflect the existing vegetation of the area. These will be derived from local native-origin stocks where possible.

The pasture in the south-western corner of the site will be managed to allow semi-natural grassland to develop. This process will be carried out under the supervision of an ecologist.

12.8.3 Mitigation – Non- native invasive plant species

Japanese Knotweed

Since the completion of the EIS in 2016, Indaver have engaged a specialist company to actively monitor and treat the stands of Knotweed at the boundary to prevent any spread onto the Indaver site. Monitoring and treatment of the stands has been ongoing since 2017.

As part of the ongoing management of the infestation at the Indaver site boundary, the site was resurveyed in May 2019 and treatment (spraying of plants where accessible from the Indaver site) will continue in the late summer/early autumn of. The monitoring and treatment will continue up to the start of construction on site and thereafter until construction is complete and as outlined in the CEMP in **Appendix 5.1** to this EIAR under **Section 8**.

There is also the potential for Japanese knotweed to be inadvertently brought onsite in imported fill or on the wheels/tracks of construction vehicles. The supplier of fill will be required to provide a guarantee that the fill to be imported does not contain Knotweed. In addition, the fill will be inspected for signs of knotweed, prior to importation to site. The inspection of topsoil brought into the site, will be carried out according to the Standard, BS3882:2015 Specification for Topsoil.

The contractor will be required to inspect vehicles before using them on site and will pay particular attention to caterpillar tracks and where trucks and dumpers are stowed.

Rhododendron

During clearance of small sections of scrub for the development of internal tracks one rhododendron plant, which was previously hidden in dense scrub, was recorded in May 2019.

The first operation in clearing rhododendron is the cutting of individual plants. Stems will be cut as close to the ground as possible. Rhododendron material can be burnt green immediately after being cut or disposed offsite to landfill. Where burning is envisaged, contact will be made with the Local Authority to obtain permission. It is noted that only one small rhododendron plant was noted.

Some method of killing must be used as rhododendron invariably grows back vigorously when cut. Digging the stumps out of the ground is an effective way of killing rhododendron. Its effectiveness is maximized by removing all viable roots. Stumps that are dug out will be burnt along with the cut material or disposed offsite to landfill.

In all sites, follow-up work will be necessary to ensure that any small plants or seedlings which were either missed on the previous visit or have entered the site subsequently from adjacent seed sources, are removed before they reach the flowering age (10-12 years).

12.8.4 Badger Mitigation Measures

The sett that was previously located within the study area, but outside the proposed development area, is no longer utilised.

As a precautionary measure, a pre-construction survey and further monitoring surveys during construction for badgers will be carried out to confirm the absence of badgers and monitor any potential badger activity or re-establishment in the development area. This will minimise any potential effects on the species.

If badgers are discovered at that time, the mitigation measures outlined in the NRA publication, *Guidelines for the Treatment of Badgers Prior to the Construction of a National Road Scheme* (NRA, 2006c), should be followed. If necessary, the following measures will be employed for all construction works where badger issues arise.

Badger sett tunnel systems can extend up to *c*. 20m from sett entrances. Therefore, no heavy machinery should be used within 30m of badger setts (unless carried out under licence); lighter machinery (generally wheeled vehicles) should not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance should not take place within 10m of sett entrances.

During the breeding season (December to June inclusive), none of the above works should be undertaken within 50m of active setts nor blasting or pile driving within 150m of active setts.

Following consultation with the NPWS and badger experts, works closer to any active setts may take place during the breeding season provided appropriate mitigation measures are in place, e.g. sett screening, restricted working hours, etc.

All affected badger setts will be clearly marked, and the extent of bounds prohibited for vehicles clearly marked by fencing and signage. Bunting is an option on a temporary basis. Hazard tape is inadequate as it is prone to deterioration and damage by wind or cattle etc.

All contractors/operators on site will be made fully aware of the procedures pertaining to each sett on site.

Construction activities within the vicinity of affected setts may commence once these setts have been evacuated and destroyed under licence from the NPWS. Where affected setts do not require destruction, construction works may commence once recommended alternative mitigation measures to address the badger issues have been complied with.

Works close to badger setts or removal of badgers from a site may only be carried out under the supervision of a qualified expert under licence from the NPWS.

12.8.5 Bird Mitigation Measures

The Wildlife Act 1976, as amended, provides that it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land, or any such growing in any hedge or ditch from the 1st of March to the 31st of August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided. Where possible vegetation will be removed outside of the breeding season. Where vegetation is removed during the breeding bird season, a bird survey will be carried out prior to commencement of removal and appropriate mitigation will be specified if required.

