

CORRIB DEVELOPMENT
BIODIVERSITY ACTION
PLAN 2014-2019



Front Cover Images: Sruwaddacon Bay Evening
Lady's Bedstraw at Glengad
Green-veined White Butterfly near Leenamore
Common Dolphin
Vegetation survey at Glengad





Leenamore Inlet

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CORRIB DEVELOPMENT BIODIVERSITY ACTION PLAN

This document was created by Shell E & P Ireland Ltd. Much of northwest Mayo is designated for nature conservation under Irish and European legislation. The development of the Corrib gas field is a good example of a project where the ongoing management of impact on biodiversity is integrated into the day-to-day running of the project, and where the presence of sensitive habitats and species have influenced important decisions including the design of project facilities. Corrib is now operated by Vermilion Energy. In line with our core values of Excellence, Trust, Respect, and Responsibility, together with our commitment to Sustainable Development Goal 15, Life on Land, and our commitment to investing in environmental protection, we are pleased to continue to support the importance of ecology and biodiversity on the Corrib Development.

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The Corrib Development Biodiversity Action Plan has been prepared, collated and edited on behalf of Shell E & P Ireland (SEPII) by the Project Ecologist, Jenny Neff CEcol CEnv FCIEEM (EACS – Ecological Advisory and Consultancy Services).

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FOREWORD



Protecting biodiversity is an important factor for the Shell Group when considering any new major project. Our approach to biodiversity is an integrated part of the way we operate. We consider biodiversity early in new projects, and develop biodiversity action plans. In the development of these we collaborate with biodiversity experts to help protect areas with sensitive eco-systems. Protecting biodiversity also makes business sense for Shell in that it reduces our operational and financial risk by making sure we get our projects right.

In the development of projects, biodiversity and ecosystem services are managed through the Impact Assessment process, and projects are required to apply a hierarchy of mitigation in all natural habitats. Shell is committed to collecting data and reporting on its performance in the context of biodiversity conservation, and we actively collaborate in environmental partnerships.

The development of the Corrib gas field is a good example of a project where the ongoing management of impact on biodiversity is integrated into the day-to-day running of the project, and where the presence of sensitive habitats and species have influenced important decisions and the design of project facilities. An example would be the decision to construct a 4.9 km tunnel to enable the installation of the onshore pipeline within Sruwaddacon Bay whilst eliminating or minimising the impact on protected habitats and species. Other examples have been the terminal and pipeline construction teams' approach to areas temporarily affected by construction, where the key objective of reinstatement has been the interest of habitat and wildlife.

The decision to publish Corrib's Biodiversity Action Plan at this stage of the project, when the majority of construction activities are coming to an end and prior to commencing gas production from the Corrib field, represents a statement of commitment for Shell. It confirms our obligations in terms of continued engagement with local communities and expertise, and the ongoing effort in the monitoring of our activities and progress to ensure our biodiversity objectives are met.

A. Rupert Thomas

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Vice President Environment Royal Dutch Shell plc

EXECUTIVE SUMMARY

Biodiversity is a contraction of the term biological diversity and includes all macro- and micro-organisms of flora and fauna on Earth, and the habitats in which they live. Biodiversity is vital for sustaining the ecosystems which also have a social and economic value, providing goods and services that intrinsically sustain human life in many ways.

In an attempt to address the global decline in biodiversity in 1992, at the Earth summit in Rio de Janeiro, Brazil, the Convention on Biological Diversity was signed. This, the first global agreement on the conservation and sustainable use of biological diversity, was subsequently ratified by more than 180 countries including Ireland, in 1996.

The Convention has been implemented in Ireland by means of the National Biodiversity Action Plan, the second of which, for 2011 – 2016, was published in November 2011 – much of which was already legislated for by the Wildlife Act, 1976 as amended by the Wildlife (Amendment) Act, 2000. Ireland's National Biodiversity Plan 2011 – 2016 states its aim: "That biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally."

The biodiversity action plan (BAP) for the Corrib Gas Development has been developed in accordance with the national strategy on biodiversity and that of the oil and gas industry. It is in accordance with Shell's corporate policy on biodiversity and their activities in sensitive areas, i.e. "Protecting biodiversity is an important factor when we consider any new major project or large expansion to existing operations. Our approach to biodiversity is an integrated part of the way we operate. It builds on the industry-first standard we set in 2001 and now incorporated in our biodiversity manual."

The Corrib natural gas field is located 83 km offshore of County Mayo and is being developed as a subsea 'tie-back' facility, connected by a pipeline to an onshore processing terminal located approximately 9 km inland.

Corrib is unusual in respect of commercial developments in that the construction phase has taken longer than originally planned. This has

resulted in habitat and species data being collected over a significantly longer period of time than would normally be the case, and a commensurate build up of knowledge and understanding of the environment in which the development is placed. An extensive biodiversity database has been built up since 2001. Much of northwest Mayo is designated for nature conservation under Irish and European legislation. Sites within 15 km of the Corrib Development are listed and those sites on which it impinges are described, namely: Broadhaven Bay Special Area of Conservation (SAC), Glenamoy Bog Complex Special Area of Conservation (SAC), Blacksod Bay/Broadhaven Special Protection Area (SPA) and Blacksod Bay/Broadhaven Ramsar site.

An overview of biodiversity from the wellheads offshore to the terminal at Bellanaboy is provided and includes marine, intertidal, and onshore habitats and species.

The aim of the BAP is to conserve, maintain, and enhance biodiversity and ecosystem services within the zone of influence of the Corrib Development and its various elements, including those areas affected by temporary works during construction. The targets and objectives are restricted, in respect of the offshore pipeline, to Broadhaven Bay and within the SAC itself. Habitats and species in respect of: nearshore and intertidal sections of the offshore pipeline, the entire onshore pipeline (including intertidal habitats), and the terminal site at Bellanaboy, are included because of their location in relation to the designated conservation sites in the locality. This rationale is consistent with national biodiversity strategy to put local plans in context, especially in relation to existing designations.

The Irish National Biodiversity Action Plan objectives include a commitment to "conserve and restore biodiversity and ecosystem services"; an approach in line with Shell's Corporate policy and its commitment in respect of biodiversity and is included in the Objectives of this BAP.

In 2011 the Corrib Development was chosen as a pilot case for the testing of No Net Loss (NNL)/Net Positive Impact (NPI) methods for the Shell Group. The study was conducted by the Biodiversity Consultancy Ltd which took all project elements into consideration and found that "without any existing NNL policy, best practice at Corrib has resulted in a project design which is predicted to be Net Neutral or Net Positive for biodiversity by 2020".

The BAP objectives for the conservation of habitats and species connected with the Corrib Development are:

1. Protect habitats and species by means of appropriate mitigation measures during the construction and operation of the various elements of the development.
2. Monitor habitats and species during and following construction of the various elements of the development.
3. Consult with stakeholders and other interested parties as appropriate.
4. Reinstate habitats affected by the construction of the development.
5. During reinstatement to enhance local biodiversity on lands in the stewardship of Shell, and elsewhere where feasible and practical.
6. Apply best practice stewardship to manage lands within the development's landholding and lease for biodiversity and ecosystem services; establish and implement a Land Management Plan.
7. Maintain species numbers, diversity and ecosystem services within, and in the vicinity of, the footprint of the development, including those areas affected by temporary works during construction.
8. Put mechanisms in place to control invasive species in reinstated habitats.
9. Contribute to the conservation and sustainable use of biodiversity through day to day activities, and administrative functions of SEPIL's activities.
10. Set up partnerships with relevant and appropriate bodies such as: academic institutions, NGOs, peer experts etc.
11. Set up BAP review working groups.
12. Provision of species records and habitat quadrat data to the national biodiversity database.

The biodiversity action plan sets out objectives and targets for a five year period, bringing it well into the operational phase of the development. It is proposed that a biennial evaluation is undertaken by biodiversity review groups which will comprise specialist consultants and SEPIL environmental staff. A separate review working group will be set up for marine mammal monitoring.

Because of the longevity and phased construction of the development, a number of actions have already been, and are being, implemented including the implementation of Environmental Management Plans (EMPs), Monitoring Programmes, and mitigation measures for the protection of habitats and species.



Aughoose – Leenamore

1 INTRODUCTION

1.1 BIODIVERSITY

1.1.1 WHAT IS BIODIVERSITY?

Biodiversity is a contraction of the term biological diversity and includes all macro- and micro-organisms of flora and fauna on Earth, and the habitats in which they live. Biodiversity as we know it today has evolved over aeons and is a complex “web of life”, on the interactions of which all species depend, including ourselves as human beings. Biodiversity also includes genetic variability within species, which results in sub species, and varieties, in the wild and domestically, for example horticultural and domestic animal varieties. This genetic variability is vital for species survival and their ability to continue to adapt (evolve) to changing conditions and local environments.

1.1.2 WHY IS BIODIVERSITY IMPORTANT?

Biodiversity is vital for sustaining the ecosystems which also have a social and economic value, providing goods and services that intrinsically sustain human life in many ways. For example in the provision of food, shelter, fuel, clothing, clean water, and medicines derived from plants. Habitats and landscapes contribute to our social well-being, and as well as having economic value in terms of recreation and tourism, they reflect human history and culture, thus giving a ‘sense of place’. This is aptly demonstrated in Ireland, where tourism has been a vital part of the national economy for decades.

Human influence in recent millennia has increasingly shaped the biodiversity of the world. Not only through the alteration of habitats, and changing landscapes, but often through a loss in species biodiversity, sometimes catastrophically. The modern landscape in Ireland is no less a product of human practices over time, which have included: the felling of native woodlands in tandem with the expansion and intensification of agriculture, and the spread of urbanisation; the exploitation of peat deposits for centuries by hand as a source of fuel for domestic use, and more recently by mechanical means for fuel and horticulture at a commercial level; and the increase of non-native commercial forestry.

Many species have become extinct and increasing numbers are under threat. In recent years there has been a sharp decline in biodiversity world-wide.



Wildflowers at Glengad



Green-veined White Butterfly near Leenamore



Soldier Beetles on Wild Angelica

1.2 INTERNATIONAL AND NATIONAL CONTEXT

1.2.1 CONVENTION ON BIODIVERSITY

In an attempt to address the global decline in biodiversity in 1992, at the Earth summit in Rio de Janeiro, Brazil, the Convention on Biological Diversity was signed¹. This, the first global agreement on the conservation and sustainable use of biological diversity, was subsequently ratified by more than 180 countries. The Convention, which was signed by Ireland in 1992 and ratified in 1996, has three main goals:

- *The conservation of biodiversity*
- *Sustainable use of the components of biodiversity*
- *The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources*

The implementation of the Convention requires biodiversity to be integrated across various sectors at international, national and local level, and is overseen and organised by the Conference of Parties. Countries that have ratified the Convention are obliged to submit national status reports at regular intervals, the first being submitted in 1998. Article 6 of the Convention sets out the general measures for conservation and sustainable use, including the provision for national biodiversity strategies or plans, and the integration of biodiversity concerns as follows:

- *Article 6A requires each Contracting Party to 'develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adopt for this purpose existing strategies, plans or programmes which shall reflect, inter alia, the measures set out in this Convention relevant to the Contracting Party concerned.'*
- *Article 6B requires each Contracting Party to 'integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross sectoral plans, programmes and policies'*

1.2.2 NATIONAL AND LOCAL IMPLEMENTATION

As stated above, the Convention was ratified by Ireland, and the most recent in a series of reports to the Convention on Biodiversity was submitted by Ireland in May 2010.

The Convention has been implemented by means of the National Biodiversity Action Plan, the second

of which, for 2011 – 2016, was published in November 2011 – much of which was already legislated for by the Wildlife Act, 1976 as amended by the Wildlife (Amendment) Act, 2000. The Plan sets out Ireland's strategic objectives as follows:

- *To mainstream biodiversity in the decision making process across all sectors*
- *To substantially strengthen the knowledge base for conservation, management and sustainable use of biodiversity*
- *To increase awareness and appreciation of biodiversity and ecosystem services*
- *To conserve and restore biodiversity and ecosystem services in the wider countryside*
- *To conserve and restore biodiversity and ecosystem services in the marine environment*
- *To expand and improve on the management of protected areas and legally protected species*
- *To substantially strengthen the effectiveness of international governance for biodiversity and ecosystem services*

The national strategy for biodiversity provides for the production of local plans, and sectoral plans, with biodiversity information and data feeding into national resources through facilities such as the National Biodiversity Data Centre (<http://www.biodiversityireland.ie/>), which was set up as an action under the 2002 National Biodiversity Plan.

"Notice Nature" (<http://www.noticenature.ie/>), a public awareness campaign on biodiversity, has been set up by the National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht (DAHG) as an action from the 2002 National Biodiversity Plan. The aim is "to raise awareness of the importance of biodiversity and to encourage all sectors to play their part in its protection. This will help halt the damage being done to our plants and animals and the landscape, waters and habitats in which they live". It encourages businesses, amongst others, to develop their own biodiversity action plans in line with the Heritage Council recommendation in their submission to the Second National Biodiversity Action Plan which stated: "The Heritage Council recommends that efforts to engage various sectors of business be continued and enhanced, with particular emphasis being placed on actions that will ensure the

application of the biodiversity guidelines, such as incentives and awards schemes. This could also include communications initiatives that highlight the links between biodiversity and business, and to appeal to non-traditional audiences on biodiversity issues”.

1.2.3 WHY A BIODIVERSITY ACTION PLAN?

The production of a BAP for the Corrib Gas Development is clearly in accordance with the national strategy on biodiversity and is also in line with the Shell Group’s policy on biodiversity and their activities in sensitive areas as follows:

“Protecting biodiversity is an important factor when we consider any new major project or large expansion to existing operations. Our approach to biodiversity is an integrated part of the way we operate. It builds on the industry-first standard we set in 2001 and now incorporated in our biodiversity manual.” (<http://www.shell.com/home/content/environment>)

This document takes into account the overall goal, objectives and principles of the National Biodiversity Action Plan and Shell’s Corporate policy in respect of biodiversity. It has been prepared for the Corrib Development with due reference to the following guidelines

- ‘Guidelines for the Production of Local Biodiversity Action Plans’ (2003, drafted by the Heritage Council and published by the Department of Environment, Heritage and Local Government (DoEHLG))
- “A Guide to Developing Biodiversity Action Plans for the Oil and Gas Sector” (2005, International Petroleum Industry Environmental Conservation Association (IPIECA) and the International Association of Oil and Gas Producers (OGP))
- “Biodiversity Action Plans for Business” (2011) published by Notice Nature, Department of Arts Heritage and the Gaeltacht (DAHG)



Glengad westwards from the landfall

2 THE CORRIB DEVELOPMENT AND BIODIVERSITY

2.1 AN OVERVIEW OF THE CORRIB DEVELOPMENT

The Corrib natural gas field is located 83 km offshore of County Mayo. This medium sized gas field is being developed as a subsea 'tie-back' facility, connected by a pipeline to an onshore processing terminal located approximately 9 km inland (Figure 1).

The Corrib Field was discovered in 1996 by Enterprise Energy Ireland Ltd, which was subsequently acquired by the Royal Dutch Shell Group in 2002. The Corrib Gas Partners are Shell E&P Ireland Limited (SEPII) (45% – Operator), Statoil Exploration (Ireland) Limited (36.5%) and Vermilion Energy Ireland Limited (18.5%).

The Corrib gas field development consists of a series of gas wells and seabed infrastructure in the Corrib field, a manifold that will gather the flow of gas from each of the wells, and a pipeline to the onshore gas terminal located at Bellanaboy Bridge (Figure 2). The gas pipeline comes ashore at Glengad on the eastern shore of Broadhaven Bay from where it will run underground to the Terminal. It will be installed in a tunnel for 4.9 km of its length, of which 4.6 km will be under Sruwaddacon Bay. There will also be a multipurpose umbilical that runs from the Terminal to the Corrib field. A treated water outfall pipeline for the discharge of treated surface water run-off from the Terminal site will run along the route of the pipeline between the Terminal and a point offshore approximately 12.7 km from the landfall. A Landfall Valve

Installation will be situated close to the landfall of the offshore pipeline, its function being to limit the pressure of the gas in the onshore section of the pipeline.

The environmental impact assessment process for the development commenced in 2000, at the time when some of the key decisions were made. These included the selection process for offshore and onshore pipeline routing, as well as the location of the Terminal. The approach taken was to eliminate where possible, or to minimise impact, and the decision making was supported by a multidisciplinary assessment based on the team's knowledge and understanding of the local receiving environment. In this way, the facilities design process was guided by the application of a mitigation hierarchy, an approach that has been adopted throughout the development project. This approach is also supported by and consistent with the Shell Group's stated principles of minimising impact and protecting biodiversity in sensitive areas.

All of the statutory permits and consents necessary to develop the Corrib gas field and associated facilities and infrastructure were in place at the end of 2004 when construction commenced. To allow the connection of the Corrib Development with the national gas distribution network the 150 km Galway to Mayo pipeline was completed in 2006 and is now connected to the Terminal. By 2012 the offshore production facilities had been installed, the 83 km offshore section of the Corrib pipeline between the field and the landfall had been laid; and the gas terminal was essentially complete.

FIGURE 1: LOCATION MAP

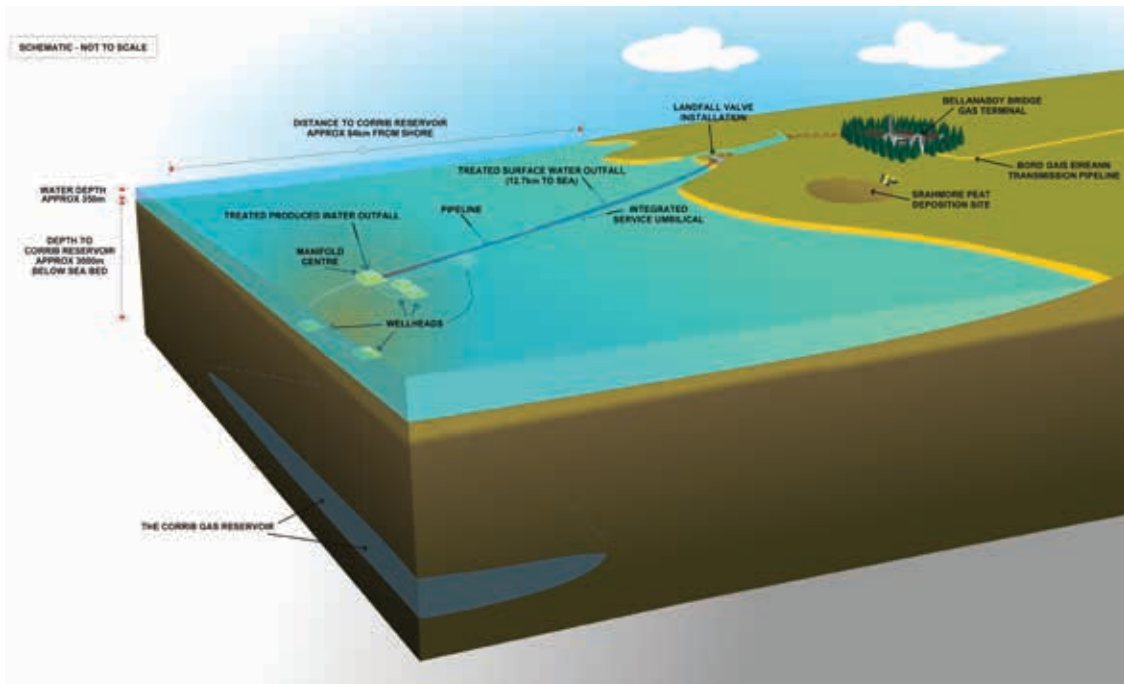


While significant progress has been made on all elements of the project, challenges were encountered resulting in delays and necessary amendments to the routing of the onshore pipeline, construction of which was halted in 2005 (See Onshore Pipeline EIS, RPS, 2010). Construction on the consented 8.3 km onshore section of the Corrib pipeline, the last major project element, commenced in July 2011. The elements of the Corrib Development are shown in Figure 2.

Habitat and species data have been collected during the course of numerous surveys since 2001 in order to

obtain an understanding of the receiving environment and the Corrib Development's context in the wider ecological landscape. This collection of data has been undertaken, not only as required in connection with the various statutory applications including environmental impact statements (EISs), the provision of supplementary information during the applications process and in preparation for construction (e.g. the preparation of environmental management plans – EMPs), but also during ongoing environmental monitoring (Monitoring programmes are set out in Appendix 5.8).

FIGURE 2: SCHEMATIC CORRIB DEVELOPMENT



Bellanaboy Bridge Gas Terminal nearing completion

2.2 DESIGNATED CONSERVATION SITES AND THE CORRIB GAS DEVELOPMENT

2.2.1 DESIGNATED CONSERVATION SITES AND LEGISLATIVE CONTEXT

The 1976 Wildlife Act, as amended by the Wildlife (Amendment) Act, 2000, associated statutory instruments, and Regulations for Birds and Natural Habitats, are implemented and controlled by the National Parks and Wildlife Service (NPWS) of the Department of Arts Heritage and the Gaeltacht (DAH/G). NPWS is also responsible for the designation of sites.

Legislation specifically relevant to flora and fauna is summarised in Table 1. Other legislation such as national commercial fisheries and planning regulations are not included here.

Site designations for conservation in the context of associated Irish and European legislation, and the Ramsar Convention are summarised in Table 2.

2.2.2 DESIGNATED SITES IN THE VICINITY OF THE CORRIB DEVELOPMENT

An extensive area of north Mayo is designated for nature conservation and Figure 3 shows the location of the Corrib Gas Development in relation to designated conservation sites, including European sites (Natura 2000 sites – SACs and SPAs), and Natural Heritage Areas (NHAs) which are designated under Irish Wildlife legislation.

Descriptions of the designated sites on which the development impinges, together with their conservation interests, are given in Appendix 5.1.

FIGURE 3: THE CORRIB DEVELOPMENT IN RELATION TO DESIGNATED CONSERVATION SITES IN NORTH MAYO

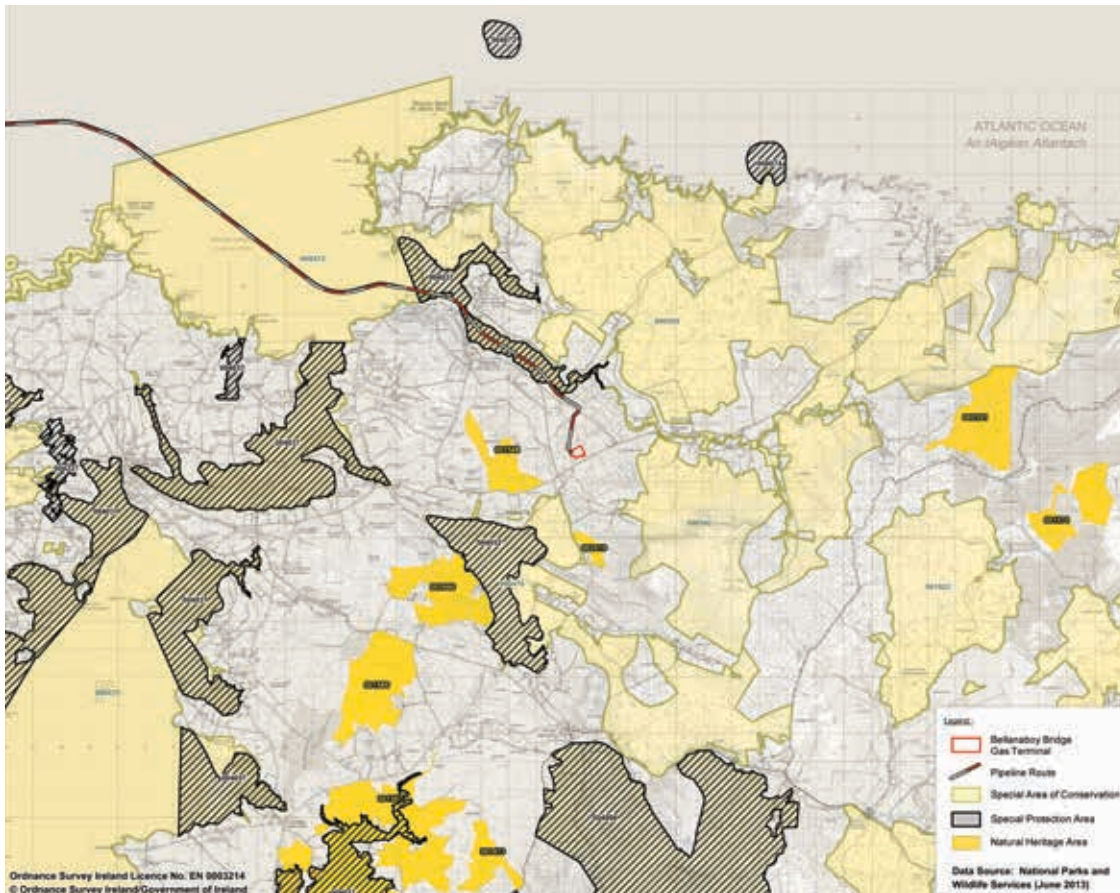


TABLE 1: SUMMARY OF LEGISLATION RELEVANT TO FLORA AND FAUNA

JURISDICTION	STATUTE
NATIONAL	Wildlife Act, 1976; as amended 2000; includes the Flora Protection Order 1999 (S.I. No. 94 of 1999).
	European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94 of 1997).
	European Communities (Natural Habitats) (Amendment) Regulations, 1998 (S.I. 233 of 1998) and 2005 (S.I. 378 of 2005).
	S.I. No. 477 Of 2011 European Communities (Birds and Natural Habitats) Regulations 2011.
	European Communities (Quality of Salmonid Waters) Regulations, 1988. S.I. No. 293 of 1988.
EUROPEAN	EU Directive 79/409/EEC of 2nd April 1979 on the conservation of wild birds (the Birds Directive).
	EU Directive 92/43/EEC of 21st May 1992, on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive).
	EU Water Framework Directive (2000/60/EC) of 23 October 2000 establishing a framework for Community action in the field of water policy.

TABLE 2: DESIGNATED CONSERVATION SITES

DESIGNATION	LEGISLATIVE BASIS/CONVENTION
SPECIAL AREA OF CONSERVATION (SAC)	Designated under the EU Habitats Directive, and the natural habitat regulations. Part of the Natura 2000 network comprising Annex I habitats – “natural habitat types of community interest whose conservation requires the designation of Special Areas of Conservation” and the habitats of Annex II species – “animal and plant species of community interest whose conservation requires the designation of Special Areas of Conservation”.
SPECIAL PROTECTION AREA (SPA)	Designated under Directive 79/409/EEC of 2nd April 1979 on the conservation of wild birds (the Birds Directive). Under the Directive, Ireland is obliged to protect the habitats of birds, which are vulnerable to habitat change or to low population numbers. Aspects of habitat protection are in the context of pollution, deterioration of habitat and disturbance. This Directive is implemented in Ireland under Statutory Instrument (1985) and is encompassed by the Wildlife and Amendment Acts, 1976 and 2000. Once designated, measures will be taken to preserve, maintain and restore biodiversity and an area necessary for birds listed in Annex I of the Directive.
NATURAL HERITAGE AREA (NHA)	Designated under the Wildlife (Amendment) Act 2000 whereby it is considered an area is worthy of conservation for one or more species, communities, habitats, landforms or geological or geomorphological features, or for its diversity of natural attributes.
RAMSAR	<p>“Ramsar” refers to an international convention in relation to wetland sites which was ratified by Ireland in 1985. The Convention has its roots in the protection of wetland wildfowl and for many sites it is species-associated. More recently Ramsar has taken on the more all-encompassing wetland habitat approach which in the context of the EU falls in line with site protection under the Habitats Directive.</p> <p>The Ramsar convention has no statutory basis itself, but it is operated through either EU or national legislation. In this case the EU Birds Directive and EU Habitats Directive through the Wildlife and Amendments Acts (1976 and 2000).</p>

TABLE 3: DESIGNATED CONSERVATION SITES WITHIN A 15 KM RADIUS OF THE CORRIB DEVELOPMENT

DESIGNATION	SITE NAME	SITE CODE	APPROXIMATE DISTANCE ² FROM THE SITE	PROJECT ELEMENT PRESENT IN THE SITE
SPECIAL AREA OF CONSERVATION (SAC)	Glenamoy Bog Complex	0000500	0.0 km	Landfall/Most of the onshore sections at Glengad/Tunnel Leenamore inlet
	Broadhaven Bay	0000472	0.0 km	Sub-sea pipeline
	Carrowmore Lake Complex	0000476	0.6 km	None
	Slieve Fyagh Bog	0000542	1.0 km	None
	Owenduff/Nepin Complex	0000534	10.0 km	None
	Bellacorick Bog Complex	0001922	10.5 km	None
	Mullet/Blacksod Bay Complex	0000470	13.2 km	None
	Erris Head	0001501	2.2 km	Sub-sea pipeline
West Connacht Coast	0002998	1.0 km	Sub-sea pipeline	
SPECIAL PROTECTION AREA (SPA)	Blacksod Bay/Broadhaven	004037	0.0 km	Sub-sea pipeline/Landfall/Tunnel/Leenamore inlet
	Carrowmore Lake	004052	1.6 km	None
	Owenduff/Nepin Complex	004098	10.2 km	None
	Stags of Broadhaven	004072	8.8 km	None
	Illanmaster	004074	10.6 km	None
NATURAL HERITAGE AREA (NHA)	Pollatomish Bog	1548	1.8 km	None
	Glenturk More Bog	2419	2.0 km	None
	Ederglen Bog	2446	5.3 km	None
	Tristia Bog	1566	8.8 km	None
	Tullaghan Bay and Bog	1567	13.2 km	None
	Inagh Bog	2391	12.0 km	None
RAMSAR SITE	Blacksod Bay/Broadhaven	844	0.0 km	Sub-sea pipeline/Landfall/Tunnel/Leenamore inlet

2: The approximate distance from the nearest point of the overall project to the designated site



Srwaddacon Bay



- 1 Glengad headland during construction
- 2 Sruwaddacon Bay
- 3 New dune formation as sand accumulates around Marram Grass tussocks
- 4 Fixed dune grassland with Lady's Bedstraw at Glengad
- 5 Sand dune system Glengad
- 6 Embryonic dunes at Glengad
- 7 Sandy beach Glengad
- 8 Limpets
- 9 Foreshore Glengad at low water



Sruwaddacon Narrows

2.3 AN OVERVIEW OF HABITATS AND SPECIES

2.3.1 HABITATS

2.3.1.1 MARINE HABITATS: INTERTIDAL, NEARSHORE AND OFFSHORE

BROADHAVEN BAY

Surveys carried out since 2001 have confirmed that the exposed, dynamic nature of Broadhaven Bay combined with the presence of coarse sediments influence the intertidal and near-shore communities such that they are relatively species poor. The offshore pipeline and umbilical occupy a very small footprint through Broadhaven Bay in this highly dynamic EU Annex I marine habitat (Table 4). Whilst not on the route of the pipeline, Eel grass (*Zostera*) beds are located close to Ballyglass pier which has been used by vessels during construction and some boat-based monitoring activities. *Zostera* species are listed as a component of some marine and estuarine Annex I habitats (EU Interpretation Manual, 2007) and they have a key role in maintaining coastal biodiversity.

ERRIS HEAD AREA

The benthic macrofaunal communities present at sites sampled north and north east of Erris Head during surveys carried out in 2007 and 2008 exhibited moderate to high diversity, generally with moderate

abundance and a high degree of evenness. There was low dominance by single species, indicating a stable seabed ecosystem. The species found were typical of subtidal sandy habitats, ranging from those found in coarse sand and gravel to those preferring more stable fine sand. It should be noted that the macrofaunal communities sampled, are representative of sediment infauna located where grab sampling took place. As a consequence, they do not reflect the communities inhabiting any hard rock substrate present in the area.

At a broad taxonomic level, annelid polychaetes were the dominant taxa, while crustaceans, molluscs and echinoderms made up small proportions of the fauna observed across the area, on average comprising less than 25% of the overall community. Tellinid bivalves such as *Moerella pygmaea* and *Abra prismatica* were also commonly observed across the Erris Head offshore area.

No species of conservation importance were recorded, and in overall terms the communities recorded are typical of seabeds along the Atlantic coasts of North West Ireland.

In the area of the outfall for the terminal's treated surface water run-off, although deeper at approx 65 metres water depth, the seabed sediments are still relatively coarse in nature, although the communities are more diverse and stable.

SURVEYS CARRIED OUT SINCE 2001 HAVE CONFIRMED THAT THE EXPOSED, DYNAMIC NATURE OF BROADHAVEN BAY COMBINED WITH THE PRESENCE OF COARSE SEDIMENTS INFLUENCE THE INTERTIDAL AND NEAR-SHORE COMMUNITIES SUCH THAT THEY ARE RELATIVELY SPECIES POOR.



Glengad foreshore looking towards Broadhaven Bay



1 Broadhaven Bay 2 Dead Man's Fingers and foliose, and encrusting calcified red algal cover on rock in Broadhaven Bay shallow sublittoral
3 Limpets 4 Foliose and encrusting red algal cover on rock in Broadhaven Bay sublittoral
5 Sub-sea *Zostera* bed in Broadhaven Bay

CORRIB MANIFOLD OFFSHORE AREA

Further offshore towards the Corrib field, the communities in deeper water are more stable and diverse, as they are less influenced by the movement of the surface waters. The macrofaunal communities in the vicinity of the Corrib Offshore Wells and Manifold were sampled and analysed in 2000 during the preparation of the offshore Environmental Impact Statement, and again in 2008. Overall the benthic environment consists of fine-grained muddy sand with an infauna that reflects this, being of moderate abundance and moderate to high diversity and demonstrating a high degree of uniformity across the sampling area.

In this area infauna is numerically dominated by annelid polychaetes, and the tube-dwelling polychaete, *Galathowenia oculata*, is by far the most abundant. Small bivalve molluscs, and to a lesser degree echinoderms, are also important components of the infauna. The dominance of

annelids over the SW-3 area is expected given the relatively fine grain size of the substrate at this location.

Larger organisms are found living on the surface and include relatively large filter-feeding anemones, burrowing squat lobsters, and echinoderms such as sea urchins. These organisms appear to contribute significantly to the physical structure of the sedimentary environment, by burrowing, feeding and movement.

Very few organic pollution indicator species were identified in the vicinity of the Corrib field, i.e. the polychaete worms *Capitella* and *Cirratulus*, were recorded in low numbers and at few stations. This suggests that any organic pollution is minimal.

No species of conservation importance were encountered in the vicinity of the Corrib Offshore Wells and Manifold.

2.3.1.2 ONSHORE PIPELINE

LANDFALL TO SRUWADDA CON BAY

The landfall for the offshore pipeline and umbilical is on the westerly shore at Glengad where the low cliff is of glacial till. Part of the cliff here comprises the section which has been cut several times and reinstated once the offshore pipeline had been installed in 2009. A Sand Martin colony is located in the soft cliff to the north and north east of the landfall at Glengad.

To the east of the landfall the onshore pipeline route traverses improved agricultural grassland, regularly grazed by sheep. The improved grassland and wet-rushy grassland habitats through which the onshore pipeline is routed at Glengad are located at the south-western boundary of Glenamoy Bog Complex SAC within the SAC buffer zone. The development avoids the highly mobile dune system and associated fixed dune grasslands to the north. The site of the (temporary) tunnel reception pit compound is in an area dominated by wet rushy improved grassland, the northern part of which is within the SAC.

The area between the pipeline wayleave and the fixed dune grassland has in the past, and is still, subject to grazing by cattle and sheep. This has led to the development of “dry” grassland which, although it maintains floristic elements of its ‘dune’ origins, it is essentially an enriched (improved) grassland community (GA1³). The dominant species are Perennial Rye-grass (*Lolium perenne*), Red Fescue (*Festuca rubra*), Crested Dog’s-tail

(*Cynosurus cristatus*), Yorkshire Fog (*Holcus lanatus*), Daisy (*Bellis perennis*), Ribwort Plantain (*Plantago lanceolata*), Red Clover (*Trifolium pratense*), White Clover (*T. repens*), Selfheal (*Prunella vulgaris*), Black Knapweed (*Centaurea nigra*), Creeping Thistle (*Cirsium arvense*) and Yarrow (*Achillea millefolium*).

Along the pipeline route at Glengad, where the land has been improved, or is subject to higher levels of grazing, the following species are more common: Perennial Rye-grass and Red Fescue, Mouse-eared Chickweed (*Cerastium fontanum*), Field Buttercup (*Ranunculus acris*), White Clover, Broad-leaved Dock (*Rumex obtusifolius*), Dandelion (*Taraxacum officinale*), Daisy, and Greater Plantain (*Plantago major*). Thistle species are locally abundant where grazing is less intense and/or predominantly by sheep rather than cattle.

Most field boundaries along this part of the route comprise post and wire fences, with earthen (sod) banks in places.

The agricultural lands are wetter towards the eastern half of the Glengad section, where the vegetation is a mosaic of wet rushy improved grassland, dominated by Soft Rush (*Juncus effusus*) and Jointed Rush (*Juncus articulatus*). The floristic composition varies considerably depending on the moisture content of the substrate. In wetter areas the dominant species include Soft Rush, Compact Rush (*J. conglomeratus*), Jointed rush, Common Sedge (*Carex nigra*) and Star Sedge (*Carex echinata*), and Yellow Flag (*Iris pseudacorus*) which is locally abundant.



Vegetation survey at Glengad



Tufted Vetch at Glengad



1 Lady's Bedstraw at Glengad 2 Dune Chafer Beetles at Glengad 3 Yellow Rattle at Glengad 4 *Bombus pascuorum*
5 Wall Butterfly at Glengad



Sruwaddacon Bay evening

HABITATS OVER THE TUNNEL

The onshore pipeline will be installed in a tunnel of approximately 4.9 km in length beneath terrestrial and estuarine habitats, of which 4.6 km will be underneath Sruwaddacon Bay, which forms part of the Blacksod Bay/Broadhaven SPA and the Glenamoy Bog Complex SAC.

Eastwards from the tunnel reception pit, the pipeline will pass under *Juncus* and *Iris* – dominated areas which merge into a small area of salt marsh at the Glengad side of the estuary. Since 2005 this area of salt marsh has become degraded as a result of runoff from the lands above it, and in places is also deeply rutted from tracking vehicles. This has led to encroachment by Soft Rush. There is no longer a defined boundary to the landward side of the salt marsh, which is species poor and dominated at the estuarine edge by Sea Milkwort (*Glaux maritima*) and Common Saltmarsh-grass (*Puccinellia maritima*).

The intertidal sand and mud flats beneath the route at the Glengad side of the estuary have little vegetation, though to the north of the route is an area of accretion upon which salt marsh vegetation is becoming established. Occasional rounded hard “pebbles” of peat occur here also; these are the eroded remnants of peat brought down by the Pollatomish landslide in 2003. They have been noted with Gutweed (*Ulva* spp. formerly known as *Enteromorpha* spp.) and, to a lesser extent, Eel Grass (*Zostera*), attached.

SRUWADDACON BAY

Sruwaddacon Bay is an important part of the Glenamoy/Muingnabo River salmonid system, with

fish migrations passing through the bay en route to and from spawning grounds upstream.

All stages of the estuary, from small freshwater streams to fully marine conditions, are represented within a relatively small area. The high-energy nature of the large yet shallow bay has resulted in the sediments being dominated by moderately exposed sands with few areas of low-energy muddy communities, typical of most estuaries, confined to the upstream end of the bay and small inlets away from the main channel. No unusual or rare biotopes were recorded within the bay.

Habitat denominations within the upper intertidal areas around the estuary are relatively consistent, with few exceptions. Grass dominated (*Puccinellia* spp.) saltmarsh (EU Annex I habitat) occurs around the majority of the upper intertidal zone of the estuary – typically as a fringe between terrestrial vegetation and marine habitats (the latter dominated by algae).

Tidal influences into this zone are often marked by a strandline of decaying furoid algae, together with an associated community of talitrid amphipods. An exception to this is the seaward end of the northern shore, where steep cliffs of bedrock mark the upper boundary with a zone affected by sea spray and encrusted by lichens.

Between the upper saltmarsh or cliff areas and the homogenous sands that make up the majority of the bay’s surface soils, a regular band of mixed sediments supports several discrete but regular communities, with the thickness of the band characterised by the upper tidal range and the gradient of the shore. Traversing down the shore,

THE ONSHORE PIPELINE WILL BE INSTALLED IN A TUNNEL OF APPROXIMATELY 4.9 KM IN LENGTH BENEATH TERRESTRIAL AND ESTUARINE HABITATS, OF WHICH 4.6 KM WILL BE UNDERNEATH SRUWADDA CON BAY, WHICH FORMS PART OF THE BLACKSOD BAY/BROADHAVEN SPA AND THE GLENAMOY BOG COMPLEX SAC.

the upper saltmarsh or bedrock gives way to a succession of varying habitats, starting with the clean coarse gravels with associated crustaceans where freshwater influences are greatest; and Channelled Wrack (*Pelvetia canaliculata*) marks the upper limit of the high water mark.

Below this is a zone of often mixed Spiral Wrack (*Fucus spiralis*), Bladder Wrack (*F. vesiculosus*) and in areas near freshwater input, Horned Wrack (*F. ceranoides*) is attached to large cobbles and boulders. Regular downshore strips of Gutweed (*Ulva/Enteromorpha spp.*) and occasionally Sea Lettuce (*Ulva lactuca*) are also common near freshwater inputs (numerous ditches and small gullies). Further down the shore, Egg Wrack (*Ascophyllum nodosum*) and the epiphytic *Polysiphonia lanosa* are dominant. Epifaunal species are common within the fucoids, and include Winkles (*Littorina sp.*), amphipods, and occasional juvenile Shore Crab (*Carcinus maenas*). Further seaward (towards fully marine conditions), occasional Limpets (*Patella vulgata*), Mussels (*Mytilus edulis*), Barnacles (*Semibalanus balanoides*) and, less frequently, Anemones (*Actinia sp.*) occur attached to boulders. Below this, sedimentary environments are present throughout the remainder of the estuary.

Sandy sediments dominate the bay. However, a small variation in habitat is noted due to subtle changes in exposure from both channel currents and wave action. In a survey conducted in 2007, the most mobile sands were recorded in the seaward third of the bay which had granular, freely-draining medium sands and a relatively deep redox layer

(up to 15-20 cm). Well-developed bedforms (ripples and meg-ripples) indicated these areas to be subject to strong currents. Obvious fauna in these areas was sparse although higher numbers of Lugworms (*Arenicola marina*) were recorded when compared to previous survey years. The majority of the remaining sands within the bay showed varying levels of rippling (some wave induced in the shallower areas), and the sand flats became less well drained south of Pollatomish Pier. Mixed sediments occurred at the margins of the bay, but showed varying levels of gravel and elevated fines. Some gravels in the channels of small freshwater streams showed reworking with fines winnowed away. These gave rise to fluvial deposits, inhabited by both *Enteromorpha spp.* alongside fucoids, reflecting the brackish conditions.

Large areas of anoxic muddy sediments, more typical of many low-energy estuaries, were limited to small sheltered embayment in the upper estuary. Here, there were shallow basins outside the main current flow and sheltered from wave action, which have become a depositional environment. The resulting sediments were soft and unconsolidated with a relatively shallow redox layer.

In terms of benthic fauna, survey results to date suggest that there is a significant biomass of macro-invertebrates amongst the rocks of the bank deposits when compared to the sandy sediments, although the access to many of the species (as beneath the larger rocks) may be limited. The overall numbers of individuals and resulting biomass appear to vary greatly both by geographical location and by survey year.



1 Vegetation survey at Aughooose 2 Collection of *Sphagnum* at Aughooose for BeadaMoss 3 Eroded blanket bog at Aughooose

PEAT EROSION HAD BEEN PARTICULARLY SEVERE IN PARTS OF THE DEVELOPMENT SITE AT AUGHOOOSE WITH UP TO 50-70% BARE PEAT SURFACE EVIDENT IN EASTERN AREAS OF THE SITE.

SOUTH OF SRUWADDA CON BAY – AUGHOOOSE TO BELLANABOY

The pipeline tunnel passes beneath the fringe saltmarsh at the shoreline and then under an area of undesignated blanket bog which is recovering and considered to be of Annex I quality. Old cutover is present at the southern end of this recovering area towards the road. To the east of the recovering blanket bog there is an area of undesignated blanket bog that was heavily eroded in places and was still subject to ongoing active erosion prior to commencement of construction of the (temporary) Aughooose tunnelling compound in 2011. A pre-construction vegetation survey in 2011 noted that the surface here was very uneven, with large bare areas of peat and active erosion. Species such as Purple Moor-grass (*Molinia caerulea*), Black Bog-rush (*Schoenus nigricans*) and Cross-leaved Heath (*Erica tetralix*) dominated the vegetation, generally with a low cover of *Sphagnum* mosses.

Prior to construction, old cutover, almost cutaway in places, was also present in this area, mainly adjacent to the road.

Progressing eastwards, the condition of the bog deteriorates with larger areas of exposed peat and with marked vegetation change. Peat erosion had been particularly severe in parts of the development site at Aughooose with up to 50-70% bare peat surface evident in eastern areas of the site. The surface was very fragmented and uneven, with deep peat hags (erosion channels) and exposed pine stumps. The surface vegetation was dominated by species more typical of acid grassland habitats, which have colonised the shallow peat soils that have resulted from blanket bog erosion; e.g. Matt Grass (*Nardus stricta*), which is characteristic of heavily overgrazed areas on acid substrates, and Green-ribbed Sedge (*Carex binervis*). Pockets of dense Gorse (*Ulex europaeus*) scrub are present, including along drain edges.

Wet, rushy, grassland habitat dominates two small sloping fields on either side of the Leenamore inlet. These are dominated by rushes, and with Yellow Flag being locally abundant in the fields close to the solitary dwelling house. There are some species-rich areas, especially to the east of the Leenamore, where for example orchids are locally abundant, but generally the vegetation is dominated by Soft Rush and the moss *Calliergonella cuspidata*. Other conspicuous species in the vegetation include Crested Dog's-tail, White Clover, Cuckooflower (*Cardamine pratensis*) and Common Marsh-bedstraw (*Galium palustre*).

The Leenamore is a small tidal inlet with fringe salt marsh which comprises small areas of two types of salt-marsh vegetation namely tall vegetation, dominated by the rush Sea Rush (*Juncus maritimus*) and tightly grazed vegetation dominated by Common Salt-marsh grass. The adjacent bed of Sruwaddacon Bay is stony and dominated by a variety of brown fucoid seaweeds. Gorse scrub is present on either side of the inlet.

To the east of the inlet, towards the western edge of the conifer plantation, there is a short section

of approximately 190 metres of undesignated blanket bog, formerly eroded to varying degrees as a result of past overgrazing. Recovery is evident however, especially in the southern half of this small area of bog (approximately 7 ha.). In the more intact areas the vegetation is dominated by characteristic blanket bog species such as Black Bog-rush, Cross-leaved Heath, Bog Asphodel (*Narthecium ossifragum*) and Purple Moor-grass. As a result of the recovery observed since 2001, it was re-classified in 2010 from "eroded blanket bog" (Heritage Council habitat classification, PB5) to "recovering blanket bog" (PB5/PB3). However, erosion is continuing in places, especially on the northern side of the pipeline route towards the shore of the Bay, where, on the steeper slopes, the vegetation has been modified to a type of heathy grassland. The most prominent plant species being Soft Rush with Deer Sedge (*Trichophorum cespitosum*), Bent (*Agrostis spp.*), Cross-leaved Heath, Ling (*Calluna vulgaris*), with Sweet Vernal-grass (*Anthoxanthum odoratum*) also being frequent and conspicuous.



1 Wet grassland on either side of the Leenamore inlet 2 Sea Aster – Leenamore salt marsh 3 Common Blue Damselfly



4 Leenamore inlet 5 Salt marsh habitat at the Leenamore inlet 6 Leenamore River south of the inlet



1 Recovering blanket bog at Aughooose towards Srwaddacon Bay 2 Recovering Blanket bog vegetation
3 Bog Myrtle in bud 4 *Cladonia portentosa* at Aughooose 5 Ling, Heather 6 Black Bog-rush

Eastwards, the pipeline route then enters an area of coniferous woodland (WD4) on blanket peat dominated by Lodgepole Pine (*Pinus contorta*). Prior to felling the wayleave for pipeline construction the canopy was generally between 6 and 10 metres tall, as is currently the case on either side of the wayleave at the western end of the plantation. In areas where the trees have grown well a thick layer of pine needles had resulted in a sparse ground vegetation that is characterised by clumps of Purple Moor-grass and the moss *Hypnum cupressiforme*. In more open areas, where the trees had not grown so well, a luxuriant growth of species such as Ling (*Calluna vulgaris*), Purple Moor-grass, *Hypnum cupressiforme* and *Sphagnum capillifolium* had developed – and is present outside the wayleave in places.



The pipeline crosses a local road L1202, and skirts a small area of non-designated blanket bog which occupies a triangle between the south side of the road and the forest edge. This small area of lowland blanket bog (PB3) at Bellagelly was formerly in good condition as a result of the low incidence of peat-cutting and livestock grazing in the past, but has since been subject to mechanical peat cutting in the recent past, though some areas remain intact. Although pool areas are absent, wet hollows do occur and these increase the floristic diversity of the area. The vegetation is dominated by Purple Moor-grass and Black Bog-rush, with Cross-leaved Heath and the moss *Racomitrium lanuginosum* also common. This area of blanket bog was the subject of quadrat – based vegetation surveys in 2001 and 2007, but is now located outside the pipeline wayleave and SEPIL's landholding, and is no longer subject to monitoring.