Retention of the native hedges along the southern boundaries will reduce the loss of breeding and nesting habitat for birds. Some new hedgerow will also be planted along this boundary, a tree line along the northern boundary will be removed, however replacement planting is proposed.

NRA guidelines on the protection of trees and hedges prior to and during construction should be followed (NRA, 2006b). Primarily native species will be utilised for new planting at the site. The development of a more species rich sward on grassland in the southwest of the site will in time provide additional feeding resources for birds.

The coastal protection works will take place outside the main wintering season.

12.8.6 Otter Mitigation Measures

No signs of otter or otter holts were noted within 300m of the proposed development. However, otters do occur within the wider landscape and are common within Cork Harbour. A detailed pre-construction survey will confirm the absence of otter holts within 150m of the proposed development area.

Any holts found to be present will be subject to monitoring and mitigation as set out in the NRA *Guidelines for the Treatment of Otter prior to the Construction of National Road Schemes (2006b)*. If found to be inactive, exclusion of holts may be carried out during any season. No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance will also not take place within 15m of such holts, except under license. The prohibited working area associated with otter holts will be fenced and appropriate signage erected. Where breeding females and cubs are present no evacuation procedures of any kind will be undertaken until after the otters have left the holt, as determined by a specialist ecologist. Breeding may take place at any season, so activity at a holt must be adjudged on a case by case basis. The exclusion process, if required, involves the installation of one-way gates on the entrances to the holt and a monitoring period of 21 days to ensure the otters have left the holt prior to removal.

12.8.7 Marine Mitigation Measures

Coastal protection works will take place outside the main wintering season for birds which runs from October to March.

As outlined in **Section 13.4.4***, it* is anticipated that monitoring of the coastal boundary and consequently the efficacy of the sacrificial material placed on the beach, will take place every year. If such material is to be replaced in the future, an ecological survey will be carried out in advance to ensure that ecological conditions have not changed in the intervening period.

12.8.8 Residual Effects

The EPA document Guidelines on the information to be contained in Environmental Impact Assessment Reports (draft August 2017) provides a standard scheme for classifying effects as detailed in **Table 12.1**. Based on this classification scheme the effects of the proposed development are classified below in **Table 12.18.**

Table 12.8 Predicted effects

Potential Effect	Predicted effect
Indirect effects due to increased noise and disturbance during the construction phase of the development	The effect is predicted to be short-term and not significant
Indirect effects on the terrestrial biodiversity due to the spreading of invasive species during site works	The effect is predicted to be imperceptible.
Indirect effects on the adjoining beach, effects could arise from increased noise and disturbance associated with the coastal protection works.	The effect will be short-term and not significant.
Indirect effects on the marine environment could arise during construction from increased run-off of suspended solids or from inadvertent spillages of hydrocarbons during construction works.	The effect will be short-term and not significant.
Direct effects due to be a net, permanent loss of an area of semi-natural terrestrial habitat	There will be a permanent, slight effect in respect of habitats within the site. There will be a permanent, slight effect on terrestrial birds, mammals and other fauna due to the loss of habitat.
Direct effects on the ecology of the upper shore from the beach nourishment scheme	This will be a medium-term, not significant effect.
Indirect effects due to increased traffic and noise associated with the site could potentially increase levels of disturbance which could result in the disturbance/displacement of birds and mammals such as otter and seals.	For construction traffic the effect will be short-term and not significant. During operation the effect will be long term and not significant.
Direct effect from the stack of the main process building which could theoretically create a collision risk for birds thus leading to a risk of increased bird mortality and potential subsequent effects on bird populations.	Any significant collision risk is considered unlikely and thus the effect is predicted to be long term and not significant.

Indirect effect due to emissions to air could theoretically have eco-toxicological effects particularly on piscivorous birds, otters and seals due to bioaccumulation.	The effect is predicted to be long-term and imperceptible.
Indirect effect on nesting birds as the importation of organic waste could attract increased predator numbers.	The effect is predicted to be long term and imperceptible
Indirect effects from accidents during operation or during the transport of ash and flue gas residues could theoretically effect on marine ecology.	The risk of significant accidents is considered unlikely and the effect is predicted to be imperceptible.

In conclusion the development is not predicted to have a significant effect on terrestrial and marine ecology. The cumulative effect will not be significant. The effect on European Sites, which was also specifically addressed by a Natura Impact Statement, will be imperceptible.

12.9 Difficulties Encountered

No difficulties were encountered in compiling information or carrying out relevant surveys.

12.10 References

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