A considerable amount of *Rhododendron* scrub is present, especially from the L1202 southwards, with less well developed conifer plantation – as described above. *Rhododendron* is an invasive species which out-competes native flora. Its removal and treatment within the pipeline wayleave has been, and will continue to be, undertaken by an established specialist contractor.



7 *Sphagnum cuspidatum* 8 Sundew at Aughoose 9 Bog Asphodel 10 Hare's-tail Cotton-grass at Aughoose
11 *Rhododendron* control on pipeline wayleave near Bellanaboy 12 *Sphagnum palustre* in coniferous woodland

The pipeline route then continues southwards through clear-felled conifer plantation to the Bellanaboy Bridge Gas Terminal.

Two small freshwater streams/watercourses are crossed by the pipeline section through the conifer plantations to the terminal and the streams can be summarised as follows:

To the north of the L1202, there is a small, very slow-flow, drainage channel with Pondweed (*Potamogeton spp*) and Common Water-starwort (*Callitriche stagnalis*) present at water surface, and with typical macroinvertebrates such as water beetles, damselfly larvae, and water boatmen etc. This is of moderate to low ecological value and is unsuitable for salmonid fish or Lamprey, although these could be present further downstream from the point where the drainage channel joins a small stream and flows northwards towards the Glenamoy River. Water quality in 2010 was found to be of good status.

Between the L1202 and the terminal there is a very small flow stream over soft organic (peat) substrate which is overgrown with bankside vegetation so that the channel itself was not visible. In-stream vegetation present immediately upstream at the pipeline crossing point is dominated by Sweet-grass (*Glyceria spp.*) and Common Water-starwort. The habitat is unsuitable, and the stream is too small, for electrofishing; and of low ecological and fisheries value; though Trout, Eel and Lamprey are known from further down in the Leenamoy catchment (See Appendix 5.7, Freshwater species).

Whilst the areas of agricultural grassland and coniferous plantations present along the pipeline wayleave are of relatively low ecological value, others such as the designated EU Annex I intertidal and saltmarsh habitats at the Leenamoy River inlet are of international importance. Much of the route section at Glengad is within the Glenamoy Bog Complex SAC, while the estuarine and intertidal habitats at the landfall and in Sruwaddacon Bay lie within both the SAC, and Blacksod Bay/Broadhaven SPA.

Blanket bog habitats present do not constitute part or whole of any designated conservation site, SAC or otherwise. They range in ecological value from Low, Local/Moderate, to Nationally Important.

Plant species recorded from the various habitats are listed in Appendix 5.4.

2.3.1.3 TERMINAL SITE

The terminal site is located on part of the former Glenamoy Peatland Experimental Station, which was established by the Department of Agriculture in 1955 with the following objectives:

- "to find suitable methods of reclaiming and fertilising blanket bog for agricultural and forestry";
- "to develop suitable animal and crop husbandry systems for peatland".

It was administered by the Soils Division of An Foras Talúntais from 1959 and was wound down in the late 1970s/early 1980s. During that time, a research programme was developed aimed at determining "the best and cheapest methods of reclaiming western blanket peat" (Glenamoy Review Group Report, 1978). A number of issues were investigated at the research station including: drainage, soil fertility and grassland, arable crops, shelterbelts, horticultural and industrial crops etc. Of these, the most relevant in terms of habitats are:

- *Drainage: trials of five different methods of drainage were carried out over a period of approximately thirty years.*
- *Fertiliser applications: with trials using different combinations of chemicals on the native flora.*
- *Shelterbelt planting: 30 metre wide shelterbelts comprising Lodgepole Pine, Sitka Spruce and Larch.*

Subsequently the site was managed by the Forest Service and more recently by Coillte Teo.

The habitats present have therefore been heavily modified by man's intervention during the last sixty years or so. Baseline surveys in 2001 identified the two main habitat types within the site as being immature conifer plantation, and rank, wet, rushy grassland dominated by Soft Rush. Relatively little semi-natural scrub (Willow and Gorse) occurred on site. Small remnants of modified blanket bog vegetation were present, and many of the boundaries and margins alongside the roads and tracks were dominated by *Rhododendron*. In habitat terms, this is still the case in areas not within the terminal footprint and associated temporary infrastructure. Plant species recorded from the habitats at the Gas Terminal site at Bellanaboy are listed in Appendix 5.4.



- 1 Remnant blanket bog and conifer plantation at the Terminal site at Bellanaboy
- 2 *Gunnera tinctoria* at Bellanaboy
- 3 Roadside willow scrub at the Terminal site at Bellanaboy
- 4 Recently planted conifers at the Terminal site at Bellanaboy
- 5 Self-seeded Lodgepole Pine in rushy grassland in the western part the Terminal site at Bellanaboy

TABLE 4: HABITATS PRESENT WITHIN THE FOOTPRINT OF THE CORRIB GAS DEVELOPMENT

PROJECT ELEMENT	MAIN HABITAT(S) PRESENT	HERITAGE COUNCIL	EQUIVALENT EU ANNEX HABITAT (CODE)
OFFSHORE/ NEARSHORE (BROADHAVEN BAY)	Marine/estuarine	Sea inlets and bays (MW2)	Large shallow inlets and bays (1160).
LANDFALL AND ONSHORE (GLENGAD)	Intertidal	Muddy sand shores (LS3)	Mudflats and sand flats not covered by sea water at low tide (1140).
	Upper shore line	Mixed substrate shores (LR4)	None
	Sedimentary cliff	Sedimentary sea cliffs (CS3)	None
	Improved agricultural grassland	Improved agricultural grassland (GA1)	None
	Earthen/sod bank field boundaries	Earth banks (BL2)	None
	Wet rushy grassland.	Wet grassland (GS4)	None for wet grassland dominated by <i>Juncus effusus</i> .
TUNNEL (UNDER THESE HABITATS)	Improved agricultural grassland; wet, rushy grassland and marsh	Improved agricultural grassland (GA1)	None
	Lower salt marsh	Lower salt marsh (CM1)	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) (1330)
	Estuary and intertidal	Muddy sand shores (LS3)	Mudflats and sand flats not covered by sea water at low tide (1140).
	Recovering lowland blanket bog (undesigned)	Eroded Lowland blanket bog (PB5/PB3)	(Recovering towards) ⁴ Blanket bog* (7130) ⁵
	Heavily Eroded blanket bog (undesigned)	Eroding blanket bog (PB5)	None
ONSHORE (AUGHOOSE TO TERMINAL)	Heavily Eroded blanket bog (undesigned)	Eroding blanket bog (PB5)	None
	Severely eroded blanket bog with some old cutover (undesigned)	Eroding blanket bog (PB5)	None
	Wet grassland	Wet grassland (GS4)	None for wet grassland dominated by <i>Juncus effusus</i> .
	Scrub	Scrub (WS1)	None for <i>Ulex europaeus</i> scrub.
	Estuary and intertidal	Muddy sand shores (LS3)	Mudflats and sand flats not covered by sea water at low tide (1140).
	Lower salt marsh	Lower salt marsh (CM1)	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) (1330)
	Upper saltmarsh	Upper salt marsh (CM2)	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) (1330)
	Wet grassland	Wet grassland (GS4)	None for wet grassland dominated by <i>Juncus effusus</i> .
	Recovering eroded blanket bog (undesigned)	Eroded Lowland blanket bog (PB5/PB3)	(Recovering towards) Blanket bog* (7130) ⁴

4: Formerly heavily grazed lowland blanket bog which shows signs of good recovery (PB5/PB3)

5: * denotes EU Annex I Priority Habitat

PROJECT ELEMENT	MAIN HABITAT(S) PRESENT	HERITAGE COUNCIL	EQUIVALENT EU ANNEX HABITAT (CODE)
ONSHORE (AUGHOOSE TO TERMINAL)	Coniferous forestry	Conifer plantation (WD4)	None
	Coniferous forestry	Recently felled woodland (WS5)	None
	Freshwater streams	Eroding upland rivers (FW1)	None relating to the type of stream present.
TERMINAL	Conifer plantations	Conifer plantation (WD4)	None
	Wet Grassland Dominated by <i>Juncus effusus</i> .	Wet grassland (GS4)	None for wet grassland dominated by <i>Juncus effusus</i> .
	Wet Drains Supporting Marsh Vegetation.	Drainage ditches (FW4)	None
	Scrub and Hedgerow.	Scrub (WS1)	None for species present.
	Low Deciduous Scrub Along Track and Plantation Margins.	Scrub (WS1)	None for species present.
	Rhododendron scrub	Ornamental/non-native shrub (WS3)	None

2.3.2 PROTECTED SPECIES AND SPECIES OF CONSERVATION INTEREST

2.3.2.1 FLORA

Desk studies and consultations have confirmed that no rare species of plant, including those on the current Flora Protection Order 1999 (FPO, SI No 94 of 1999) are known to occur along the route of the onshore pipeline. Neither was any FPO species found during the many surveys carried out since 2001.

2.3.2.2 MARINE MAMMALS

Base line and monitoring surveys have been carried out since 2001 as part of the monitoring programme in connection with offshore works, landfall construction, the laying of the offshore pipeline and subsequent rock placement works in Broadhaven Bay.

The results of these marine mammal surveys have shown that Broadhaven Bay and neighbouring waters are nationally important in terms of diversity

and abundance of cetaceans, that there may be a resident population of bottlenose dolphins and that the area may be used as a breeding and rearing area by some dolphin species. Eight species of cetacean and two seal species have been recorded in the bay.

All cetaceans are listed under Annex IV of the Habitats Directive, designating them as "species of community interest in need of strict protection". A further five species of marine mammals occurring in Irish waters are listed under Annex II, designating them as "species of community interest, whose conservation requires the designation of special areas of conservation". Four of these Annex II species, Bottlenose dolphin (*Tursiops truncatus*), Harbour porpoise (*Phocoena phocoena*), Grey seal (*Halichoerus grypus*) and Harbour (Common) seal (*Phoca vitulina*), have been recorded in the bay almost throughout the year.

Marine mammals recorded are listed in Appendix 5.2.



1 & **2** Sei Whale recorded for the first time in Broadhaven Bay SAC, and in coastal Irish waters. Pictures show skim-feeding individual present within SAC **3** Bottlenose Dolphin **4** Common Dolphin **5** Bottlenose Dolphin

2.3.2.3 FISH

Salmon (*Salmo salar*), an EU Annex II species is present in the Glenamoy River catchment, and migrates through Sruwaddacon Bay. The freshwater catchment is designated for salmonids and comprises part of the Glenamoy Bog Complex SAC for which salmon is a qualifying interest species, and Sea Trout (*Salmo trutta*) a species of conservation interest for the site.

In the Glenamoy River, spawning takes place upstream of Glenamoy Bridge where there are extensive stretches of suitable habitat throughout the system, none of which are in the vicinity of the development. Downstream of Glenamoy Village, the river mainly comprises holding and nursery areas for Salmon and Trout, the most important of which is located near the mouth of Sruwaddacon Bay in a deep bend between Rossport Pier and the seaward side of Pollatomish Pier. Elsewhere the channel within Sruwaddacon Bay is considered too shallow to hold many fish. In contrast to the Carrowmore Lake catchment, the Glenamoy River is a "late river" in terms of salmonids. The Muingnabo River is generally considered to be more important for Trout and Sea trout than Salmon.

Of the other aquatic Annex II species, the Brook Lamprey (*Lampetra planeri*), which is non-migratory, is the only lamprey species to have been recorded with certainty in the wider locality i.e. in the Bellanaboy River. However, there have been reports of unidentified lampreys in one of the small streams crossed by the route, namely the Leenamore at a point about 200 metres upstream of the pipeline crossing. This species is likely to be Brook lamprey



Electrofishing at Leenamore

also, but could possibly be River lamprey (*L. fluviatilis*) as they are very difficult to distinguish from each other when immature. Surveys carried out by the Central Fisheries Board in 2006 near the confluence of the Muingnabo and Glenamoy Rivers in upper Sruwaddacon Bay did not record any lamprey.

The streams in the Carrowmore Lake catchment are spawning and nursery streams, mostly for Sea trout. Whilst not within the footprint of the Corrib Development, the Carrowmore catchment receives storm water from non-process areas of the terminal site.

2.3.2.4 BENTHIC SPECIES

As indicated above at 2.3.1.1, a number of benthic surveys have been carried out since 2000, including the Corrib Field area, along the offshore pipeline route, the outfall, nearshore in Broadhaven Bay, intertidal at the landfall, and within Sruwaddacon Bay. Benthic species recorded at the various locations are summarised in Appendix 5.3.

No species of conservation importance were recorded, and in overall terms the communities recorded are typical of the sea bed along the Atlantic coasts of North West Ireland.



Benthic survey at Leenamore

2.3.2.5 TERRESTRIAL AND INTERTIDAL FAUNA

NON-AVIAN VERTEBRATE FAUNA

Faunal surveys have been conducted in connection with the Corrib Development since 2001, the results of which have been included in the various environmental impact statements.

A number of mammalian species protected under the 1976 Wildlife Act as Amended (2000), are known to be present in, or in the vicinity of, the Corrib development. These include: Otter (*Lutra lutra*), Badger (*Meles meles*), Pine Marten (*Martes martes*), Irish Stoat (*Mustela erminea hibernica*), Pygmy Shrew (*Sorex minutus*), Hedgehog (*Erinaceus europaeus*), and Irish Hare (*Lepus timidus hibernicus*). Most of these species may be considered as common species and ubiquitous through much of the Irish countryside. Once relatively scarce, the Pine Marten has become widespread over much of Ireland. Red Deer (*Cervus elaphus*) are occasional in the area, and known to occur at Bellanaboy.

The following species known to be, or with the potential of being, present are considered as species of conservation interest: Otter, Badger, Pine Marten, Irish Hare, Pipistrelle bat (*Pipistrellus spp.*), Daubenton's bat (*Myotis daubentonii*), Leisler's bat (*Nyctalus leisleri*), and Brown Long-eared bat (*Plecotus auritus*). The Otter is listed under Annex II and IV of the EU Habitats Directive and is

present along shorelines, watercourses and in their hinterland in the project study area and in the wider locality. Ireland's Fourth Report to the Convention on Biodiversity describes the Otter's national status as being "poor", whilst the 2009 NPWS Red List⁶ shows it as being "near-threatened". Conversely, for the Pine Marten which had been in decline nationally, status is "good". This is borne out by the findings at Bellanaboy. All bat species are listed under Annex IV of the EU Habitats Directive. Few bat species have been recorded during surveys, and then usually only as individuals, which is considered attributable to a lack of suitable roosts and feeding areas in a locality which comprises open landscapes and an absence of mature deciduous trees.

The Common Lizard (*Zootoca vivipara*, formerly *Lacerta vivipara*), Common Frog (*Rana temporaria*), and the Smooth Newt (*Triturus vulgaris*) are all protected species under the Wildlife Acts. All three are known to occur within the development's footprint, the Smooth Newt having been recently recorded at Bellanaboy. Frogs which are listed as being of "least concern"⁷ are common in most Irish habitats, particularly so in the wet rushy grassland habitats and marginal blanket bog habitats present in the area.

Non-avian vertebrate species recorded, together with further information in relation to their conservation status, are listed in Appendix 5.5.



1 Pine Marten at Bellanaboy 2 Smooth newt at Bellanaboy 3 Common lizard at Aughooose
4 Otters near the Glenamoy River 5 Badgers at night (by infra red)

6: Ireland Red List no 3 – Terrestrial mammals. National Parks & Wildlife Service (NPWS, 2009)

7: Ireland Red List no 5 – Amphibians, Reptiles and Freshwater Fish. National Parks & Wildlife Service (NPWS, 2011)



6 Soprano pipistrelle bat in hand at Bellanaboy 7 Erecting Pine Marten box at Bellanaboy 8 Irish Hare at Glengad 9 Common Frog

AVIAN FAUNA

A total of 77 bird species have been recorded by water bird studies of the Sruwaddacon Bay area between 2001 and early 2012. Only one species, Light-bellied Brent Goose (*Branta bernicla hrota*), exceeded the threshold of nationally important numbers (i.e. 1% of the estimated National Population). It is noteworthy that the diversity of water birds in the bay is low. This is attributable to a limited food supply as a result of there being a relatively low benthic biomass in the intertidal areas which are dominated by coarse sandy substrates. A total of 51 species have been recorded during terrestrial based studies along and in the vicinity of the onshore pipeline route. Overall, bird diversity and abundance is considered to be low. Open habitats and a lack of mature deciduous 'woody' vegetation characterise the coastal nature of the terrestrial parts of the study area. This explains the lack or scarcity of many nationally common terrestrial bird species.

Most bird species are protected under the 1976 Wildlife Act as Amended (2000), barring those regarded as pest species, and for those considered as game species (where they may be hunted under conditions).

Several species of high conservation concern (i.e. Annex I and/or Red listed species) have been recorded by the field studies in the vicinity of the development: Bartailed Godwit, Chough, Curlew, Common/Arctic Tern, Golden Plover, Great-northern Diver, Hen Harrier, Little Tern, Lapwing, Shoveler, Red-throated Diver, Sandwich Tern, Little Egret, Black-headed Gull, Herring Gull, Redshank, Whooper Swan and Peregrine Falcon. Most of these species occurred in very low numbers (i.e. <10) and only from time to time, gull species being the main exception.

Bird species recorded, together with their taxonomic names and conservation status, are listed in Appendix 5.6.

A TOTAL OF 77 BIRD SPECIES HAVE BEEN RECORDED BY WATER BIRD STUDIES OF THE SRUWADDA CON BAY AREA BETWEEN 2001 AND EARLY 2012. ONLY ONE SPECIES, LIGHT-BELLIED BRENT GOOSE (*Branta bernicla hrota*), EXCEEDED THE THRESHOLD OF NATIONALLY IMPORTANT NUMBERS (I.E. 1% OF THE ESTIMATED NATIONAL POPULATION).



1 & 2 Light-bellied Brent Geese at Glengad 3 Brent Goose feeding area at Glengad 4 Grey Heron on Leenamore River
5 Soft cliff with Sand Martin colony at Glengad 6 Juvenile Sand Martins at Glengad 7 Skylark – adult carrying food
8 Skylark eggs & nest at Glengad

2.4 DATABASE OF BIODIVERSITY

Corrib is unusual in respect of commercial developments in that the construction phase has taken longer than originally planned. This has resulted in data being collected over a significantly longer period of time than would normally be the case, and a commensurate build up of knowledge and understanding of the environment in which the development is placed. Baseline surveys and monitoring (ongoing) have been undertaken since 2000/2001 in respect of the various elements, including offshore, nearshore in Broadhaven Bay, intertidal and onshore (for pipeline and terminal).

Thus a large body of accumulated data exists in baseline reports, environmental impact statements (EISs), and monitoring reports. The information gathered to date has informed the impact assessment processes, and has given a firm grounding for targeting mitigation measures and developing and implementing appropriate monitoring programmes which are ongoing.

Because of the volume of data that has been gathered by the Corrib project it is not practical to include it all in this document. Tabular summaries for species are presented in Appendices 5.2 to 5.7 in respect of marine mammals, benthic fauna, plant species, non-avian vertebrate fauna, bird species, and freshwater species.



9 Ringed Plover nest at Glengad 10 Juvenile Ringed Plover 11 Turnstone at water's edge Srwaddacon Bay 12 Herring Gull 13 Hirundine house at Bellanaboy 14 Nest box maintenance 15 Nest box maintenance



Hare's-tail Cotton-grass

3 THE BIODIVERSITY ACTION PLAN

3.1 ESTABLISHING PRIORITIES FOR CONSERVATION

Methodology for prioritising species or habitats of special local conservation importance is not included in the various guidelines for the preparation of BAPs, presumably because each case is different. The rationale for deciding which parameters to use for the Corrib Development BAP has included the consideration of the habitats and protected species in the context of, not only their conservation status in national terms, but also their role and status in the area in which the development is located. This approach has been informed by the large volume of information on habitats and species already gathered by the project.

The targets and objectives are restricted, in respect of the offshore elements of the development, to Broadhaven Bay and within the SAC itself. Habitats and species in respect of the nearshore and intertidal sections of the offshore pipeline route, the entire onshore pipeline route (including intertidal habitats), and the terminal site at Bellanaboy, are included because of their location in relation to the designated conservation sites in the locality. This rationale is consistent with Irish national biodiversity strategy, i.e. to put local plans in context, especially in relation to existing designations.

Habitats and species associated with the peat deposition site at Srahmore are not included in the Corrib BAP because they comprise part of the Bord na Móna Biodiversity Action Plan (2010).

3.1.1 HABITATS

"Priority"⁸ habitats for the purposes of this BAP are those which, as a result of information gathered to date, are considered key to the deliverance of Corrib's biodiversity targets as follows:

- *Habitats which are protected by legislation: both EU Habitats Directive Annex I and non-annexed habitats which occur within a designated site.*
- *Non-annexed recovering eroded blanket bog habitat at Aughoose is treated as though it were EU Annex I habitat status, although there is no legal obligation to do so. This is in accordance with best practice.*

- *Habitats which have the potential to be reinstated towards diverse habitats for example degraded peatlands, and felled conifer plantations.*
- *Freshwater streams.*

3.1.2 SPECIES

"Priority"⁹ species, for the purposes of this BAP are:

- *EU Annexed species.*
- *Species protected under Irish wildlife legislation.*

3.2 AIMS

The aim of the Biodiversity Action Plan is to conserve, maintain, and enhance biodiversity and ecosystem services within the zone of influence of the Corrib Development and its various elements, including those areas affected by temporary works during construction.

As referred to above, biodiversity is vital for sustaining the ecosystems which also have a social and economic value, providing goods and services that intrinsically sustain human life in many ways. The Irish National Biodiversity Action Plan objectives include a commitment to "conserve and restore biodiversity and ecosystem services". This approach is in line with Shell's Corporate policy and its commitment in respect of biodiversity and is included at Objectives 6 and 7 (Tables 5 and 6).

The Corrib Development has the opportunity to contribute to local biodiversity by the enhancement of reinstated habitats on modified and marginal lands, and to create new habitats within the landscape which in turn will provide food and refuge for a wider range of faunal species. In places, habitat creation will enhance the landscape from a visual perspective. In others, such as in the agricultural lands and designated Annex I habitats at Glengad in SEPIL's ownership, habitats will be managed with appropriate grazing in association with local landowners not only to maintain local and national biodiversity but also to provide and restore ecosystem services. From the marine perspective, recent rock placement along sections of the offshore pipeline will, in time, provide seabed reef habitats and so increase marine biodiversity in those areas.

In 2011 the Corrib Development was chosen, amongst others, as a pilot case for the testing of the No Net Loss (NNL) and Net Positive Impact

8: "Priority" in this context does not equate with, or relate to, EU Annexed Priority habitats.

9: "Priority" in this context does not equate with, or relate to, EU Priority Species

(NPI) principles for the Shell Group. The study was conducted by the Biodiversity Consultancy¹⁰ which took all project elements into consideration and found that “without any existing NNL policy, best practice at Corrib has resulted in a project design which is predicted to be Net Neutral or Net Positive for biodiversity by 2020”.

In respect of the prediction by the Biodiversity Consultancy of a likely Net Positive Impact (NPI) outcome, the Corrib BAP aims to achieve a positive impact on certain biodiversity elements such as an increase of species diversity for example as a result of habitat enhancement, wetland habitat creation, and bird nest and bat box schemes. This aim is primarily encompassed by Objective 5 (Tables 5 and 6).

The Corrib BAP also aspires to achieve NPI in respect of increasing societal awareness of the ecological values of the landscape, its habitats and species in the context of local community engagement, and educational opportunities with local schools (Objective 9 – Tables 5 and 6).

3.3 OBJECTIVES AND ACTIONS

The objectives for the conservation of habitats and species connected with the Corrib Development are summarised in Table 5 and further expanded in Table 6 which includes required actions and other relevant information.

Because of the longevity and phased construction of the development a number of actions in this regard have already been, and are being, implemented including the implementation of Environmental Management Plans (EMPs), Monitoring Programmes, and mitigation measures for the protection of habitats and species.

3.4 MONITORING, EVALUATION AND IMPROVEMENT

3.4.1 MONITORING

As stated previously in this document, monitoring has been, and is being, undertaken in accordance with the approved monitoring programmes for the various project elements, which were developed in tandem with, and enshrined in their associated Environmental Management Plans. Thus for example, marine mammal monitoring has been undertaken when offshore activity was

planned or in progress, with associated monitoring reports issued. In addition independent cetacean monitoring has been undertaken in 2001/2002, 2005 and continuously since mid 2008. Similarly, bird monitoring has been undertaken since 2002.

Methodologies for monitoring surveys follow standard, best practice methodologies, and those used for certain protected species have been agreed in consultation with National Parks and Wildlife Service (NPWS) of the Department of Arts Heritage and the Gaeltacht (DAHG). This has been so in the case of the cetaceans monitoring and with regard to certain targeted bird species. Similarly a protocol has been developed and implemented in respect of frog translocations which are carried out under licence.

The ecological monitoring programmes provide for review and improvement in the light of findings during monitoring, and for this reason they are flexible, such that monitoring procedures can be adapted in response to changing situations on the ground if necessary. For example, in 2009, prior to commencement of landfall works, the survey methodology for Sand Martin was changed in consultation with NPWS, to increase the frequency of survey visits to weekly in order to gain a better understanding of the species’ behaviour close to the landfall works at Glengad.

Monitoring will continue throughout in respect of:

- *Cetaceans*
- *Benthic species*
- *Terrestrial habitats and vegetation*
- *Non-avian fauna, with special emphasis on Otter and other protected species such as Common frog, Badger, Bats, Pine Marten etc.*
- *Avian fauna, with a special emphasis on key and targeted migratory species such as Light-bellied Brent Goose, wintering waterbirds and waders, and breeding Sand Martins*
- *Freshwater habitats*

Actions in respect of monitoring are included in Table 6, Objective 2 and monitoring programmes are set out in Appendix 5.8.

3.4.2 EVALUATION AND IMPROVEMENT

The BAP sets out objectives and targets for a five year period, bringing it well beyond completion of the main construction phase of the development and it is essential that progress is evaluated along the way. It is proposed that a biennial evaluation is undertaken (See Objective 11, Tables 5 and 6).

This evaluation will be carried out by the biodiversity review groups which will comprise specialist consultants and SEPIL environmental staff. A separate review working group will be set up for marine mammal monitoring. The BAP may need to be amended before 2019.

TABLE 5: SUMMARY OF OBJECTIVES AND ACTIONS FOR THE CONSERVATION OF HABITATS AND SPECIES

NUMBER	OBJECTIVE/ACTION	PROJECT ELEMENT
1	Protect habitats and species by means of appropriate mitigation measures during the construction and operation of the various elements of the development.	All
2	Monitor habitats and species during and following construction of the various elements of the development.	All
3	Consult with stakeholders and other interested parties, as appropriate.	All
4	Reinstate habitats affected by the construction of the development. ¹¹	Landfall, Onshore pipeline and Terminal.
5	During reinstatement to enhance local biodiversity on lands in the stewardship of Shell, and elsewhere where feasible and practical. ¹¹	Onshore pipeline and Terminal.
6	Apply best practice stewardship to manage lands within the development's landholding and lease for biodiversity and ecosystem services; establish and implement a Land Management Plan.	Onshore pipeline and Terminal.
7	Maintain species numbers, diversity and ecosystem services within, and in the vicinity of, the footprint of the development, including those areas affected by temporary works during construction. ¹¹	All
8	Put mechanisms in place to control invasive species in reinstated habitats.	Onshore pipeline and Terminal.
9	Contribute to the conservation and sustainable use of biodiversity through day to day activities, and administrative functions of SEPIL's activities.	All
10	Set up partnerships with relevant and appropriate bodies such as: academic institutions, NGOs, peer experts and others.	All
11	Set up BAP review working groups.	All
12	Provision of species records and habitat quadrat data to the national biodiversity data base.	All

¹¹: Detailed plans are established for the reinstatement and aftercare of areas affected by the Corrib Development.

3.4.3 REPORTING, COMMUNICATING AND VERIFICATION

3.4.3.1 ACTIONS

The findings of all surveys conducted during the construction phase are reported and all reports add to the Corrib Development database. Certain monitoring reports such as bird reports and marine mammal monitoring reports are provided to NPWS as a matter of course.

3.4.3.2 COMMUNICATION

There is provision in the BAP (Objective 12, Tables 5 and 6) to supply species records, and habitat quadrat data, to the National Biodiversity Data Centre in Waterford. This is in line with the national strategy on biodiversity and in the interests of best practice and scientific recording.

Objective 10 (Tables 5 and 6) provides for the setting up of partnerships with academic and other institutions for data analysis, for example bird data and Otter DNA analyses. It is intended that this will lead to publication in peer reviewed scientific publications in due course. See also 3.5.2 below.

3.5 STAKEHOLDER ENGAGEMENT AND PARTNERSHIPS FOR BIODIVERSITY

3.5.1 STAKEHOLDER ENGAGEMENT AND CONSULTATION

As provided for in Objective 3, stakeholder engagement and consultation will continue, as a minimum, with:

- *National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht (DAHG); and*
- *Inland Fisheries Ireland (IFI)*

3.5.2 PARTNERSHIPS FOR BIODIVERSITY

Objective 10 (Tables 5 and 6), provides for the setting up of partnerships with relevant and appropriate bodies such as: academic institutions, NGOs, peer experts and others. To some extent this is already underway, with the following:

- *Marine Mammal Monitoring has been undertaken by the Coastal and Marine Research Centre (CMRC) of University College Cork (UCC) since 2001.*
- *A specialist vegetation group, as specified in the Onshore pipeline EIS (2010) was set up in 2011 to examine options and opportunities for reinstatement in terms of vegetation re-establishment in areas of modified blanket bog. It includes the Project Ecologist (a vegetation scientist), other vegetation specialists and landscape architect; a leading UK habitat restoration/rehabilitation specialist consultant; Bord na Móna ecologist; and there is agreement to consult directly with NPWS' blanket bog specialist, and Irish Peatland Conservation Council (IPCC).*
- *Waterford Institute of Technology (WIT) will provide Otter spraint and Pine Marten DNA analyses, with a view to joint publication of results with the Project Ecologist team's faunal specialist.*
- *As part of their commitment to sustainable community development, SEPIL has agreed with IFI to provide funding for a Salmon conservation measure in respect of the commercial draft net fishery on the Glenamoy River. This is also covered by Objective 9.*

In addition, the following partnerships are in the process of being put in place:

- *The Department of Zoology, Ecology and Plant Science, UCC has agreed in principle to carry out a detailed analysis of the Sand Martin monitoring data which has been gathered over a period of nearly ten years. The next step is to set up a formal arrangement with UCC with a view to eventual joint publication of results with the Project Ecologist team's ornithologist.*
- *A partner is being sought to carry out a detailed analysis of the waterbird data which has been gathered over a period of ten years. The aim being to set up a formal arrangement with a view to eventual joint publication of results with the Project Ecologist team's ornithologist.*

3.5.3 COMMUNITY STAKEHOLDER ENGAGEMENT

Objective 9 (Tables 5 and 6) is broad-based and which provides for the contribution to the conservation and sustainable use of biodiversity through day to day activities, and administrative functions of SEPIL's activities. It includes its role as a provider of funds for projects, and education.

The following are included under this objective:

- *Outreach and educational opportunities for local schools with a focus on biodiversity.*
- *Consider sponsoring local biodiversity and conservation projects and initiatives, for example the salmon fishery measure described at 3.5.2.*
- *Increase societal awareness of the ecological values of the landscape, its habitats and species through community engagement.*

TABLE 6: DELIVERY OF THE PLAN, ACTIONS AND TARGETS

OBJECTIVE	ACTIONS REQUIRED
1: PROTECT HABITATS AND SPECIES BY MEANS OF APPROPRIATE MITIGATION MEASURES DURING THE CONSTRUCTION AND OPERATION OF THE VARIOUS ELEMENTS OF THE DEVELOPMENT	<ul style="list-style-type: none"> ■ Implementation of mitigation measures set out in the EISs and EMPs. ■ <i>Additional measures may be required as a result of monitoring.</i> ■ <i>Regular monitoring of success of mitigation measures.</i>
2: MONITOR HABITATS AND SPECIES DURING AND FOLLOWING CONSTRUCTION OF THE VARIOUS ELEMENTS OF THE DEVELOPMENT	<ul style="list-style-type: none"> ■ Monitoring project elements in accordance with Monitoring Programmes set out for the Terminal, Offshore/Nearshore/Intertidal and Onshore. ■ Reporting in accordance with consent conditions.
3: CONSULT WITH STAKEHOLDERS AND OTHER INTERESTED PARTIES AS APPROPRIATE	<ul style="list-style-type: none"> ■ EMPs. ■ Monitoring programmes. ■ Method Statements. ■ Methodologies for protected species.
4: REINSTATE HABITATS AFFECTED BY THE CONSTRUCTION OF THE DEVELOPMENT	<ul style="list-style-type: none"> ■ Develop Reinstatement Plans. ■ Reinstatement in accordance with the Reinstatement Plans for the Terminal and Onshore Pipeline. ■ Use standard and modern micro-propagation methods to increase the chances of successful and appropriate vegetation establishment. ■ Regular monitoring.
5: DURING REINSTATEMENT TO ENHANCE LOCAL BIODIVERSITY ON LANDS IN THE OWNERSHIP OF SHELL, AND ELSEWHERE WHERE FEASIBLE AND PRACTICAL	<ul style="list-style-type: none"> ■ Habitat creation and diversification during reinstatement on lands affected by construction of the onshore pipeline and at the Bellanaboy. ■ Planting of native shrub species in suitable areas to enhance invertebrate biodiversity, and in turn birds and bat species. ■ Set up specialist working group of vegetation experts. ■ Provision of bat boxes, bird nest boxes and pine marten natal boxes at Bellanaboy.

	RESPONSIBLE	RESOURCES REQUIRED	OTHER
	Contractor. Environmental Staff. Specialist experts/consultants.	Support from entire project team.	EMPs in place. Refer to Terminal, Offshore and Onshore EMPs for details of mitigation measures for habitats and species.
	Specialist experts.		Peer review of monitoring reports where relevant/appropriate. Includes long term peatland habitat and marine mammal monitoring See also Appendix 5.8.
	SEPIL Specialist consultants.		Ongoing, including with: DCENR, Mayo CoCo, DoECLG, DAHG (NPWS), IFI.
	Project team with Specialist consultants/experts.	Support from entire project team.	<ul style="list-style-type: none"> ■ See also below at Objective 10. ■ Detailed reinstatement plans have been established. ■ Bead-a-Moss® Sphagnum beads; also propagation of native seedlings; seed collection.
	Contractor. Environmental Staff. Specialist consultants/experts.		<ul style="list-style-type: none"> ■ Detailed reinstatement and aftercare plans have been established. ■ See also below at Objective 10. ■ Bat, Nest and Pine Marten boxes were first erected in January 2011.

TABLE 6: DELIVERY OF THE PLAN, ACTIONS AND TARGETS (CONT)

OBJECTIVE	ACTIONS REQUIRED
<p>6: APPLY BEST PRACTICE STEWARDSHIP TO MANAGE LANDS WITHIN THE DEVELOPMENT'S LANDHOLDING AND LEASE FOR BIODIVERSITY AND ECOSYSTEM SERVICES; ESTABLISH AND IMPLEMENT A LAND MANAGEMENT PLAN</p>	<p>Managing its own land and activities to maximise their contribution to biological diversity by giving a commitment to adhere to or undertake the following:</p> <ul style="list-style-type: none"> ■ Identify any conservation designations opportunities on land owned and its conservation significance at both a local and a national level. ■ Plant native trees and hedges as determined by the local landscape character. ■ Use tree stocks from local seed sources (if available). ■ Introduce grass cutting and appropriate grazing régimes that are compatible with biodiversity enhancement and species conservation. ■ Introduce hedge/tree cutting and other vegetation maintenance régimes to enhance biodiversity and which adhere to wildlife legislation (generally no cutting between 1st March and 31st August). ■ Reduce and where possible eliminate the use of pesticides, herbicides and chemical fertilisers. ■ Reduce areas of bare peat by vegetation restoration techniques. ■ When considering works on buildings or other structures, ensure, including through survey where appropriate, that protected or other important species are properly protected (e.g. it is an offence to interfere with or destroy the breeding or roosting places of bats). ■ Consider creating ponds or other wetland areas. ■ Restore degraded habitats. ■ Safeguard and manage species of national significance which occur on its land. ■ Ensure that biodiversity surveys are undertaken to inform changes to land use or when undertaking development producing and implementing management plans for locally important sites in its ownership. ■ Erect bird and bat boxes. ■ Manage water courses and their margins to benefit biological diversity. ■ Discourage the permanent canalisation or culverting of water courses and ensure the design of culverts and bridges allows for the passage of aquatic life. ■ Where relevant and appropriate, provide educational facilities for the public. ■ Encourage contractors and consultants to adopt the principles of biodiversity enhancement in designing development sites and adhere to best practice. ■ Promote the distinctiveness and quality of the area's biodiversity.
<p>7: MAINTAIN SPECIES NUMBERS, DIVERSITY AND ECOSYSTEM SERVICES WITHIN, AND IN THE VICINITY OF, THE FOOTPRINT OF THE DEVELOPMENT, INCLUDING THOSE AREAS AFFECTED BY TEMPORARY WORKS DURING CONSTRUCTION</p>	<ul style="list-style-type: none"> ■ Ensure that mitigation measures are in place and functioning. ■ Appropriate grazing regimes to be put in place to maintain/encourage habitats and species diversity. ■ Monitor and compare against baseline data.
<p>8: PUT MECHANISMS IN PLACE TO CONTROL INVASIVE SPECIES IN REINSTATED HABITATS</p>	<ul style="list-style-type: none"> ■ Monitor reinstated habitats for the invasive species -<i>Rhododendron</i> and <i>Gunnera</i>. ■ If found, they must be removed by means of the best practice methodology pertaining at the time. ■ Vigilance in case of infestation by other invasive species.

	RESPONSIBLE	RESOURCES REQUIRED	OTHER
	SEPIL	Management support.	Some measures are also already in place and currently practiced.
			Carbon release mitigation.
	Specialist consultants/experts.	SEPIL	Mechanisms are in place for this and bat surveys have been carried out on SEPIL-owned properties over the years.
			Included in the Reinstatement Plans.
			Commenced at Bellanaboy in Jan 2011.
			Long term goal, after reinstatement.
			Long term goal, after reinstatement.
	Environmental Staff/Specialist consultants/experts.		Detailed reinstatement and aftercare plans have been established.
	Environmental Staff/Specialist consultants/experts.	Support from entire project team including Management.	There is a obligation under Action 28 of National Biodiversity Plan to control invasive species. Reinstatement and aftercare plans include provisions for dealing with these invasive species.

TABLE 6: DELIVERY OF THE PLAN, ACTIONS AND TARGETS (CONT)

OBJECTIVE	ACTIONS REQUIRED
9: CONTRIBUTE TO THE CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY THROUGH DAY TO DAY ACTIVITIES, AND ADMINISTRATIVE FUNCTIONS OF SEPIL'S ACTIVITIES	<ul style="list-style-type: none"> ■ Examine and Implement the National Sustainable Development Strategy as a consumer of materials, furniture, paper, water etc and as a producer of waste ■ As a consumer of materials, furniture, paper, water etc and as a producer of waste ■ As a consumer of energy ■ As an operator ■ As a funder of projects, subsidies and contracts; and provider of educational opportunities etc.
10: SET UP PARTNERSHIPS WITH RELEVANT AND APPROPRIATE BODIES SUCH AS: ACADEMIC INSTITUTIONS, NGOS, PEER EXPERTS AND OTHERS	<ul style="list-style-type: none"> ■ Marine Mammal Monitoring. ■ Specialist vegetation working group. ■ Analysis of Otter spraint and Pine Marten DNA. ■ Provision of funding for a salmon conservation measure in respect of the commercial draft net fishery on the Glenamoy River. ■ Specialist analysis of bird data.
11: SET UP BAP REVIEW WORKING GROUPS: ONE FOR CETACEAN MONITORING AND FOR MONITORING OF OTHER HABITATS AND SPECIES	<ul style="list-style-type: none"> ■ Cetacean monitoring BAP review group. ■ Habitat monitoring BAP review group. ■ Fauna (avian and non-avian) monitoring BAP review group.
12: PROVISION OF SPECIES RECORDS AND HABITAT QUADRAT DATA TO THE NATIONAL BIODIVERSITY DATA BASE	<ul style="list-style-type: none"> ■ Species records and habitat quadrat data will, in due course be fed into the national biodiversity data base through the National Biodiversity Centre in Waterford.

	RESPONSIBLE	RESOURCES REQUIRED	OTHER
	SEPIL	SEPIL Management support.	Much of this is already implemented as Company policy.
	SEPIL Specialist consultants.		Partnership already in place: Marine Mammal Monitoring has been undertaken by the Coastal and Marine Resources Centre (CMRC) of University College Cork (UCC).
	SEPIL		Set up specialist group for overseeing long term MMM.
	Project ecologist.		Set up in 2011, the group includes the Project Ecologist, vegetation specialists, and landscape architect; a leading UK habitat restoration/rehabilitation specialist consultant; Bord na Móna ecologist; and a agreement to consult with NPWS and Irish Peatland Conservation Council (IPCC) blanket bog specialists.
	Project ecologist.	SEPIL Management support/funding.	Partnership in place with Waterford Institute of Technology (WIT), first test samples have been analysed.
	SEPIL		Commitment to support community sustainable development. Agreement set up with IFI in 2013.
	Project ecologist.	SEPIL Management support/funding.	<ul style="list-style-type: none"> ■ Partnership provisionally in place with the Department of Zoology, Ecology and Plant Science UCC to carry out Sand Martin data analysis – to be confirmed ■ A partner is being sought to carry out waterbird data analysis.
	SEPIL and specialist consultants.	SEPIL Management support.	To review the BAP on a biennial basis. Group composition to be decided.
	SEPIL and specialist consultants.	SEPIL Management support.	To review the BAP on a biennial basis. The group to comprise Project Ecologist, specialist consultants, and bird peer reviewer; with input from SEPIL Environmental staff.
	SEPIL and specialist consultants.		This is line with the national strategy on biodiversity and in the interests of best practice and scientific recording.

4 REFERENCES

4.1 CORRIB DEVELOPMENT – RELATED

Extensive bibliographies relating to biodiversity are contained within the relevant chapters/sections/technical reports of the following documents, which may be found: <http://www.corribgaspipeline.com>:

- RSK 2001 Corrib Offshore Environmental Impact Statement 2001
- RSK 2010 Corrib Offshore Supplementary Update Report 2010
- RPS 2010 Corrib Onshore Pipeline Environmental Impact Statement 2010
- RPS 2010 Corrib Onshore Pipeline Environmental Impact Statement Addendum 2010.

4.2 BIODIVERSITY AND RELATED GUIDANCE DOCUMENTS

- CBD 2005 Handbook of The Convention on Biological Diversity including its Cartagena Protocol on Biosafety 3rd Edition
- Department of Arts, Heritage, Gaeltacht and the Islands 2002 National Biodiversity Plan Government of Ireland
- Department of Arts Heritage and the Gaeltacht (DAHG) 2011 Actions for Biodiversity 2011-2016 Ireland's National Biodiversity Plan
- Department of Arts Heritage and the Gaeltacht (DAHG) 2011 Biodiversity Action Plans for Business Notice Nature
- Glowka, Lyle 1994 A Guide to the Convention on Biological Diversity – Environmental Policy and Law Paper No. 30. IUCN, Environmental Law Centre; IUCN, Biodiversity Programme
- Heritage Council 2003 Guidelines for the Production of Local Biodiversity Action Plans Department of Environment, Heritage and Local Government (DoEHILG).

- IPIECA 2005 A Guide to Developing Biodiversity Action Plans for the Oil and Gas Sector International Petroleum Industry Environmental Conservation Association (IPIECA) and the International Association of Oil and Gas Producers (OGP)
- Ireland 4th National Report To The Convention On Biological Diversity May 2010 Government of Ireland.

4.3 LEGISLATION

- EC Directive 79/409/EEC of 2nd April 1979 on the conservation of wild birds (the Birds Directive)
- European Commission 1992 Council Directive No. 92/43/EEC of May 21, 1992 (The Habitats Directive)
- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011)
- European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293 of 1988)
- EU Water Framework Directive (2000/60/EC) of 23 October 2000 establishing a framework for Community action in the field of water policy
- Flora Protection Order 1999 (SI No. 94 of 1999)
- Wildlife Act 1976 and Wildlife Amendment Act 2000. The Stationery Office, Government of Ireland.

4.4 WEB LINKS

4.4.1 INTERNATIONAL

- Convention on Biological Diversity:
<http://www.cbd.int/>
- Ramsar Convention on Wetlands:
<http://www.ramsar.org/>
- Bonn Convention on Migratory Species:
<http://www.cms.int/>
- Bern Convention on the Conservation of European Wildlife and Natural Habitats:
<http://www.coe.int/t/dg4/cultureheritage/nature/Bern/>.

4.4.2 EUROPEAN

- European Environment Agency:
<http://www.eea.europa.eu/themes/biodiversity>
- European Commission:
http://ec.europa.eu/environment/nature/index_en.htm.

4.4.3 NATIONAL

- Department of Communications, Energy and Natural Resources: <http://www.dcenr.gov.ie/>
- Environmental Protection Agency: www.epa.ie
- Invasive Species Ireland
www.invasivespeciesireland.com
- National Biodiversity Data Centre:
<http://www.biodiversityireland.ie/>
- National Parks and Wildlife Service: www.npws.ie
- Notice Nature: <http://www.noticenature.ie/>.

4.4.4 CORRIB DEVELOPMENT AND INDUSTRY RELATED LINKS

- <http://www.corribgaspipeline.com/index.php?page=eis-and-upstream-pipeline>
- http://www.dcenr.gov.ie/Natural/Petroleum+Affairs+Division/Corrib+Gas+Field+Development/http://www.shell.ie/home/content/irl/aboutshell/our_business_tpkg/e_and_p/corrib/
- http://www.shell.com/home/content/environment_society/environment/biodiversity/
- <http://www.ipieca.org/>.

APPENDICES



5 APPENDICES

5.1 DESIGNATED CONSERVATION SITES

As set out in Section 2.2 of the Biodiversity Action Plan, the Corrib Project impinges, either directly or indirectly on:

- Broadhaven Bay SAC
- Glenamoy Bog Complex SAC
- Blacksod Bay/Broadhaven SPA and Blacksod Bay/Broadhaven Ramsar Site (Code 844)
- Carrowmore Lake Complex SAC (downstream of the Bellanaboy Bridge Gas Terminal)
- Carrowmore Lake SPA (downstream of the Bellanaboy Bridge Gas Terminal).

The site synopses for these sites are presented below and dated as shown on the National Parks and Wildlife Service website. The table at 5.1.2 sets out the conservation interests for each site.

5.1.1 SITE SYNOPSES

5.1.1.1 BROADHAVEN BAY SAC (SITE CODE IE0000472)

Broadhaven Bay is a large, north facing bay situated on the north-west Mayo coast.

The site extends from the innermost part of the bay at Belmullet to the outer marine area between Erris Head and Benwee Head. At its outermost part, the site is 10 km wide. Exposure to prevailing winds and wave action diminishes from the mouth toward the head of the bay. Subsidiary inlets along the length of the bay provide further areas of additional shelter.

Broadhaven Bay encompasses a range of marine and coastal habitats from extremely exposed bedrock at Benwee Head to sheltered sediments in the inner bay. There are good examples of wave-surged cave communities in shallow water with the anemone *Phellia gausapata* typically found in areas very exposed to wave action. A cave in deeper water supports colonies of the rare anemone *Parazoanthus anguicomus* and the soft coral *Alcyonium glomeratum*. The subtidal reef communities in the outer part of the bay are good examples of the zonation from kelp forest in shallow water to kelp park with an understudy of foliose brown algae and to the sponge communities in deeper water. Species richness can be high (up to 72 species) and the widely distributed but uncommon

crab *Pirimela denticulata*, and hydroid *Tamarisca tamarisca* were both found at one site. In deeper water the reef communities are characterised by the Axinellid sponge community, communities tolerant of sand scour and communities typical of vertical or steeply sloping bedrock. A range of sublittoral sediments occurs within the site with sediment in the outer part of the bay characterised by bivalves or the burrowing urchin *Echinocardium cordatum*. Seagrass (*Zostera marina*) occurs in more sheltered areas and the oyster *Ostrea edulis* may be present. The inner part of the bay has extensive areas of intertidal mud characterised by polychaete communities or muddy sand which support communities of polychaetes and bivalves, typical for these substrates.

Salt marshes occur in the very sheltered areas at Tallagh and Barnatra. These are fringe marshes on peat and typical of the Atlantic salt meadow type. Species present include Thrift (*Armeria maritima*), Sea Arrowgrass (*Triglochin maritima*), Sea Plantain (*Plantago maritima*), Common Salt-marsh Grass (*Puccinellia maritima*), and the rushes *Juncus gerardii* and *Juncus maritimus*. Turf fucoids occur.

Inishderry, a small island in the inner bay, supports important numbers of breeding terns, with Sandwich Tern (81 pairs in 1995) and Common and Arctic Terns (42 pairs in 1995). The rare Little Tern has bred in the past. The island also has breeding Black-headed Gulls (100 individuals in 1995).

Broadhaven Bay is an important area for wintering waterfowl, being part of a large complex that includes the Mullet and Blacksod Bay. Based on average peak counts over the five winters 1994/95 to 1998/99 the following species have nationally important populations: Red-breasted Merganser (38), Ringed Plover (484), Grey Plover (52), Sanderling (74), Dunlin (2,108) and Bartailed Godwit (484). In some winters Brent Goose numbers exceed the threshold of 200 for national and international importance. Regionally important numbers of a number of other species occur: Oystercatcher, Golden Plover, Lapwing, Knot, Curlew, Redshank and Turnstone.

This site is of high conservation importance owing to the presence of several habitats that are listed on Annex I of the EU Habitats Directive: large shallow bays; intertidal sand flats, reefs, marine caves and salt marshes. In addition it has ornithological importance for breeding and wintering birds.

Site synopsis date: 3.9.2001

5.1.1.2 GLENAMOY BOG COMPLEX SAC (SITE CODE: IE0000500)

This large site is situated in the extreme north-west of County Mayo, where the climate is wet oceanic and gales from the Atlantic are frequent. This area is underlain by metamorphic rocks, comprising mainly schists and quartzites of Moinian age. From sea-level, the site reaches 379m O.D. at Maumakeogh. The soils are predominantly peats, with underlying glacial tills usually only visible along water channels and roads. Four main river systems drain the site: the Glenamoy, the Muingnabo, the Belderg and the Glenglassra Rivers. One medium-sized lake, Lougherglass, occurs on the site.

The site is a candidate SAC selected for active blanket bog and machair, both priority habitats on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for sea cliffs, wet heath, Juniper scrub, transition mires, dystrophic lakes and Rhynchosporion, all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive – Atlantic Salmon, the plant Marsh Saxifrage, the liverwort Petalwort and the moss *Drepanocladus vernicosus*. These 3 plant species are also protected under the Flora Protection Order (1999).

Blanket bog, a priority habitat under Annex I of the E.U. Habitats Directive, dominates the site. Glenamoy Bog is a prime example of the extreme oceanic form of lowland blanket bog and is one of the most extensive tracts of bog in the country. The bog occupies a gently undulating plain, but extends uphill to cover the slopes of Maumakeogh and Benmore in the eastern sector of the site, and northward, out toward the sea cliffs of the north-west Mayo coastline. Peat depth reaches 6 metres in the low-lying areas. A large flush occurs at Rathavisteen, which supports species-rich vegetation, including Cranberry (*Vaccinium oxycoccos*) and a moss (*Homalothecium nitens*) which is nationally rare. Marsh Saxifrage (*Saxifraga hirculus*), listed under Annex II of the Habitats Directive is found in another flush area in Barroosky. Five other Annexed habitats occur in close association with the blanket bog-dystrophic lakes, wet heath, Juniper heath, Rhynchosporion depressions and transition mires.

Dystrophic lakes, which lie in peaty basins and have peat-stained water, are a common feature of lowland blanket bog. At Glenamoy, the lakes are particularly well-developed. Juniper (*Juniperus communis* subsp. *nana*) occurs scattered over the blanket bog, often in association with Crowberry (*Empetrum nigrum*)

and hummocks formed of mosses (*Racomitrium lanuginosum*). On steep slopes where the peat is shallow, the blanket bog grades into wet heath. Here, Ling Heather (*Calluna vulgaris*), Cross-leaved Heath (*Erica tetralix*), Tormentil (*Potentilla erecta*) and Purple Moor-grass (*Molinia caerulea*) are found. Where the heath is drier, and especially towards the northern coastal zone of the site, scattered Bearberry (*Arctostaphylos uva-ursi*) occurs with Ling and Juniper.

Transition mires or quaking bogs occur where the bog vegetation merges with flush type vegetation influenced by base enrichment, and also at the interface between large pools/small lakes and adjacent blanket bog. The vegetation is characterised by lawns of Sphagnum, with abundant small sedges (especially *Carex limosa*, *C. paniculata*, *C. rostrata* and *C. lepidocarpa*), Bogbean (*Menyanthes trifoliata*) and White-beaked Sedge (*Rhynchospora alba*). Diagnostic bryophytes (other than Sphagnum) include *Aneura pinguis*, *Drepanocladus revolvens* and *Calliergon giganteum*. Rhynchosporion vegetation is best represented around pool margins and in wet hollows and is often a component of transition mires. Sphagnum cuspidatum and *S. auriculatum* are principal moss species associated with this habitat, with a relatively low diversity of vascular plants: White-beaked Sedge, Bogbean, Bog cotton (*Eriophorum angustifolium*), Purple Moor-grass (*Molinia caerulea*) and sundews (*Drosera* spp.). The rare Brown Beak-sedge (*Rhynchospora fusca*) is found in some of the pools and lawns.

A rare moss, *Drepanocladus vernicosus*, has been recorded from an area of poor fen habitat within the blanket bog complex. This is only one of 11 known sites for the plant in Ireland. This species is listed on Annex II of the EU Habitats Directive.

The coastal habitats at Glenamoy are extensive and varied. Sea cliffs extend for about 20 km along the north coast and achieve a height of 253m, at Benwee Head. They vary in physical character from sheer cliff-face to slopes of varying gradients. Typical cliff-face vegetation includes Thrift (*Armeria maritima*), Sea Campion (*Silene vulgaris* subsp. *maritima*) and Red Fescue (*Festuca rubra*). Sea stacks and several islands occur, of which Illaunmaistir is the most notable. A feature of the cliffs is the well developed cliff-top vegetation, which range from typical Plantain-dominated vegetation (*Plantago sward*) to coastal heath. South of Benwee Head, the rocky coastline grades into an estuarine system, Suwaddacon Bay, which contains sand dunes and a machair system. Machair is a form of sandy, flat, coastal grassland,

and this particular machair is unusual in that it extends upslope at Garter Hill – most machairs occupy flat, low-lying plains. It is, however, now very degraded owing mainly to over-grazing by sheep. Petalwort (*Petallophyllum ralfsii*), a rare bryophyte, listed on Annex II of the E.U. Habitats Directive, occurs abundantly on the machair habitat. This is thought to be the second largest colony (after Slyne Head in Co. Galway) of this species in Ireland.

The sea cliffs and islands provide excellent habitat for breeding seabirds. An internationally important population of Storm Petrel (7,500-10,000 pairs, pre-1987), occurs on Illaunmaistir. A large Puffin colony (c.2,000 pairs, pre 1987) and a small colony of Manx Shearwaters (c.100 pairs) also occurs on Illaunmaistir. The mainland cliffs was the first breeding site in Ireland for Fulmar and now has a very substantial colony (c.2,000 pairs, pre 1987). There is a sizeable Kittiwake colony (c.400 pairs pre 1987) and small colonies of Guillemots and Razorbills (less than 100 individuals of each). Peregrine Falcon and Chough, both Annex I Bird Directive species, breed on the cliffs. Another Annex I species, Merlin, breeds on the blanket bog, as does Golden Plover. In winter, a small flock (less than 50 individuals) of Barnacle Geese visit Illaunmaistir and Kid Island.

Otter, an E.U. Habitats Directive Annex II species, occurs on the site, as well as two other Red Data Book mammal species: Badger and Irish Hare. The Glenamoy River is predominantly a western, acidic, spate river which has a valuable late run of salmon (*Salmo salar*) in July with good spawning habitats and good water quality. Sea Trout are also found.

A number of landuse practices have damaged parts of this site. Grazing by sheep and cattle is widespread and over-grazing, which leads to soil erosion, has caused damage to parts of the blanket bog, heath and machair habitats. Peat cutting, by hand and to a lesser extent by mechanised means, is widespread throughout though mostly confined to near roads and tracks. The region in general has been heavily afforested with conifers and much of the site is bounded by plantations. Within parts of the site afforestation continues and poses a threat to the blanket bog.

This site is of immense ecological importance because of the presence of a number of E.U. Annex I habitats, including two priority habitats – blanket bog and machair. It supports populations of an Annex II species, two Annex II plant species and six Annex I Birds Directive species. It also has nationally important populations of other seabirds. Despite

serious damage to parts of the site in recent years, large areas remain in good condition. Considerable archaeological interest is contained within the site, including the renowned Céide Fields. Furthermore, the site is of outstanding scenic value.

Site synopsis date: 7.12.2005

5.1.1.3 BLACKSOD BAY/BROADHAVEN SPA (SITE CODE IE004037)

Situated in the extreme north-west of Co. Mayo, this site comprises all of the inner part of Broadhaven Bay and the various sheltered bays and inlets in Blacksod Bay, including Trawmore Bay, Saleen Harbour, Elly Harbour and Tullaghan Bay. At low tide extensive areas of intertidal sand and mudflats are exposed. These support a well-developed macro-invertebrate fauna. Talitrid amphipods occur in decomposing seaweed on the strand line, whilst polychaete worms (*Arenicola marina*), bivalves (*Cerastoderma edule*) and crustaceans, such as *Urothoe brevicornis*, *Ampelisca brevicornis* and *Bathyporeia pilosa*, are common in the middle shore. Eelgrass (*Zostera marina*) occurs at several localities. Salt marshes, which are often on a peat substrate, fringe parts of the site and provide useful roosts for the wintering waterfowl. Species typically present include Thrift (*Armeria maritima*), Common saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster trifolium*), Sea Milkwort (*Glaux maritima*), Sea Rush (*Juncus maritimus*) and Saltmarsh Rush (*Juncus gerardi*). At the lower levels of the marshes, and in places extending onto the open sand flats, are found Glasswort (*Salicornia europaea* agg.) and Seablite (*Suaeda maritima*). Sandy and shingle beaches are well represented. A small island, Inishderry, situated in the inner part of the bay, is used by nesting terns and gulls. The underlying bedrock consists mainly of schists and gneiss.

The site supports an excellent diversity of wintering waterfowl species and is one of the most important wetland complexes in the west. It has nationally important populations of Great Northern Diver (31), Red-breasted Merganser (48), Bar-tailed Godwit (441), Ringed Plover (332) and Dunlin (1,709) – figures are average peaks for the 5 seasons 1995/96-1999/00. It also supports Red-throated Diver (15), Brent Goose (149), Oystercatcher (262), Golden Plover (267), Grey Plover (53), Knot (234), Sanderling (53), Curlew (330), Redshank (96), Turnstone (38), Shelduck (26), Mallard (55), Cormorant (29), Black-headed Gull (183) and Common Gull (161). It provides both feeding and roosting areas for the birds though some species may also utilise marginal habitats above the shoreline

for feeding and/or roosting, as well as the shallow marine waters elsewhere in Blacksod Bay.

Inishderry Island has a nationally important breeding colony of Sandwich Tern, with 160-170 pairs present in 1994 and 81 pairs in 1995. The terns at this site are considered to be the same population that nested at Carrowmore Lake in the past. It also has nesting Common Tern and Arctic Tern (total for the two species of 42 pairs), and a colony of Black-headed Gull (100 individuals in 1995). Little Tern has also bred in small numbers in the past.

There are no serious imminent threats to the various bird populations. Aquaculture occurs and intensification could cause disturbance to the birds and their habitats. Some of the salt marshes have suffered damage due to heavy grazing by sheep, and remain vulnerable.

This site is of high ornithological importance for its excellent diversity of wintering waterfowl and for the nationally important populations of five species that it supports. Of particular note is the usage of the site by over 3% of the national Ringed Plover population. It is also of importance as a breeding site for terns and gulls, especially the localised Sandwich Tern. It is of note that seven of the species that occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Great Northern Diver, Red-throated Diver, Golden Plover, Bar-tailed Godwit, Sandwich Tern, Common Tern and Arctic Tern.

Site synopsis date: 30.3.2005

INTERNATIONAL DESIGNATIONS – RAMSAR

“Ramsar” refers to an international convention in relation to wetland sites which was ratified by Ireland in 1985. The Convention has its roots in the protection of wetland wildfowl and for many sites it is species-associated. More recently Ramsar has taken on the more all-encompassing wetland habitat approach which in the context of the EU falls in line with site protection under the Habitats Directive.

The Ramsar convention has no statutory basis itself, but it is operated through either EU or national legislation, in this case the EU Birds Directive and EU Habitats Directive through the Wildlife and Amendments Acts (1976 and 2000).

It must be noted therefore that part of the SPA 004037, including Sruwaddacon Bay, is designated under the Ramsar Convention as follows:

BLACKSOD BAY/BROADHAVEN (RAMSAR SITE CODE 844)

Designated in 1996 the site covers 683 ha., and is

a “composite of diverse marine and coastal habitats that includes vast dune systems and extensive areas of dune grassland with salt marshes occurring in sheltered bays and inlets. The grasslands are of considerable botanical importance. The site also includes several brackish lakes important to various species of breeding waders, large numbers of wintering waterbirds of various species, and internationally important numbers of Brent Geese” (www.ramsar.org).

5.1.1.4 CARROWMORE LAKE COMPLEX SAC (SITE CODE IE000476)

This site is located north and east of Bangor Erris, in County Mayo. There are two main parts to the site: Carrowmore Lake, a large, shallow oligotrophic/mesotrophic lake, and Largan More Bog, an impressive tract of blanket bog. From an altitude of 6m at the lake, the site grades upwards in a general south-easterly direction, reaching 199m on Largan More Bog.

Three areas of blanket bog are incorporated into the site: Glenturk, Carrowmore (or Glencullin) and Largan More. Glenturk Bog has a relatively uniform vegetation and Carrowmore Bog is more diverse, with quaking lawns formed by bog mosses (*Sphagnum spp.*), hummocks (including some formed by *Sphagnum fuscum*), bog pools and an interconnecting pool system. Largan More is the most extensive and interesting, with a fine interconnecting pool system and large areas of typical, intact blanket bog vegetation. Bog pools are a feature of the bog surface, and these are colonised by a range of mosses and higher plants including Lesser Bladderwort (*Utricularia minor*), White Water-lily (*Nymphaea alba*), Water Lobelia (Lobelia dortmanna) and Pipewort (*Eriocaulon aquaticum*). Species-rich flush communities occur on streamsides and stream-heads. Sedges (including *Carex limosa*, *C. rostrata*, *C. lepidocarpa*) are abundant in flushes, with a rich variety of calcicole herbs and mosses. Cranberry (*Vaccinium oxycoccos*) occurs in some flushes – this species is uncommon outside the centre of Ireland.

Carrowmore Lake is a large (960ha), shallow lake, with a maximum depth of approximately 2.5m and a generally stony bottom. The lake water is almost neutral in terms of acidity (i.e. pH) and generally rather nutrient-poor. The shallow waters support species such as Common Spike-rush (*Eleocharis palustris*), Shoreweed (*Littorella uniflora*), Bulbous Rush (*Juncus bulbosus*), Marsh Pennywort (*Hydrocotyle vulgaris*) and Perfoliate Pondweed (*Potamogeton*

perfoliatus). The shoreline is dominated by Soft Rush (*Juncus effusus*), Yellow Iris (*Iris pseudacorus*) and stands of Common Club-rush (*Scirpus lacustris*) or Common Reed (*Phragmites australis*). This emergent vegetation grades landward into freshwater marsh and acid wet grassland, backed by blanket bog. Along this transition zone, bushes of Mediterranean Heath (*Erica erigena*) are prominent. This species is frequent in parts of west Mayo, but rare in west Galway and unknown elsewhere in Ireland.

The rare Marsh Saxifrage (*Saxifraga hirculus*) occurs at the site. This species is protected under The Flora Protection Act (1987) and is listed under Annex II of the European Habitats Directive. It is confined in its distribution to north-west County Mayo.

The site supports a number of bird species which are of international conservation significance and which are listed on Annex I of the European Birds Directive. In winter, Greenland White-fronted Geese arrive to feed around the lake and in some nearby fields. These birds are a sub-flock of the nationally important Bog of Erris flock. In summer, Merlin and Golden Plover breed on the boglands within the site. An Irish Tern Survey (1984) revealed that Sandwich Tern (164 pairs) and Arctic Tern (18 pairs) formerly bred within the site, and although the terns have not bred in recent years, Derreen's Island still supports a large and important colony of Common Gulls (600 individuals, 1993).

A variety of wildfowl also occur, including Tufted Duck, Pochard and Wigeon. Goosander, a very rare species in Ireland, has been recorded.

Blanket bog in the site is used for grazing cattle and sheep and for turf-cutting, which is largely done by machine. Angling and water abstraction are the main landuses at Carrowmore Lake.

This site is of considerable ecological value, primarily for its extensive, intact blanket bog, which has a typical range of good quality habitats, but also as a site for the very rare Marsh Saxifrage. The north-western part of the site supports a number of Greenland White-fronted Geese, while other important bird species which occur are Golden Plover, Merlin, Sandwich Tern and Arctic Tern.

Site synopsis date: 28.1.1997

5.1.1.5 CARROWMORE LAKE SPA (SITE CODE IE004052)

Carrowmore Lake is a large, fairly shallow, oligotrophic/mesotrophic lake, which overlies Dalradian schists and quartzite. The lake generally

has a stony bottom and shoreline. Stands of emergent, swamp vegetation occur, especially in sheltered areas. The shallow waters support species such as Common Spike-rush (*Eleocharis palustris*), Shoreweed (*Littorella uniflora*), Bulbous Rush (*Juncus bulbosus*) and Perfoliate Pondweed (*Potamogeton perfoliatus*). Soft Rush (*Juncus effusus*) and Yellow Iris (*Iris pseudacorus*) are frequent along the shore, with stands of Common Club-rush (*Scirpus lacustris*) and Common Reed (*Phragmites australis*). The lake has one substantial island, Derreens Island, and several small islands; these are dominated by a grassy sward. Carrowmore Lake is set in a landscape dominated by blanket bogs.

There is a long established breeding colony of gulls and terns on Derreens Island. Black-headed Gull and Common Gull both nest in numbers of national importance (37 and 59 pairs respectively in 2000), with the latter representing over 5% of the national total. Considerably higher numbers of both of these species have nested in the past. Sandwich Tern formerly had a large nesting population (164 pairs in 1984) but has not nested in at least the last 5 years. The colony is thought to have moved to an island in Broadhaven Bay but birds still regularly visit the lake and nesting may occur again in the future. Arctic Tern has also nested in the past. Mink predation is considered a problem for the nesting gulls and terns.

A population of Greenland White-fronted Goose winters on the surrounding bogs and at times uses the lake for roosting and/or feeding. The number of birds using the site is fairly small, with an average peak of 34 for the five winters 1998/99-2002/03. Small numbers of wildfowl, mostly diving duck such as Pochard (72) and Tufted Duck (90), as well as Mallard (38), Scaup (5), Goldeneye (10), Red-breasted Merganser (4) and Cormorant (12) occur in winter.

Research is required to determine the reason for the declining gull and tern numbers at Derreens Island. The island may need to be managed to optimise the potential nesting habitat. The lake is a Wildfowl Sanctuary so shooting is not an issue.

Carrowmore Lake is of high ornithological importance on account of the nationally important gull colony and, in the past, the nesting terns. The occurrence of Greenland White-fronted Goose is of note as this species is listed on Annex I of the E.U. Birds Directive (as are the tern species).

Site synopsis date: 6.10.2004

5.1.2 DESIGNATED SITES – SUMMARY OF QUALIFYING AND NON-QUALIFYING INTERESTS
IN RELATION TO THE CORRIB GAS DEVELOPMENT

NATURA 2000 SITE	STATUS OF HABITAT/SPECIES	HABITAT/SPECIES	LOCATION IN RELATION TO THE CORRIB GAS DEVELOPMENT FOOTPRINT
BROADHAVEN BAY SAC 000472	Qualifying interest – Annex I Habitats.	<ul style="list-style-type: none"> ■ 1170 – Reefs ■ 1160 – Large shallow inlets and bays ■ 1140 – Mudflats and sandflats not covered by seawater at low tide ■ 1330 – Atlantic salt meadows (<i>Glauco – Puccinellietalia</i>) ■ 8330 – Submerged or partially submerged sea caves. 	Offshore pipeline laid on sea bed in Broadhaven Bay through Annex I habitat: Large shallow inlets and bays.
	Listed Annex I bird species.	<ul style="list-style-type: none"> ■ Golden Plover (<i>Pluvialis apricaria</i>) ■ Bar-tailed Godwit (<i>Limosa lapponica</i>) ■ Sandwich Tern (<i>Sterna sandvicensis</i>) ■ Common Tern (<i>Sterna hirundo</i>) ■ Arctic Tern (<i>Sterna paradisaea</i>). 	
	Annex II Marine Mammals (neither qualifying nor listed for the SAC).	<ul style="list-style-type: none"> ■ Grey seal (<i>Halochoerus grypus</i>) ■ Common (Harbour) seal (<i>Phoca vitulina</i>). 	
	Annex IV Marine Mammals (neither qualifying nor listed for the SAC).	<ul style="list-style-type: none"> ■ Sei whale (<i>Balaenoptera borealis</i>) ■ Minke whale (<i>Balaenoptera acutorostrata</i>) ■ Killer whale (<i>Orcinus orca</i>) ■ Risso's dolphin (<i>Grampus griseus</i>) ■ White-beaked dolphin (<i>Lagenorhynchus albirostris</i>) ■ White-sided dolphin (<i>Lagenorhynchus acutus</i>) ■ Common dolphin (<i>Delphinus delphis</i>) ■ Bottlenose dolphin (<i>Tursiops truncatus</i>) ■ Harbour Porpoise (<i>Phocoena phocoena</i>). 	
GLENAMOY BOG COMPLEX SAC 000500	Qualifying interest – Annex I Habitats.	<ul style="list-style-type: none"> ■ 7130 Blanket bog (* active only) ■ 4010 Northern Atlantic wet heaths with <i>Erica tetralix</i> ■ 1230 Vegetated sea cliffs of the Atlantic and Baltic Coasts ■ 5130 Juniper communis formations on heaths or calcareous grasslands ■ 7150 Depressions on peat substrates of the Rhynchosporion ■ 7140 Transition mires and quaking bogs ■ 3160 Natural dystrophic lakes and ponds ■ 21A0 Machair (* in Ireland). 	

5.1.2 DESIGNATED SITES – SUMMARY OF QUALIFYING AND NON-QUALIFYING INTERESTS
IN RELATION TO THE CORRIB GAS DEVELOPMENT (CONT)

NATURA 2000 SITE	STATUS OF HABITAT/SPECIES	HABITAT/SPECIES	LOCATION IN RELATION TO THE CORRIB GAS DEVELOPMENT FOOTPRINT
GLENAMOY BOG COMPLEX SAC (CONT)	Qualifying interest – Protected plant species (Annex II).	<ul style="list-style-type: none"> ■ Petalwort (<i>Petalophyllum ralfsii</i>) ■ Varnished Hook-moss (<i>Drepanocladus vernicosus</i>) ■ Marsh saxifrage (<i>Saxifraga hirculus</i>). 	
	Annex I bird species.	<ul style="list-style-type: none"> ■ Golden Plover (<i>Pluvialis apricaria</i>) ■ Barnacle Goose (<i>Branta leucopsis</i>) ■ Storm Petrel (<i>Hydrobates pelagicus</i>) ■ Merlin (<i>Falco columbarius</i>) ■ Peregrine Falcon (<i>Falco peregrinus</i>) ■ Chough (<i>Pyrrhocorax pyrrhocorax</i>). 	
	Qualifying fish species (Annex II).	<ul style="list-style-type: none"> ■ Salmon (<i>Salmo salar</i>). 	
	Regularly occurring Migratory Birds not listed on Annex I.	<ul style="list-style-type: none"> ■ Fulmar (<i>Fulmarus glacialis</i>) ■ Manx Shearwater (<i>Puffinus puffinus</i>) ■ Kittiwake (<i>Rissa tridactyla</i>) ■ Razorbill (<i>Alca torda</i>) ■ Common Guillemot (<i>Uria aalge</i>) ■ Puffin (<i>Fratercula arctica</i>). 	
	SAC species of importance – birds.	<ul style="list-style-type: none"> ■ Shag (<i>Phalacrocorax aristotelis</i>) ■ Red Grouse (<i>Lagopus lagopus hibernicus</i>) ■ Herring Gull (<i>Larus argentatus</i>) ■ Great Black-backed Gull (<i>Larus marinus</i>) ■ Black Guillemot (<i>Cepphus grylle</i>). 	
	SAC species of importance – mammals.	<ul style="list-style-type: none"> ■ Badger (<i>Meles meles</i>) ■ Irish Hare (<i>Lepus timidus hibernicus</i>). 	
	SAC species of importance – amphibian.	<ul style="list-style-type: none"> ■ Common Frog (<i>Rana temporaria</i>). 	
	SAC species of importance – reptile.	<ul style="list-style-type: none"> ■ Common Lizard (<i>Zootoca vivipara</i> [<i>Lacerta vivipara</i>]). 	
	SAC species of importance – fish.	<ul style="list-style-type: none"> ■ Sea Trout (<i>Salma trutta</i>). 	
	SAC species of importance – plants.	<ul style="list-style-type: none"> ■ Brown beak-sedge (<i>Rhynchospora fusca</i>). 	
	Annex I habitats (neither qualifying nor listed for the SAC).	<ul style="list-style-type: none"> ■ 1160 – Large shallow inlets and bays ■ 1140 – Mudflats and sandflats not covered by seawater at low tide ■ 1330 – Atlantic salt meadows (Glauco – Puccinellietalia). 	The tunnel will be underneath 1160, 1140 and 1330 in Sruwaddacon Bay. Leenamoy River inlet crossing: 1140 and 1330.

5.1.2 DESIGNATED SITES – SUMMARY OF QUALIFYING AND NON-QUALIFYING INTERESTS
IN RELATION TO THE CORRIB GAS DEVELOPMENT (CONT)

NATURA 2000 SITE	STATUS OF HABITAT/SPECIES	HABITAT/SPECIES	LOCATION IN RELATION TO THE CORRIB GAS DEVELOPMENT FOOTPRINT
GLENAMOY BOG COMPLEX SAC (CONT)	Non-annexed habitats (neither qualifying nor listed for the SAC).	<ul style="list-style-type: none"> Reinstated section of sedimentary cliff and foreshore. 	<ul style="list-style-type: none"> Landfall.
		<ul style="list-style-type: none"> Improved agricultural grassland. 	<ul style="list-style-type: none"> Landfall valve installation site.
		<ul style="list-style-type: none"> Improved agricultural grassland. 	<ul style="list-style-type: none"> (Temporary works areas for the landfall valve installation, onshore pipeline and tunnel reception shaft).
		<ul style="list-style-type: none"> Improved agricultural grassland and wet, rushy grassland (SC2). 	<ul style="list-style-type: none"> Tunnel will be underneath some non-annexed habitats in the SAC on the Glengad section.
		<ul style="list-style-type: none"> Mosaic of wet, rushy grassland, marsh. 	
	EU Annex faunal spp. (terrestrial) (neither qualifying nor listed for the SAC).	<ul style="list-style-type: none"> Otter (<i>Lutra lutra</i>) (Annex II & IV) Bats (Annex IV). 	
	EU Annex II Marine Mammals (neither qualifying nor listed for the SAC).	<ul style="list-style-type: none"> Grey Seal (<i>Halochoerus grypus</i>) Common (Harbour) Seal (<i>Phoca vitulina</i>). 	
Annex IV Marine Mammals (neither qualifying nor listed for the SAC).	<ul style="list-style-type: none"> Harbour Porpoise (<i>Phocoena phocoena</i>) Larger odontocetes (Bottlenose Dolphin or Common Dolphin; <i>Tursiops truncatus</i> and <i>Delphinus delphis</i>, respectively). 		
Annex II Fish (neither qualifying nor listed for the SAC).	<ul style="list-style-type: none"> River Lamprey (<i>Lampetra fluviatilis</i>) Sea Lamprey (<i>Petromyzon marinus</i>). 		
Benthic fauna (neither qualifying nor listed for the SAC or SPA).	<ul style="list-style-type: none"> Macro-invertebrate population in general (food source for SPA species (see below)) Macro-invertebrate and epifauna population in the upper Leenamore inlet. 		
Other bird species (neither qualifying nor listed for the SAC or SPA).	<ul style="list-style-type: none"> Sand Martin (<i>Riparia riparia</i>) Birds (Terrestrial – general). 		
BLACKSOD BAY/ BROADHAVEN SPA 004037	SPA bird species.	<ul style="list-style-type: none"> Resident and over wintering. 	Landfall, tunnel under Sruwaddacon Bay and Leenamore inlet crossing in the SPA.

5.1.2 DESIGNATED SITES – SUMMARY OF QUALIFYING AND NON-QUALIFYING INTERESTS
IN RELATION TO THE CORRIB GAS DEVELOPMENT (CONT)

NATURA 2000 SITE	STATUS OF HABITAT/SPECIES	HABITAT/SPECIES	LOCATION IN RELATION TO THE CORRIB GAS DEVELOPMENT FOOTPRINT
BLACKSOD BAY/ BROADHAVEN (CONT)	Features of interest (recent list from NPWS website).	<ul style="list-style-type: none"> ■ Great Northern Diver (<i>Gavia immer</i>) ■ Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) ■ Common Scoter (<i>Melanitta nigra</i>) ■ Red Breasted Merganser (<i>Mergus serrator</i>) ■ Ringed Plover (<i>Charadrius hiaticula</i>) ■ Sanderling (<i>Calidris alba</i>) ■ Dunlin, Bar-tailed Godwit (<i>Limosa lapponica</i>) ■ Curlew (<i>Numenius arquata</i>) ■ Sandwich Tern (<i>Sterna sandvicensis</i>) ■ Wetlands and waterbirds. 	Landfall, tunnel under Sruwaddacon Bay and Leenamore inlet crossing in the SPA.
CARROWMORE LAKE COMPLEX SAC 000476	Qualifying interest – Annex I Habitats.	<ul style="list-style-type: none"> ■ 7130 Blanket bog (*active only) ■ 7150 Depressions on peat substrates of the Rhynchosporion. 	Bellanaboy Bridge Gas terminal is upstream from Carrowmore Lake.
	Listed Annex I bird species.	<ul style="list-style-type: none"> ■ Greenland white-fronted goose (<i>Anser albifrons flavirostris</i>) ■ Sandwich tern (<i>Sterna sandvicensis</i>) ■ Arctic tern (<i>Sterna paradisaea</i>) ■ Merlin (<i>Falco columbarius</i>) ■ Golden plover (<i>Pluvialis apricaria</i>). 	
	Qualifying interest – Protected plant species.	<ul style="list-style-type: none"> ■ Marsh Saxifrage (<i>Saxifraga hirculus</i>) ■ Varnished Hook-moss (<i>Drepanocladus vernicosus</i>). 	
	Regularly occurring Migratory Birds not listed on Annex I.	<ul style="list-style-type: none"> ■ Common Gull (<i>Larus canus</i>) ■ Wigeon (<i>Anas penelope</i>) ■ Garganey (<i>Anas querquedula</i>) ■ Tufted duck (<i>Aythya fuligula</i>). 	
	Other important species of flora and fauna.	<ul style="list-style-type: none"> ■ Mediterranean Heath (<i>Erica erigena</i>) ■ Red Grouse (<i>Lagopus lagopus</i>) ■ Irish Hare (<i>Lepus timidus hibernicus</i>). 	
CARROWMORE LAKE SPA 004052	Qualifying interest – Annex I bird species.	<ul style="list-style-type: none"> ■ Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) ■ Sandwich Tern (<i>Sterna sandvicensis</i>). 	Bellanaboy Bridge Gas terminal is upstream from Carrowmore Lake.
	Regularly occurring Migratory Birds not listed on Annex I.	<ul style="list-style-type: none"> ■ Common gull (<i>Larus canus</i>) ■ Black-headed gull (<i>Larus ridibundus</i>) ■ Cormorant (<i>Phalacrocorax carbo</i>) ■ Mallard (<i>Anas platyrhynchos</i>) ■ Pochard (<i>Aythya farina</i>) ■ Tufted duck (<i>Aythya fuligula</i>) ■ Scaup (<i>Anas marila</i>) ■ Goldeneye (<i>Bucephala clangula</i>) ■ Red Breasted Merganser (<i>Mergus serrator</i>). 	

5.2 MARINE MAMMALS AND OTHER MEGA-FAUNAL SPECIES RECORDED IN BROADHAVEN BAY 2002 TO 2011

5.2.1A MARINE MAMMAL OBSERVER SURVEY RECORDS FROM VESSELS ENGAGED IN PIPELINE SURVEY AND ROCK-DUMP OPERATIONS AND INCLUDES THE AREA FROM THE LANDFALL OUT TO THE FIELD (OCEAN SCIENCE CONSULTING)

SPECIES		SIGHTINGS			
		2011	2010	2009	2008
Minke whale	<i>Balaenoptera acutorostrata</i>		1		
Sei whale	<i>Balaenoptera borealis</i>				
Killer whale	<i>Orcinus orca</i>			1	
Risso's dolphin	<i>Grampus griseus</i>				
Bottlenose dolphin	<i>Tursiops truncatus</i>		3	12	5
Common dolphin	<i>Delphinus delphis</i>			5	
Atlantic white-sided dolphin	<i>Lagenorhynchus acutus</i>				
Whitebeaked dolphin	<i>Lagenorhynchus albirostris</i>				
Harbour porpoise	<i>Phocoena phocoena</i>			2	
Unidentified Whale					
Unidentified Dolphin				9	1
Grey seal	<i>Halochoerus grypus</i>	1	7		12
Harbour seal	<i>Phoca vitulina</i>		2	7	4
Unidentified Seal			6	44	3
Otter	<i>Lutra lutra,</i>				
Basking shark	<i>Cetorhinus maximus</i>			1	
Ocean Sunfish	<i>Mola mola</i>			2	

* Note that the term 'sighting' can comprise an individual or a cluster (group) of animals
'Unidentified' = sighting was distant and/or brief, which prevented identification of species

5.2.1B RECORDS MADE DURING MARINE MAMMAL OBSERVER SURVEY WORK FROM VESSELS ENGAGED IN PIPELINE SURVEY AND ROCK-DUMP OPERATIONS AND INCLUDES THE AREA FROM THE LANDFALL OUT TO THE FIELD (OCEAN SCIENCE CONSULTING)

SPECIES		INDIVIDUALS (BASED ON MAXIMUM POSSIBLE ESTIMATE OF INDIVIDUALS)			
		2011	2010	2009	2008
Minke whale	<i>Balaenoptera acutorostrata</i>		1		
Sei whale	<i>Balaenoptera borealis</i>				
Killer whale	<i>Orcinus orca</i>			2	
Risso's dolphin	<i>Grampus griseus</i>				
Bottlenose dolphin	<i>Tursiops truncatus</i>		80	170	27
Common dolphin	<i>Delphinus delphis</i>			82	
Atlantic white-sided dolphin	<i>Lagenorhynchus acutus</i>				
Whitebeaked dolphin	<i>Lagenorhynchus albirostris</i>				
Harbour porpoise	<i>Phocoena phocoena</i>			2	
Unidentified Whale					
Unidentified Dolphin				101	8
Grey seal	<i>Halochoerus grypus</i>	1	8		12
Harbour seal	<i>Phoca vitulina</i>		2	7	4
Unidentified Seal			6	45	3
Otter	<i>Lutra lutra</i>				
Basking shark	<i>Cetorhinus maximus</i>			1	
Sunfish	<i>Mola mola</i>			2	

5.2.2 SPECIES RECORDED IN BROADHAVEN BAY (CMRC¹²)

Note: 2005 and 2002 data based only on June to September

SPECIES		SIGHTINGS					
		2011	2010	2009	2008	2005	2002
Minke whale	<i>Balaenoptera acutorostrata</i>	39	25	15	6	1	4
Sei whale	<i>Balaenoptera borealis</i>	0	0	3	0	0	0
Killer whale	<i>Orcinus orca</i>	1	5	0	1	2	0
Risso's dolphin	<i>Grampus griseus</i>	2	1	3	7	4	6
Bottlenose dolphin	<i>Tursiops truncatus</i>	8	16	19	9	8	14
Common dolphin	<i>Delphinus delphis</i>	37	32	6	10	5	3
Atlantic white-sided dolphin	<i>Lagenorhynchus acutus</i>	2	0	1	0	0	3
Whitebeaked dolphin	<i>Lagenorhynchus albirostris</i>	1	2	0	0	0	2
Harbour porpoise	<i>Phocoena phocoena</i>	8	17	5	13	3	16
Unidentified Whale		3	1	1	2	0	0
Unidentified Dolphin		12	13	9	20	7	4
Unidentified cetacean		1	1	0	0	0	
Grey seal	<i>Halochoerus grypus</i>	49	93	31	10	22	58
Harbour seal	<i>Phoca vitulina</i>	4	26	6	✓	10	31
Unidentified Seal		45	38	40	12	2	2
Otter	<i>Lutra lutra</i>	2	1	0	0	0	0
Basking shark	<i>Cetorhinus maximus</i>	4	5	0	0	0	0
Sunfish	<i>Mola mola</i>	5	1	0	0	0	0
Leatherback turtle	<i>Dermochelys coriacea</i>	1	0	0	0	0	0

SPECIES		INDIVIDUALS					
		2011	2010	2009	2008	2005	2002
Minke whale	<i>Balaenoptera acutorostrata</i>	40	31	17	6	1	4
Sei whale	<i>Balaenoptera borealis</i>	0	0	4	0	0	0
Killer whale	<i>Orcinus orca</i>	2	12	0	3	6	
Risso's dolphin	<i>Grampus griseus</i>	17	8	13	38	11	19
Bottlenose dolphin	<i>Tursiops truncatus</i>	131	460	471	77	81	152
Common dolphin	<i>Delphinus delphis</i>	1561	1724	370	310	307	49
Atlantic white-sided dolphin	<i>Lagenorhynchus acutus</i>	10	0	30	0	0	91
Whitebeaked dolphin	<i>Lagenorhynchus albirostris</i>	7	20	0	0	0	8
Harbour porpoise	<i>Phocoena phocoena</i>	12	35	10	26	3	34
Unidentified Whale		4	1	1	3	0	0
Unidentified Dolphin		141	259	208	128	75	9
Unidentified cetacean		1	1		0	0	0
Grey seal	<i>Halochoerus grypus</i>	54	104	34	0	24	63
Harbour seal	<i>Phoca vitulina</i>	4	26	6	16	10	83
Unidentified Seal		54	39	42	13	2	8
Otter	<i>Lutra lutra</i>	2	1	0	0	0	0
Basking shark	<i>Cetorhinus maximus</i>	4	5	0	0	0	0
Sunfish	<i>Mola mola</i>	5	1	0	0	0	0
Leatherback turtle	<i>Dermochelys coriacea</i>	1	0	0	0	0	0

12: Coastal and Marine Resources Centre, University College Cork (UCC).

5.3 BENTHIC SPECIES

5.3.1 SRUWADDACON BAY

The following tables contain a list of the benthic species which were found in the different types of habitat during baseline surveys in Sruwaddacon Bay in 2007.

The MCS code (Marine Conservation Society) is listed in the first column of the following tables. This code is unique to each species and has been included for reference should species names change in the future.

5.3.1.1 INTERTIDAL SAND

MCS CODE	SPECIES		TOTAL COUNT
P0776	<i>Pygospio elegans</i>		718
HD001	<i>Nematoda</i>		167
W0385	<i>Hydrobia ulvae</i>		112
S0076	<i>Neomysis integer</i>		69
P0458	<i>Nereididae</i>	juveniles	46
P1490	<i>Tubificoides benedii</i>		44
P1479	<i>Heterochaeta costata</i>		33
P0462	<i>Hediste diversicolor</i>		32
P1425	<i>Tubificidae</i>	damaged/indet	32
P0906	<i>Capitella</i>	spp. complex	30
P1501	<i>Enchytraeidae</i>		22
P0117 /118	<i>Eteone flava/longa</i>		21
P0917	<i>Heteromastus filiformis</i>		20
W1961	<i>Cerastodema edule</i>		15
S0457	<i>Bathyporeia pilosa</i>		14
S0452	<i>Bathyporeia elegans</i>		13
P0737	<i>Malacoceros fuliginosus</i>		12
S0247	<i>Urothoe brevicornis</i>		11
S0605	<i>Corophium</i>	juvs	10
P0791	<i>Spio martinensis</i>		9
W2068	<i>Scrobicularia plana</i>		7

5.3.1.1 INTERTIDAL SAND (CONT)

MCS CODE	SPECIES		TOTAL COUNT
S0616	<i>Corophium volutator</i>		6
G0001	<i>Nemertea</i>		5
P1003	<i>Ophelia rathkei</i>		5
P0498	<i>Nephtys cirrosa</i>		4
P0672	<i>Scoloplos armiger</i>		4
P0789	<i>Spio decorata</i>		4
P1294	<i>Manayunkia aestuarina</i>		4
P1007	<i>Travisia forbesi</i>		3
W2012	<i>Angulus tenuis</i>		3
S0106	<i>Apherusa? jurinei</i>		2
S0456	<i>Bathyporeia pelagica</i>		2
W1695	<i>Mytilus edulis</i>	juvs	2
P0025	<i>Polynoidae</i>	scale-less	1
P0145	<i>Anaitides mucosa</i>		1
P0421	<i>Exogone hebes</i>		1
P0495	<i>Nephtys assimilis</i>		1
P0677	<i>Aricidea minuta</i>		1
S0081	<i>Praunus</i>	damaged/indet	1
S1383	<i>Crangon</i>	juvs	1
S1385	<i>Crangon crangon</i>		1
S1594	<i>Carcinus maenus</i>		1
W0088	<i>Gastropoda</i>	shell-less	1
	<i>Zostera sp.</i>	present	

5.3.1.2 INTERTIDAL MUDDY SAND

MCS CODE	SPECIES		TOTAL COUNT
P1479	<i>Heterochaeta costata</i>		49
P1490	<i>Tubificoides benedii</i>		48
P0462	<i>Hediste diversicolor</i>		41
P0458	Nereididae	juveniles	36
P0776	<i>Pygospio elegans</i>		31
S0076	<i>Neomysis integer</i>		14
S0616	<i>Corophium volutator</i>		7
W0385	<i>Hydrobia ulvae</i>		5
W2068	<i>Scrobicularia plana</i>		5
S1594	<i>Carcinus maenus</i>		2
D0079	Edwardsiidae		1
P0499	<i>Nephtys hombergii</i>		1
P0655	Orbiniidae	mid-section only	1
P1294	<i>Manayunkia aestuarina</i>		1
P1501	Enchytraeidae		1
S1385	<i>Crangon crangon</i>		1
W1961	<i>Cerastodema edule</i>		1

5.3.1.3 INTERTIDAL MIXED SEDIMENTS

MCS CODE	SPECIES		TOTAL COUNT
P1479	<i>Heterochaeta costata</i>		165
HD001	Nematoda		119
P0458	Nereididae	juveniles	83
P1501	Enchytraeidae		72
P0776	<i>Pygospio elegans</i>		62
P1490	<i>Tubificoides benedii</i>		51
W0385	<i>Hydrobia ulvae</i>		33
P1425	Tubificidae	damaged/indet	18
P0906	<i>Capitella</i>	spp. complex	14
P0737	<i>Malacoceros fuliginosus</i>		12
P0462	<i>Hediste diversicolor</i>		10
P1294	<i>Manayunkia aestuarina</i>		5
P0117/118	<i>Eteone flava/longa</i>		3
P0720	Spionidae	juvs/damaged	3
P0917	<i>Heteromastus filiformis</i>		3
W2068	<i>Scrobicularia plana</i>		3
S0457	<i>Bathyporeia pilosa</i>		2
W1695	<i>Mytilus edulis</i>	juvs	2
S0616	<i>Corophium volutator</i>		1
S0855	<i>Eurydice spinigera</i>		1
S1594	<i>Carcinus maenus</i>		1
W1937	Cardiacea	juvs/damaged	1
W1961	<i>Cerastodema edule</i>		1

5.3.1.4 SUBTIDAL SAND

MCS CODE	SPECIES		TOTAL COUNT
P0794	<i>Spiophanes bombyx</i>		59
S0456	<i>Bathyporeia pelagica</i>		41
S0247	<i>Urothoe brevicornis</i>		16
P0776	<i>Pygospio elegans</i>		13
P0498	<i>Nephtys cirrosa</i>		9
S0452	<i>Bathyporeia elegans</i>		9
W0385	<i>Hydrobia ulvae</i>		7
G0001	<i>Nemertea</i>		5
P0789	<i>Spio decorata</i>		5
S0248	<i>Urothoe elegans</i>		4
S0412	<i>Atylus swammerdami</i>		4
P0791	<i>Spio martinensis</i>		3
S0133	<i>Pontocrates altamarinus</i>		3
S0471	<i>Gammarus</i>		3
W2012	<i>Angulus tenuis</i>		3
P0907	<i>Capitella capitata</i>		2
W0294	<i>Littorina</i>		2
HD001	<i>Nematoda</i>		1
P0494	<i>Nephtys</i>		1
P1095	<i>Myriochele danielsseni</i>		1
S0410	<i>Atylus falcatus</i>		1
S0577	<i>Aoridae</i>		1
S1594	<i>Carcinus maenus</i>		1

5.3.2 BENTHIC INFAUNA AND EPIFAUNAL SPECIES RECORDED DURING THE JUNE 2010
12-MONTH POST-CONSTRUCTION SURVEY AT GLENGAD LANDFALL
(FROM LANDFALL INTERTIDAL SURVEY JUNE 2010)

PHYLUM	TAXON	2010	
		1MM	0.5MM
Cnidaria	<i>Dynamena pumila</i>	✓	
Entoprocta	<i>Pedicellina</i> sp.	✓	
Nemertea	Nemertea	✓	✓
Nematoda	Nematoda		✓
Annelida	<i>Pisione remota</i>	✓	
	<i>Eteone longa</i>	✓	✓
	<i>Hesionura elongate</i>	✓	✓
	<i>Mysta picta</i>		✓
	<i>Microphthalmus</i> sp.		✓
	Nereididae		✓
	<i>Hediste diversicolor</i>	✓	
	<i>Nephtys cirrosa</i>	✓	
	<i>Malacoceros fuliginosus</i>	✓	✓
	<i>Pygospio elegans</i>	✓	✓
	<i>Scolelepis squamata</i>	✓	✓
	<i>Spio martinensis</i>		✓
	<i>Psammodrillus balanoglossoides</i>		✓
	<i>Capitella</i> sp.	✓	✓
	<i>Arenicola</i> sp.	✓	
	Opheliidae.	✓	✓
	<i>Ophelia rathkei</i>	✓	✓
	<i>Travisia forbesii</i>		✓
	<i>Saccocirrus papillocercus</i>	✓	✓
	<i>Fabricia stellaris</i>	✓	✓
Enchytraeidae		✓	
Arthropoda	<i>Pontocrates arenarius</i>	✓	✓
	<i>Talitrus saltator</i>	✓	✓
	<i>Urothoe brevicornis</i>		✓
	<i>Bathyporeia pelagica</i>	✓	✓
	Gammaridae	✓	
	<i>Jaera albifrons</i>		✓
Mollusca	Portunidae	✓	
	<i>Lacuna parva</i>	✓	✓
	<i>Odostomia</i> spp.		✓
	<i>Mytilus edulis</i>	✓	✓
Ectoprocta	<i>Bowerbankia</i> spp.	✓	
Bryozoa	<i>Electra pilosa</i>	✓	✓

5.4 PLANT SPECIES RECORDED FROM TERRESTRIAL HABITATS AND THE LEENAMORE INLET

Note: Bryophyte nomenclature is after: Atherton, I. et al (Ed) 2010 Mosses and Liverworts of Britain and Ireland a field guide. British Bryological Society

5.4.1 GLENGAD

5.4.1.1 ONSHORE TEMPORARY WORKS AREAS

5.4.1.1A PLANT SPECIES RECORDED IN IMPROVED GRASSLAND HABITAT PRE-CONSTRUCTION IN 2001, AND IN 2011, TWO YEARS AFTER REINSTATEMENT IN 2009

SPECIES	COMMON NAME	2001	2011
HIGHER PLANTS			
<i>Achillea millefolium</i>	Yarrow	✓	-
<i>Agrostis capillaris</i>	Common Bent	✓	-
<i>Agrostis stolonifera</i>	Creeping Bent	✓	✓
<i>Alopecurus geniculatus</i>	Marsh Foxtail	-	✓
<i>Anagallis tenella</i>	Bog Pimpernel	✓	✓
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	✓	✓
<i>Bellis perennis</i>	Daisy	✓	✓
<i>Bromus hordaceus</i>	Soft Brome	✓	-
<i>Cardamine pratensis</i>	Cuckoo Flower	✓	-
<i>Carex flacca</i>	Glaucous Sedge	-	✓
<i>Carex viridula subsp. oedocarpa</i>	Short-stalked Yellow-sedge	-	✓
<i>Centaurea nigra</i>	Knapweed	✓	-
<i>Centaurium erythraea</i>	Common Centaury	-	✓
<i>Cerastium fontanum</i>	Common Mouse-ear	✓	✓
<i>Cirsium arvense</i>	Creeping Thistle	✓	-
<i>Cirsium palustre</i>	Marsh Thistle	✓	-
<i>Cirsium vulgare</i>	Spear Thistle	-	✓
<i>Cynosurus cristatus</i>	Crested Dog's-tail	✓	-
<i>Euphrasia tetraquetra</i>	Eyebright	✓	-
<i>Festuca rubra</i>	Red Fescue	✓	-
<i>Galium verum</i>	Lady's Bedstraw	✓	-
<i>Geranium molle</i>	Dove's-foot Cranesbill	✓	-
<i>Glyceria sp.</i>	Sweet-grass species	-	✓
<i>Heracleum sphondylium</i>	Hogweed	✓	-
<i>Holcus lanatus</i>	Yorkshire Fog	✓	✓
<i>Hypericum humifusum</i>	Trailing St. John's-wort	-	✓
<i>Hypochoeris radicata</i>	Cat's Ear	✓	✓
<i>Isolepis setacea</i>	Bristle Club-rush	-	✓
<i>Juncus articulatus</i>	Jointed Rush	✓	✓

5.4.1.1A PLANT SPECIES RECORDED IN IMPROVED GRASSLAND HABITAT PRE-CONSTRUCTION IN 2001,
AND IN 2011, TWO YEARS AFTER REINSTATEMENT IN 2009 (CONT)

SPECIES	COMMON NAME	2001	2011
HIGHER PLANTS			
<i>Juncus bufonius</i>	Toad Rush	✓	✓
<i>Juncus bulbosus</i>	Bulbous Rush	-	✓
<i>Juncus effusus</i>	Soft Rush	-	✓
<i>Leontodon autumnalis</i>	Autumn Hawkbit	✓	✓
<i>Leontodon taraxacoides</i>	Lesser Hawkbit	✓	-
<i>Leucanthemum vulgare</i>	Oxeye Daisy	-	✓
<i>Lolium perenne</i>	Perennial Rye-grass	✓	✓
<i>Lotus corniculatus</i>	Bird's-foot Trefoil	✓	✓
<i>Luzula campestris</i>	Field Woodrush	✓	-
<i>Myosotis arvensis</i>	Common Forget-me-not	-	✓
<i>Plantago coronopus</i>	Buck's-horn Plantain	✓	-
<i>Plantago lanceolata</i>	Ribwort Plantain	✓	-
<i>Plantago major</i>	Greater Plantain	✓	✓
<i>Poa annua</i>	Annual Meadow-grass	✓	✓
<i>Poa pratensis</i>	Smooth Meadow-grass	✓	✓
<i>Polygonum aviculare</i>	Knotgrass	✓	-
<i>Potentilla anserina</i>	Silverweed	✓	-
<i>Potentilla reptans</i>	Creeping Cinquefoil	✓	-
<i>Prunella vulgaris</i>	Selfheal	✓	-
<i>Ranunculus acris</i>	Meadow Buttercup	✓	-
<i>Ranunculus flammula</i>	Lesser Spearwort	-	✓
<i>Ranunculus repens</i>	Creeping Buttercup	✓	✓
<i>Rumex acetosa</i>	Sorrel	✓	✓
<i>Rumex acetosella</i>	Sheep's Sorrel	-	✓
<i>Rumex crispus</i>	Curled Dock	-	✓
<i>Sagina procumbens</i>	Procumbent Pearlwort	✓	✓
<i>Senecio jacobea</i>	Ragwort	✓	✓
<i>Sonchus sp.</i>	Sow Thistle species	-	✓
<i>Stellaria graminea</i>	Lesser Stitchwort	✓	-
<i>Stellaria media</i>	Common Chickweed	✓	✓
<i>Taraxacum officinale</i>	Dandelion	✓	✓
<i>Trifolium pratense</i>	Red Clover	✓	-
<i>Trifolium repens</i>	White Clover	✓	✓
<i>Veronica arvensis</i>	Wall Speedwell	✓	-
BRYOPHYTES (MOSESSES AND LIVERWORTS)			
<i>Brachythecium rutabulum</i>	Rough-stalked Feather-moss	✓	-
<i>Bryum sp.</i>		-	✓
<i>Kindbergia praelonga (formerly Eurhynchium praelongum)</i>	Common Feather-moss	✓	-
<i>Lophocolea bidentata</i>	Bifid Crestwort	✓	-
<i>Plagiomnium undulatum</i>	Hart's-tongue Thyme-moss	✓	-
<i>Rhytidiadelphus squarrosus</i>	Spring Turf-moss	✓	✓

5.4.1.1B PLANT SPECIES RECORDED AT GLENGAD IN WET GRASSLAND WHICH OCCURS IN PLACES WITHIN THE TEMPORARY WORKS AREAS. (FROM SURVEYS BETWEEN 2001 AND 2011)

SPECIES	COMMON NAME	SITE COMPOUND SC1 AND WAYLEAVE (WEST)	SITE COMPOUND SC2
HIGHER PLANTS			
<i>Agrostis capillaris</i>	Common Bent	-	✓
<i>Agrostis stolonifera</i>	Creeping Bent	✓	✓
<i>Anagallis tenella</i>	Bog Pimpernel	✓	-
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	✓	✓
<i>Cardamine pratensis</i>	Cuckoo Flower	✓	-
<i>Carex disticha</i>	Brown Sedge	✓	-
<i>Carex echinata</i>	Star Sedge	✓	-
<i>Carex nigra</i>	Common Sedge	✓	-
<i>Cynosurus cristatus</i>	Crested Dog's-tail	✓	✓
<i>Dactylis glomerata</i>	Cock's Foot	-	✓
<i>Festuca rubra</i>	Red Fescue	✓	-
<i>Galium palustre</i>	Common Marsh-bedstraw	-	✓
<i>Gnaphalium uliginosum</i>	Marsh Cudweed	✓	-
<i>Holcus lanatus</i>	Yorkshire Fog	✓	✓
<i>Hydrocotyle vulgaris</i>	Marsh Pennywort	✓	-
<i>Hypericum pulchrum</i>	Slender St. John's-wort	✓	-
<i>Juncus articulatus</i>	Jointed Rush	✓	✓
<i>Juncus bufonius</i>	Toad Rush	✓	-
<i>Juncus bulbosus</i>	Bulbous Rush	✓	-
<i>Juncus conglomeratus</i>	Compact Rush	✓	✓
<i>Juncus effusus</i>	Soft Rush	-	✓
<i>Juncus inflexus</i>	Hard Rush	✓	-
<i>Iris pseudacorus</i>	Yellow Flag	-	✓
<i>Leontodon autumnalis</i>	Autumn Hawkbit	✓	-
<i>Phleum pratense</i>	Timothy	✓	-
<i>Poa pratensis</i>	Smooth Meadow-grass	✓	✓
<i>Prunella vulgaris</i>	Selfheal	-	✓
<i>Ranunculus acris</i>	Meadow Buttercup	-	✓
<i>Ranunculus flammula</i>	Lesser Spearwort	✓	-
<i>Ranunculus repens</i>	Creeping Buttercup	✓	✓
<i>Rumex acetosa</i>	Sorrel	-	✓
<i>Sagina procumbens</i>	Procumbent Pearlwort	✓	-
<i>Senecio aquaticus</i>	Marsh Ragwort	✓	-
<i>Taraxacum officinale</i>	Dandelion	✓	-
<i>Trifolium repens</i>	White Clover	✓	✓
<i>Veronica arvensis</i>	Wall Speedwell	✓	-

5.4.1.1B PLANT SPECIES RECORDED AT GLENGAD IN WET GRASSLAND WHICH OCCURS IN PLACES WITHIN THE TEMPORARY WORKS AREAS. (FROM SURVEYS BETWEEN 2001 AND 2011) (CONT)

SPECIES	COMMON NAME	SITE COMPOUND SC1 AND WAYLEAVE (WEST)	SITE COMPOUND SC2
BRYOPHYTES (MOSESSES AND LIVERWORTS)			
<i>Brachythecium rutabulum</i>	Rough-stalked Feather-moss	✓	-
<i>Calliergonella cuspidata</i>	Pointed Spear-Moss	-	✓
<i>Kindbergia praelonga</i> (formerly <i>Eurhynchium praelongum</i>)	Common Feather-moss	✓	-
<i>Plagiomnium undulatum</i>	Hart's-tongue Thyme-moss	✓	-
<i>Rhytidiadelphus squarrosus</i>	Spring Turf-moss	✓	-

5.4.1.2 SOFT CLIFF HABITAT AT GLENGAD

5.4.1.2A PLANT SPECIES RECORDED AT THE REINSTATED SECTION OF CLIFF FOLLOWING LANDFALL WORKS IN 2009

SPECIES	COMMON NAME	POST – REINSTATEMENT (2009)	
		2011	2012
<i>Agrostis sp.</i>	Bent-grass species	-	✓
<i>Ammophila arenaria</i>	Marram Grass	✓	✓
<i>Bellis perennis</i>	Daisy	✓	✓
<i>Cerastium fontanum</i>	Common Mouse-ear	✓	-
<i>Cirsium vulgare</i>	Spear Thistle	✓	✓
<i>Festuca rubra</i>	Red Fescue	✓	✓
<i>Holcus lanatus</i>	Yorkshire Fog	✓	✓
<i>Juncus sp.</i>	Rush species	✓	-
<i>Leontodon autumnalis</i>	Autumn Hawkbit	-	✓
<i>Plantago lanceolata</i>	Ribwort Plantain	✓	✓
<i>Plantago major</i>	Greater Plantain	-	✓
<i>Plantago maritima</i>	Sea Plantain	✓	✓
<i>Poa annua</i>	Annual Meadow-grass	✓	✓
<i>Prunella vulgaris</i>	Selfheal	✓	-
<i>Ranunculus repens</i>	Creeping Buttercup	✓	✓
<i>Rumex acetosa</i>	Sorrel	✓	✓
<i>Rumex acetosella</i>	Sheep's Sorrel	✓	-
<i>Rumex crispus</i>	Curled Dock	✓	✓
<i>Rumex obtusifolius</i>	Broad-leaved Dock	✓	✓
<i>Sagina procumbens</i>	Procumbent Pearlwort	✓	✓
<i>Senecio jacobea</i>	Ragwort	✓	✓
<i>Sonchus asper</i>	Prickly Sow-thistle	✓	✓
<i>Stellaria sp.</i>	Chickweed species	✓	-
<i>Taraxacum officinale agg.</i>	Dandelion	✓	-
<i>Trifolium pratense</i>	Red Clover	-	✓
<i>Trifolium repens</i>	White Clover	✓	✓
<i>Tussilago farfara</i>	Colt's-foot	✓	✓

5.4.1.2B PLANT SPECIES RECORDED ON THE LOW CLIFF TO THE NORTH OF THE TEMPORARY WORKS AREA AT GLENGAD 2011 AND 2012

(Note: This cliff is outside the footprint of the Corrib development, but is under the stewardship of the project)

SPECIES	COMMON NAME	2011	2012
HIGHER PLANTS			
<i>Ammophila arenaria</i>	Marram Grass	✓	✓
<i>Armeria maritima</i>	Thrift	✓	✓
<i>Bellis perennis</i>	Daisy	✓	✓
<i>Cardamine pratensis</i>	Cuckoo Flower	✓	-
<i>Festuca rubra</i>	Red Fescue	✓	✓
<i>Holcus lanatus</i>	Yorkshire Fog	✓	✓
<i>Hypochoeris radicata</i>	Cat's-ear	-	✓
<i>Lotus corniculatus</i>	Bird's-foot Trefoil	✓	✓
<i>Osmunda regalis</i>	Royal Fern	✓	✓
<i>Plantago coronopus</i>	Buck's-horn Plantain	✓	✓
<i>Plantago lanceolata</i>	Ribwort Plantain	✓	✓
<i>Plantago maritima</i>	Sea Plantain	✓	✓
<i>Poa annua</i>	Annual Meadow-grass	✓	-
<i>Primula vulgaris</i>	Primrose	✓	✓
<i>Rumex acetosa</i>	Sorrel	✓	✓
<i>Rumex crispus</i>	Curled Dock	✓	✓
<i>Sagina procumbens</i>	Procumbent Pearlwort	✓	✓
<i>Senecio jacobea</i>	Ragwort	✓	✓
<i>Taraxacum officinale agg.</i>	Dandelion	✓	-
<i>Trifolium repens</i>	White Clover	✓	✓
<i>Tussilago farfara</i>	Colt's-foot	✓	✓
<i>Viola riviniana</i>	Dog-violet	✓	-
FERNS			
<i>Dryopteris dilatata</i>	Broad Buckler Fern	✓	-
<i>Phyllitis scolopendrium</i>	Hart's-tongue Fern	✓	-

5.4.2 AUGHOOSE AND THE LEENAMORE INLET

5.4.2.1 PLANT SPECIES OCCURRING AT AUGHOOSE (SITE COMPOUND SC3) IN HEAVILY AND SEVERELY ERODED BLANKET BOG HABITATS PRE-CONSTRUCTION (2011) AND DURING CONSTRUCTION (2012)

SPECIES	COMMON NAME	PRE-CONSTRUCTION (2011) (✓ = present) § = more frequent in the very heavily eroded areas	DURING CONSTRUCTION PEAT STORAGE AREAS 2012 (✓ = present)
HIGHER PLANTS			
<i>Agrostis sp.</i>	Bent grass species	✓ §	-
<i>Calluna vulgaris</i>	Ling, Heather	✓	✓
<i>Carex binervis</i>	Green-ribbed Sedge	✓ §	-
<i>Carex echinata</i>	Star Sedge	✓ §	-
<i>Carex panicea</i>	Carnation Sedge	✓	✓
<i>Danthonia decumbens</i>	Heath Grass	✓ §	-
<i>Drosera rotundifolia</i>	Round-leaved Sundew	✓	✓
<i>Eleocharis multicaulis</i>	Many-stalked Spike-rush	✓ §	✓
<i>Erica cinerea</i>	Bell Heather	✓	✓
<i>Erica tetralix</i>	Cross-leaved Heath	✓	✓
<i>Eriophorum angustifolium</i>	Common Bog Cotton	✓	✓
<i>Eriophorum vaginatum</i>	Hare's tail Bog Cotton	✓	✓
<i>Festuca ovina</i>	Sheep's Fescue	✓	-
<i>Holcus lanatus</i>	Yorkshire Fog	-	✓
<i>Juncus bulbosus</i>	Bulbous Rush	✓ §	✓
<i>Juncus effusus</i>	Soft Rush	✓	-
<i>Juncus squarrosus</i>	Heath Rush	✓ §	-
<i>Molinia caerulea</i>	Purple Moor-grass	✓	✓
<i>Myrica gale</i>	Bog Myrtle	✓	✓
<i>Nardus stricta</i>	Mat Grass	✓ §	-
<i>Narthecium ossifragum</i>	Bog Asphodel	✓	✓
<i>Pedicularis sylvatica</i>	Lousewort	-	✓
<i>Pinus contorta (seedlings)</i>	Lodgepole Pine	-	✓
<i>Polygala serpyllifolia</i>	Heath Milk-wort	✓	✓
<i>Potentilla erecta</i>	Tormentil	✓	✓
<i>Rhynchospora alba</i>	White-beaked Sedge	✓	✓
<i>Schoenus nigricans</i>	Black Bog-rush	✓	✓
<i>Tricophorum cespitosum</i>	Deer Grass	✓	✓
<i>Ulex europaeus</i>	Orse	✓	-

5.4.2.1 PLANT SPECIES OCCURRING AT AUGHOOSE (SITE COMPOUND SC3) IN HEAVILY AND SEVERELY ERODED BLANKET BOG HABITATS PRE-CONSTRUCTION (2011) AND DURING CONSTRUCTION (2012) (CONT)

SPECIES	COMMON NAME	PRE-CONSTRUCTION (2011) (✓ = present) § = more frequent in the very heavily eroded areas	DURING CONSTRUCTION PEAT STORAGE AREAS 2012 (✓ = present)
BRYOPHYTES (MOSES AND LIVERWORTS)			
<i>Campylopus spp.</i>		-	✓
<i>Campylopus atrovirens</i>	Bristly Swan-neck Moss	✓	-
<i>Campylopus introflexus</i>	Heath Star-moss	✓ §	✓
<i>Hylocomium splendens</i>	Glittering wood-moss	✓	✓
<i>Hypnum jutlandicum</i>	Heath Plait-moss	✓	✓
<i>Odontoschisma sphagni</i>	Bog-moss Flapwort	✓	-
<i>Pleurozia purpurea</i>	Purple Spoonwort	✓	✓
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	✓	-
<i>Racomitrium lanuginosum</i>	Woolly Fringe-moss	✓	✓
<i>Rhytidiadelphus loreus</i>	Little Shaggy-moss	✓	✓
<i>Sphagnum spp.</i>		-	✓
<i>Sphagnum capillifolium</i>	Acute-leaved/Red Bog-moss	✓	✓
<i>Sphagnum cuspidatum</i>	Feathery Bog-moss	✓	✓
<i>Sphagnum denticulatum</i>	Cow-horn Bog-moss	✓	✓
<i>Sphagnum magellanicum</i>	Magellanic Bog-moss	✓	
<i>Sphagnum papillosum</i>	Papillose Bog-moss	✓	✓
<i>Sphagnum subnitens</i>	Lustrous Bog-moss	✓	-
<i>Sphagnum tenellum</i>	Soft Bog-moss	✓	✓
LICHENS			
<i>Cladonia portentosa</i>		✓	✓
<i>Cladonia uncialis</i>		✓	✓

5.4.2.2 PLANT SPECIES RECORDED AT THE LEENAMORE INLET FROM SALT MARSH,
MARGINS AND INCLUDING INTERTIDAL SEAWEEDS

SPECIES	COMMON NAME	2008	2012
HIGHER PLANTS			
<i>Agrostis stolonifera</i>	Creeping Bent	✓	✓
<i>Anagallis tenella</i>	Bog Pimpernel	✓	✓
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	✓	✓
<i>Armeria maritima</i>	Thrift	✓	✓
<i>Aster tripolium</i>	Sea Aster	-	✓
<i>Carex extensa</i>	Long-bracted Sedge	✓	✓
<i>Carex panicea</i>	Carnation Sedge	✓	✓
<i>Cochlearia officinalis</i>	Common Scurvy-grass	✓	✓
<i>Eleocharis uniglumis</i>	Slender Spike-rush	-	✓
<i>Festuca rubra</i>	Red Fescue	✓	✓
<i>Glaux maritima</i>	Sea Milkwort	✓	✓
<i>Hydrocotyle vulgaris</i>	Marsh Pennywort	✓	✓
<i>Isolepis setacea</i>	Bristle Club-rush	-	✓
<i>Juncus gerardii</i>	Salt-marsh Rush	✓	✓
<i>Juncus maritimus</i>	Sea Rush	✓	✓
<i>Leontodon autumnalis</i>	Autumn Hawkbit	✓	✓
<i>Plantago coronopus</i>	Buck's-horn Plantain	✓	✓
<i>Plantago maritima</i>	Sea Plantain	-	✓
<i>Puccinellia maritima</i>	Common Salt-marsh grass	✓	✓
<i>Spergularia sp.</i>	Sea-spurrey species	✓	✓
<i>Trifolium repens</i>	White Clover	✓	✓
<i>Triglochin maritima</i>	Sea Arrow-grass	-	✓
BRYOPHYTES (MOSES AND LIVERWORTS)			
<i>Calliergonella cuspidata</i>	Pointed Spear-Moss	✓	✓
<i>Kindbergia praelonga</i> (formerly <i>Eurhynchium praelongum</i>)	Common Feather-moss	✓	✓
<i>Rhytidiadelphus squarrosus</i>	Spring Turf-moss	✓	✓
ALGAE – SEAWEEDS			
<i>Ascophyllum nodosum</i>	Knotted wrack	✓	✓
<i>Fucus ceranoides</i>	Horned wrack	✓	✓
<i>Fucus serratus</i>	Toothed wrack	-	✓
<i>Fucus vesiculosus</i>	Bladder wrack	✓	✓

5.4.2.3 PLANT SPECIES RECORDED IN THE FIELDS OF WET, RUSHY GRASSLAND
ON EITHER SIDE OF THE LEENAMORE INLET

SPECIES	COMMON NAME	2008	2012
HIGHER PLANTS			
<i>Anagallis tenella</i>	Bog Pimpernel	✓	✓
<i>Cardamine pratensis</i>	Cuckoo Flower	✓	✓
<i>Carex binervis</i>	Green-ribbed Sedge	✓	✓
<i>Carex echinata</i>	Star Sedge	✓	✓
<i>Cerastium fontanum</i>	Common Mouse Ear	✓	✓
<i>Cirsium palustre</i>	Marsh Thistle	✓	✓
<i>Cynosurus cristatus</i>	Crested Dog's-tail	✓	✓
<i>Eriophorum angustifolium</i>	Common Bog Cotton	✓	✓
<i>Holcus lanatus</i>	Yorkshire Fog	✓	✓
<i>Hydrocotyle vulgaris</i>	Marsh Pennywort	✓	✓
<i>Juncus articulatus</i>	Jointed Rush	✓	✓
<i>Juncus effusus</i>	Soft Rush	✓	✓
<i>Lolium perenne</i>	Perennial Rye-grass	✓	✓
<i>Nardus stricta</i>	Mat Grass	✓	✓
<i>Ranunculus flammula</i>	Lesser Spearwort	✓	✓
<i>Ranunculus repens</i>	Creeping Buttercup	✓	✓
<i>Trifolium repens</i>	White Clover	✓	✓
<i>Cirsium vulgare</i>	Spear Thistle	✓	-
<i>Galium palustre</i>	Common Marsh-bedstraw	✓	-
<i>Montia fontana</i>	Blanks	✓	-
<i>Wahlenbergia hederacea</i>	Ivy-leaved Bellflower	✓	-
<i>Agrostis capillaris</i>	Common Bent grass	-	✓
<i>Agrostis stolonifera</i>	Creeping Bent grass	-	✓
<i>Anthoxanthum odoratum</i>	Sweet Vernal grass	-	✓
<i>Bellis perennis</i>	Daisy	-	✓
<i>Carex flacca</i>	Glauous Sedge	-	✓
<i>Carex panicea</i>	Carnation Sedge	-	✓
<i>Carex pulicaris</i>	Flea Sedge	-	✓
<i>Carex viridula subsp. oedocarpa</i>	Short-stalked Yellow Sedge	-	✓
<i>Dactylorhiza sp.</i>	Orchid species	-	✓
<i>Danthonia decumbens</i>	Heath Grass	-	✓
<i>Epilobium palustre</i>	Marsh Willowherb	-	✓
<i>Festuca rubra</i>	Red Fescue	-	✓
<i>Filipendula ulmaria</i>	Meadowsweet	-	✓
<i>Galium saxatile</i>	Heath Bedstraw	-	✓
<i>Iris pseudacorus</i>	Yellow Flag	-	✓
<i>Juncus acutiflorus</i>	Sharp-flowered Rush	-	✓
<i>Juncus bulbosus</i>	Bulbous Rush	-	✓
<i>Luzula multiflora</i>	Heath Wood-rush	-	✓

5.4.2.3 PLANT SPECIES RECORDED IN THE FIELDS OF WET, RUSHY GRASSLAND
ON EITHER SIDE OF THE LEENAMORE INLET (CONT)

SPECIES	COMMON NAME	2008	2012
HIGHER PLANTS			
<i>Molinia caerulea</i>	Purple Moor-grass	-	✓
<i>Ophioglossum vulgatum</i>	Adder's-tongue	-	✓
<i>Poa pratensis</i>	Common Meadow-grass	-	✓
<i>Potentilla erecta</i>	Tormentil	-	✓
<i>Prunella vulgaris</i>	Selfheal	-	✓
<i>Ranunculus acris</i>	Meadow Buttercup	-	✓
<i>Rubus fruticosus</i>	Bramble	-	✓
<i>Succisa pratensis</i>	Devil's-bit Scabious	-	✓
<i>Taraxacum officinale agg.</i>	Dandelion	-	✓
<i>Trifolium pratense</i>	Red Clover	-	✓
<i>Viola palustris</i>	Marsh Violet	-	✓
BRYOPHYTES (MOSES AND LIVERWORTS)			
<i>Aulacomium palustre</i>	Bog Bead-moss	-	✓
<i>Calliergonella cuspidata</i>	Pointed Spear-moss	✓	✓
<i>Fissidens adianthoides</i>	Maidenhair Pocket-moss	-	✓
<i>Hylocomium splendens</i>	Glittering Wood-moss	✓	✓
<i>Lophocolea bidentata</i>	Bifid Crestwort	-	✓
<i>Philonotis fontana</i>	Fountain Apple-moss	✓	✓
<i>Plagiomnium undulatum</i>	Hart's-tongue Thyme-moss	-	✓
<i>Rhytidiadelphus squarrosus</i>	Spring Turf-moss	✓	✓
<i>Pseudoscleropodium purum</i>	Neat Feather-moss	-	✓
<i>Thuidium tamariscinum</i>	Common Tamarisk-moss	✓	✓

5.4.2.4 PLANT SPECIES RECORDED BETWEEN 2008 AND 2012 IN THE AREA OF
RECOVERING BLANKET BOG AT AUGHOOSE, THE "190M" SECTION

SPECIES	COMMON NAME	2008	2010	2012
HIGHER PLANTS				
<i>Agrostis sp.</i>	Bent Grass species	✓	✓	✓
<i>Calluna vulgaris</i>	Ling, Heather	✓	✓	✓
<i>Carex binervis</i>	Green-ribbed Sedge	-	✓	✓
<i>Carex panicea</i>	Carnation Sedge	✓	✓	✓
<i>Drosera rotundifolia</i>	Round-leaved Sundew	✓	✓	✓
<i>Erica cinerea</i>	Bell Heather	✓	✓	✓
<i>Erica tetralix</i>	Cross-leaved Heath	✓	✓	✓
<i>Eriophorum angustifolium</i>	Common Bog Cotton	✓	✓	✓
<i>Eriophorum vaginatum</i>	Hare's-tail Bog Cotton	✓	✓	✓

5.4.2.4 PLANT SPECIES RECORDED BETWEEN 2008 AND 2012 IN THE AREA OF
RECOVERING BLANKET BOG AT AUGHOOSE, THE "190M" SECTION (CONT)

SPECIES	COMMON NAME	2008	2010	2012
HIGHER PLANTS				
<i>Molinia caerulea</i>	Purple Moor-grass	✓	✓	✓
<i>Myrica gale</i>	Bog Myrtle	✓	✓	✓
<i>Narthecium ossifragum</i>	Bog Asphodel	✓	✓	✓
<i>Pedicularis sylvatica</i>	Heath Lousewort	-	✓	✓
<i>Pinguicula lusitanica</i>	Pale Butterwort	✓	✓	-
<i>Pinus contorta</i> (seedlings)	Lodgepole Pine	✓	✓	✓
<i>Polygala serpyllifolia</i>	Heath Milkwort	✓	✓	✓
<i>Potentilla erecta</i>	Tormentil	✓	✓	✓
<i>Rhododendron ponticum</i> (seedlings)	Rhododendron	-	✓	✓
<i>Rhynchospora alba</i>	White-beaked Sedge	✓	✓	✓
<i>Schoenus nigricans</i>	Black Bog-rush	✓	✓	✓
<i>Succisa pratensis</i>	Devil's-bit Scabious	-	-	✓
<i>Tricophorum cespitosum</i>	Deer Grass	✓	✓	✓
BRYOPHYTES (MOSESSES AND LIVERWORTS)				
<i>Campylopus</i> sp.	n/a	✓	✓	✓
<i>Campylopus atrovirens</i>	Bristly Swan-neck Moss	-	✓	✓
<i>Dicranum scoparium</i>	Broom Fork-moss	✓	✓	✓
<i>Frullania tamarisci</i>	Tamarisk Scalewort	✓	✓	✓
<i>Hypnum jutlandicum</i>	Heath Plait-moss	✓	✓	✓
<i>Leucobryum glaucum</i>	Large White-moss	-	✓	✓
<i>Odontoschisma sphagni</i>	Bog-moss Flapwort	✓	✓	✓
<i>Pleurozia purpurea</i>	Purple Spoonwort	✓	✓	✓
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	✓	✓	✓
<i>Racomitrium lanuginosum</i>	Woolly Fringe-moss	✓	✓	✓
<i>Scapania</i> sp.	Earwort	-	✓	✓
<i>Sphagnum capillifolium</i>	Acute-leaved/Red Bog-moss	✓	✓	✓
<i>Sphagnum cuspidatum</i>	Feathery Bog-moss	✓	✓	✓
<i>Sphagnum magellanicum</i>	Magellanic Bog-moss	✓	✓	✓
<i>Sphagnum papillosum</i>	Papillose Bog-moss	✓	✓	✓
<i>Sphagnum tenellum</i>	Soft Bog-moss	✓	✓	✓
LICHENS				
<i>Cladonia floerkeana</i>	n/a	-	-	✓
<i>Cladonia portentosa</i>	n/a	✓	✓	✓
<i>Cladonia uncialis</i>	n/a	✓	✓	✓

5.4.3 CONIFER PLANTATION AT AUGHOOSE

5.4.3.1 PLANT SPECIES RECORDED FROM
THE MATURE CONIFER PLANTATION
AT AUGHOOSE, TO THE NORTH
OF THE LOCAL ROAD (L1202)

SPECIES	COMMON NAME
HIGHER PLANTS	
<i>Calluna vulgaris</i>	Ling, Heather
<i>Molinia caerulea</i>	Purple Moor-grass
<i>Pinus contorta</i>	Lodgepole Pine
<i>Rhododendron ponticum</i>	Rhododendron
<i>Rubus fruticosus</i>	Bramble
<i>Solidago virgaurea</i>	Golden Rod
FERNS	
<i>Blechnum spicant</i>	Hard Fern
<i>Dryopteris dilatata</i>	Broad Buckler Fern
BRYOPHYTES (MOSES AND LIVERWORTS)	
<i>Hypnum cupressiforme</i>	Cypress-leaved Plait-moss
<i>Leucobryum glaucum</i>	Large White-moss
<i>Plagiothecium undulatum</i>	Waved Silk-moss
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss
<i>Polytrichum commune</i>	Common Haircap
<i>Rhytidiadelphus loreus</i>	Little Shaggy-moss
<i>Sphagnum palustre</i>	Blunt-leaved Bog-moss
<i>Thuidium tamariscinum</i>	Common Tamarisk-moss

5.4.4 HABITATS TO THE SOUTH OF
THE LOCAL ROAD, L1202

These include the habitats associated with the pipeline wayleave and the Bellanaboy Bridge Gas Terminal site.

5.4.4.1 PLANT SPECIES RECORDED FROM
WET RUSHY GRASSLAND

SPECIES	COMMON NAME
HIGHER PLANTS	
<i>Agrostis canina</i>	Velvet Bent
<i>Agrostis stolonifera</i>	Creeping Bent
<i>Angelica sylvestris</i>	Wild Angelica
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass
<i>Bellis perennis</i>	Daisy
<i>Calluna vulgaris</i>	Ling, Heather
<i>Calystegia sepium</i>	Hedge Bindweed
<i>Carex echinata</i>	Star Sedge
<i>Carex nigra</i>	Common Sedge
<i>Carex pulicaris</i>	Flea Sedge
<i>Cerastium fontanum</i>	Common Mouse-Ear
<i>Cirsium palustre</i>	Marsh Thistle
<i>Dactylis glomerata</i>	Cocks' Foot
<i>Dactylorhiza incarnata</i>	Early Marsh Orchid
<i>Dactylorhiza maculata</i>	Heath Spotted Orchid
<i>Epilobium palustre</i>	Marsh Willow-herb
<i>Erica tetralix</i>	Cross-leaved Heath
<i>Glyceria fluitans</i>	Floating Sweet-Grass
<i>Holcus lanatus</i>	Yorkshire Fog
<i>Hydrocotyle vulgaris</i>	Marsh Pennywort
<i>Juncus articulatus</i>	Jointed Rush
<i>Juncus bulbosus</i>	Bulbous Rush
<i>Juncus effusus</i>	Soft Rush
<i>Leontodon autumnalis</i>	Autumn Hawkbit
<i>Lolium perenne</i>	Perennial Rye-grass
<i>Myosotis laxa</i>	Tufted Forget-me-not
<i>Plantago lanceolata</i>	Ribwort Plantain
<i>Platanthera bifolia</i>	Lesser Butterfly Orchid
<i>Poa trivialis</i>	Rough Meadow-grass
<i>Potentilla erecta</i>	Tormentil
<i>Prunella vulgaris</i>	Selfheal

5.4.4.1 PLANT SPECIES RECORDED FROM WET RUSHY GRASSLAND (CONT)

SPECIES	COMMON NAME
HIGHER PLANTS	
<i>Ranunculus acris</i>	Meadow Buttercup
<i>Ranunculus flammula</i>	Lesser Spearwort
<i>Ranunculus repens</i>	Creeping Buttercup
<i>Rumex acetosa</i>	Sorrel
<i>Sagina procumbens</i>	Procumbent Pearlwort
<i>Senecio aquaticus</i>	Marsh Ragwort
<i>Stellaria uliginosa</i>	Bog Stitchwort
<i>Succisa pratensis</i>	Devils' Bit Scabious
<i>Taraxacum officinale</i> agg.	Dandelion
<i>Trifolium repens</i>	White Clover
<i>Vicia cracca</i>	Common Vetch
<i>Viola palustris</i>	Marsh Violet
FERNS	
<i>Dryopteris aemula</i>	Hay-Scented Buckler
<i>Dryopteris dilatata</i>	Broad Buckler Fern
<i>Osmunda regalis</i>	Royal Fern
BRYOPHYTES (MOSSES AND LIVERWORTS)	
<i>Aulacomium palustre</i>	Bog Bead-moss
<i>Bryum pseudotriquetrum</i>	Marsh Bryum
<i>Calliergonella cuspidata</i>	Pointed Spear-Moss
<i>Kindbergia praelonga</i> (formerly <i>Eurhynchium praelongum</i>)	Common Feather-moss
<i>Lophocolea bidentata</i>	Bifid Crestwort
<i>Marchantia polymorpha</i>	Star-headed Liverwort
<i>Philonotis fontana</i>	Fountain Apple-moss
<i>Plagiomnium affine</i>	Many-fruited Thyme-moss
<i>Plagiomnium undulatum</i>	Waved Silk-moss
<i>Polytrichum commune</i>	Common Haircap
<i>Pseudoscleropodium purum</i>	Neat Feather-moss
<i>Rhytidiadelphus squarrosus</i>	Springy Turf-moss
<i>Thuidium tamariscinum</i>	Common Tamarisk-moss
LICHENS	
<i>Peltigera</i> spp.	n/a

5.4.4.2 PLANT SPECIES RECORDED FROM
TRACKS AND MARGINS

SPECIES	COMMON NAME
HIGHER PLANTS	
<i>Achillea ptarmica</i>	Sneezewort
<i>Agrostis stolonifera</i>	Creeping Bent
<i>Alnus incana</i>	Grey Alder
<i>Alopecurus geniculatus</i>	Marsh Foxtail
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass
<i>Arrhenatherum elatius</i>	False Oat-Grass
<i>Bellis perennis</i>	Daisy
<i>Betula spp.</i>	Birch
<i>Bromus hordeaceus</i>	Soft Brome
<i>Carex disticha</i>	Brown Sedge
<i>Carex flacca</i>	Glaucous Sedge
<i>Carex ovalis</i>	Oval Sedge
<i>Carex pilulifera</i>	Pill Sedge
<i>Carex pulicaris</i>	Flea Sedge
<i>Carex viridula subsp. oedocarpa</i>	Short-stalked Yellow. sedge
<i>Centaurea nigra</i>	Knapweed
<i>Cerastium fontanum</i>	Common Mouse-Ear
<i>Cirsium palustre</i>	Marsh Thistle
<i>Cirsium vulgare</i>	Spear Thistle
<i>Crococsmia x crococsmiiflora</i>	Montbretia
<i>Cynosurus cristatus</i>	Crested Dog's-tail
<i>Dactylis glomerata</i>	Cocks' Foot
<i>Digitalis purpurea</i>	Foxglove
<i>Euphrasia officinalis agg.</i>	Eyebright
<i>Festuca rubra</i>	Red Fescue
<i>Geranium dissectum</i>	Cut-leaved Cranesbill
<i>Glyceria fluitans</i>	Floating Sweet-Grass
<i>Gnaphalium uliginosum</i>	Marsh Cudweed
<i>Holcus lanatus</i>	Yorkshire Fog
<i>Hypericum pulchrum</i>	Heath St. John's-wort
<i>Hypericum tetrapterum</i>	Square Stalked St. John's-wort

5.4.4.2 PLANT SPECIES RECORDED FROM
TRACKS AND MARGINS (CONT)

SPECIES	COMMON NAME
HIGHER PLANTS	
<i>Hypochoeris radicata</i>	Cats' Ear
<i>Isolepis setacea</i>	Bristle Club-Rush
<i>Juncus articulatus</i>	Jointed Rush
<i>Juncus bufonius</i>	Toad Rush
<i>Juncus bulbosus</i>	Bulbous Rush
<i>Juncus effusus</i>	Soft Rush
<i>Lathyrus pratensis</i>	Meadow Vetchling
<i>Lolium perenne</i>	Perennial Rye-grass
<i>Lotus uliginosus</i>	Marsh Bird's Foot Trefoil
<i>Luzula multiflora</i>	Heath Woodrush
<i>Lysmachia nemorum</i>	Yellow Pimpernel
<i>Lythrum portula</i>	Water Purslane
<i>Lythrum salicaria</i>	Purple Loosestrife
<i>Matricaria discoidea</i>	Pineapple Weed
<i>Molinia caerulea</i>	Purple Moor-Grass
<i>Nardus stricta</i>	Mat Grass
<i>Odontites verna</i>	Red Bartsia
<i>Olearia macrodonta</i>	Daisy Bush
<i>Pericaria maculosa</i>	Redshank
<i>Phragmites australis</i>	Common Reed
<i>Plantago lanceolata</i>	Ribwort Plantain
<i>Plantago major</i>	Greater Plantain
<i>Poa annua</i>	Annual Meadow-Grass
<i>Poa trivialis</i>	Rough Meadow-grass
<i>Potentilla anserina</i>	Silverweed
<i>Potentilla erecta</i>	Tormentil
<i>Primula vulgaris</i>	Primrose
<i>Prunella vulgaris</i>	Selfheal
<i>Pteridium aquilinum</i>	Bracken
<i>Ranunculus acris</i>	Meadow Buttercup
<i>Ranunculus flammula</i>	Lesser Spearwort
<i>Ranunculus repens</i>	Creeping Buttercup
<i>Rhododendron ponticum</i>	Rhododendron

5.4.4.2 PLANT SPECIES RECORDED FROM TRACKS AND MARGINS (CONT)

SPECIES	COMMON NAME
HIGHER PLANTS	
<i>Rubus fruticosus</i> agg.	Bramble
<i>Rumex acetosa</i>	Sorrel
<i>Rumex crispus</i>	Curled Dock
<i>Rumex obtusifolius</i>	Broad-Leaved Dock
<i>Sagina procumbens</i>	Procumbent Pearlwort
<i>Salix aurita</i>	Eared Willow
<i>Salix caprea</i>	Goat Willow
<i>Salix cinerea</i> subsp. <i>oleifolia</i>	Grey Willow
<i>Scrophularia auriculata</i>	Water Figwort
<i>Senecio aquaticus</i>	Marsh Ragwort
<i>Senecio jacobea</i>	Ragwort
<i>Sonchus asper</i>	Prickly Sow-thistle
<i>Sorbus aucuparia</i>	Rowan
<i>Taraxacum officinale</i> agg.	Dandelion
<i>Trifolium dubium</i>	Lesser Trefoil
<i>Trifolium repens</i>	White Clover
<i>Ulex europaeus</i>	Gorse
<i>Urtica dioica</i>	Common Nettle
<i>Veronica beccabunga</i>	Brooklime
<i>Veronica chamaedrys</i>	Germander Speedwell
<i>Veronica officinalis</i>	Heath Speedwell
<i>Veronica serpyllifolia</i>	Thyme-Leaved Speedwell
<i>Vicia cracca</i>	Common Vetch
<i>Vulpia bromoides</i>	Squirrel-tail Fescue
FERNS	
<i>Athyrium filix-femina</i>	Lady Fern
<i>Blechnum spicant</i>	Hard Fern
<i>Dryopteris affinis</i>	Scaly Male Fern
<i>Dryopteris dilatata</i>	Broad Buckler Fern
<i>Dryopteris filix-mas</i>	Male Fern
<i>Equisetum palustre</i>	Marsh Horsetail
BRYOPHYTES (MOSESSES AND LIVERWORTS)	
<i>Calliergonella cuspidata</i>	Pointed Spear-Moss

5.4.4.3 PLANT SPECIES RECORDED FROM DRAINS AND WATERCOURSES

SPECIES	COMMON NAME
HIGHER PLANTS	
<i>Callitriche stagnalis</i> agg.	Common Water-starwort
<i>Cardamine pratensis</i>	Cuckoo Flower
<i>Carex disticha</i>	Brown Sedge
<i>Carex echinata</i>	Star Sedge
<i>Carex nigra</i>	Common Sedge
<i>Epilobium palustre</i>	Marsh Willowherb
<i>Epilobium parviflorum</i>	Hoary Willowherb
<i>Eriophorum angustifolium</i>	Common Bog Cotton
<i>Festuca arundinacea</i>	Tall Fescue
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Galium palustre</i>	Common Marsh-bedstraw
<i>Hydrocotyle vulgaris</i>	Marsh Pennywort
<i>Hypericum tetrapterum</i>	Square Stalked St. John's-wort
<i>Iris pseudacorus</i>	Yellow Flag
<i>Juncus articulatus</i>	Jointed Rush
<i>Juncus bulbosus</i>	Bulbous Rush
<i>Juncus effusus</i>	Soft Rush
<i>Lemna minor</i>	Common Duckweed
<i>Lythrum salicaria</i>	Purple Loosestrife
<i>Myosotis laxa</i>	Tufted Forget-me-not
<i>Phalaris arundinacea</i>	Canary Reed-Grass
<i>Phragmites australis</i>	Common Reed
<i>Ranunculus flammula</i>	Lesser Spearwort
<i>Rorippa nasturtium-aquaticum</i>	Water Cress
<i>Rumex crispus</i>	Curled Dock
<i>Stellaria uliginosa</i>	Bog Stitchwort
<i>Typha latifolia</i>	Bulrush
<i>Veronica beccabunga</i>	Brooklime
<i>Viola palustris</i>	Marsh Violet
FERNS	
<i>Blechnum spicant</i>	Hard Fern
<i>Dryopteris dilatata</i>	Broad Buckler Fern
<i>Equisetum palustre</i>	Marsh Horsetail
BRYOPHYTES (MOSESSES AND LIVERWORTS)	
<i>Aulacomium palustre</i>	Bog Bead-moss
<i>Bryum pseudotriquetrum</i>	Marsh Bryum
<i>Calliergonella cuspidatum</i>	Pointed Spear-Moss
<i>Philonotis fontana</i>	Fountain Apple-moss

5.4.4.4 PLANT SPECIES RECORDED FROM
REMNANT BLANKET BOG

SPECIES	COMMON NAME
HIGHER PLANTS	
<i>Anagallis tenella</i>	Bog Pimpernel
<i>Calluna vulgaris</i>	Ling, Heather
<i>Carex binervis</i>	Green-Ribbed Sedge
<i>Carex panicea</i>	Carnation Sedge
<i>Carex viridula</i> subsp. <i>oedocarpa</i>	Short-stalked Yellow Sedge
<i>Cirsium dissectum</i>	Meadow Thistle
<i>Dactylorhiza maculata</i>	Heath Spotted Orchid
<i>Drosera rotundifolia</i>	Round-Leaved Sundew
<i>Erica tetralix</i>	Cross-leaved Heath
<i>Eriophorum angustifolium</i>	Cottongrass
<i>Galium saxatile</i>	Heath Bedstraw
<i>Luzula multiflora</i>	Heath Woodrush
<i>Molinia caerulea</i>	Purple Moor-Grass
<i>Nardus stricta</i>	Mat Grass
<i>Narthecium ossifragum</i>	Bog Asphodel
<i>Pedicularis sylvatica</i>	Lousewort
<i>Pinguicula lusitanica</i>	Pale Butterwort
<i>Polygala serpyllifolia</i>	Heath Milkwort
<i>Potentilla erecta</i>	Tormentil
<i>Rhynchospora alba</i>	White-beaked Sedge
<i>Schoenus nigricans</i>	Black Bog Rush
<i>Succisa pratensis</i>	Devils' Bit Scabious
<i>Taraxacum officinale</i> agg.	Dandelion
<i>Trichophorum caespitosum</i>	Deer Grass
<i>Veronica officinalis</i>	Heath Speedwell

5.4.4.4 PLANT SPECIES RECORDED FROM
REMNANT BLANKET BOG (CONT)

SPECIES	COMMON NAME
BRYOPHYTES (MOSES AND LIVERWORTS)	
<i>Hypnum cupressiforme</i>	Cypress-leaved Plait-moss
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss
<i>Polytrichum commune</i>	Common Haircap
<i>Rhytidiadelphus loreus</i>	Little Shaggy-moss
<i>Rhytidiadelphus squarrosus</i>	Spring Turf-moss
<i>Sphagnum denticulatum</i> (formerly <i>auriculatum</i>)	Cow-horn Bog-moss
<i>Sphagnum capillifolium</i>	Acute-leaved/Red Bog-moss
<i>Sphagnum palustre</i>	Blunt-leaved Bog-moss
<i>Sphagnum papillosum</i>	Papillose Bog-moss
<i>Thuidium tamariscinum</i>	Common Tamarisk-moss
LICHENS	
<i>Cladonia portentosa</i>	n/a

5.4.4.5 PLANT SPECIES RECORDED FROM
IMMATURE CONIFER PLANTATION

SPECIES	COMMON NAME
<i>Betula</i> spp.	Birch
<i>Epilobium angustifolium</i>	Rosebay
<i>Olearia macrodonta</i>	Daisy Bush
<i>Phormium tenax</i>	New Zealand Flax
<i>Picea sitchensis</i>	Sitka Spruce
<i>Pinus contorta</i>	Lodgepole Pine
<i>Rhododendron ponticum</i>	Rhododendron
<i>Rubus fruticosus</i> agg.	Bramble
<i>Salix aurita</i>	Eared Willow
<i>Salix cinerea</i> subsp. <i>oleifolia</i>	Grey Willow
<i>Ulex europaeus</i>	Gorse

5.5 NON-AVIAN TERRESTRIAL VERTEBRATES KNOWN TO OCCUR IN THE LOCALITY

ORDER COMMON NAME	SPECIES	LEVEL OF PROTECTION/ LEGISLATION EU HABITATS DIRECTIVE ANNEX II, IV, V IRISH WILDLIFE ACTS (IRISH) OTHER PROTECTION	CURRENT CONSERVATION STATUS – IRISH RED LISTS ^{13 14}	OCCURRENCE IN THE AREA
CARNIVORA				
Otter	<i>Lutra lutra</i>	II, IV Irish CITES Appendix 1	Near threatened	Common, frequent, mainly near aquatic habitats. Present throughout Bay area, and utilises streams and rivers. Will forage across adjoining terrestrial habitats.
Badger	<i>Meles meles</i>	Irish	Least concern	Widespread in the area. Locally uncommon but ranges appear to have increased over period of studies.
Pine Marten	<i>Martes martes</i>	V Irish	Least concern	Relatively frequent in areas of coniferous plantation, scrub areas and woodland. Occurs on site east in coniferous plantations including in the locality of the Bellanaboy Bridge Gas Terminal.
American Mink	<i>Mustela vison</i>	None Introduced species	-	Occasional, infrequent. In association with aquatic habitats. Known to occur in the Bay area and in the general locality.
Irish Stoat	<i>Mustela erminea hibernica</i>	Irish	Least concern	Scarce. A species that is widespread but infrequent in the Irish countryside. Rarely observed in the locality.
Fox	<i>Vulpes vulpes</i>	None	Least concern	Widespread in the area. Ranges across all habitat types, and will forage along shores also. Signs frequently found.
LAGOMORPHA				
Irish Hare	<i>Lepus timidus hibernicus</i>	V Irish	Least concern	Frequent, locally common, in the Bay area. Forages on pasture grasslands, wet grasslands, and also along shores.
Rabbit	<i>Oryctolagus cuniculus</i>	None	Least concern	Scarce in the area presently, probably due to myxomatosis.

13: Ireland Red List no 3 – Terrestrial mammals. National Parks & Wildlife Service (NPWS, 2009)

14: Ireland Red List no 5 – Amphibians, Reptiles and Freshwater Fish. National Parks & Wildlife Service (NPWS, 2011)

5.5 NON-AVIAN TERRESTRIAL VERTEBRATES KNOWN TO OCCUR IN THE LOCALITY (CONT)

ORDER COMMON NAME	SPECIES	LEVEL OF PROTECTION/ LEGISLATION EU HABITATS DIRECTIVE ANNEX II, IV, V IRISH WILDLIFE ACTS (IRISH) OTHER PROTECTION	CURRENT CONSERVATION STATUS – IRISH RED LISTS	OCCURRENCE IN THE AREA
INSECTIVORA				
Hedgehog	<i>Erinaceus europaeus</i>	Irish	Least concern	Occasional, scarce.
Pygmy Shrew	<i>Sorex minutus</i>	Irish	Least concern	Present, frequent on pastures and wet grasslands; also occurs in woodlands, scrub etc.
ARTIODACTYLA				
Red Deer	<i>Cervus elaphus</i>	Irish	Least concern	Infrequent/scarce. Known occasionally in coniferous plantations in the area.
RODENTIA				
Brown Rat	<i>Rattus norvegicus</i>	None	-	Known on site, widespread. Occurs in many terrestrial habitats.
Long-tailed Field Mouse or Wood Mouse	<i>Apodemus sylvaticus</i>	None	Least concern	Known on site, widespread. Occurs in all terrestrial habitats.
House mouse	<i>Mus musculus domesticus</i>	None	Least concern	May occur in the locality. Not recorded on site to date. Usually associated with agriculture or domestic dwellings.
CHIROPTERA (BATS)				
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	IV Irish	Least concern	Known to occur in the locality, infrequent due to relatively poor foraging habitat in the area.
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	IV Irish	Least concern	Known to occur in the locality, infrequent due to relatively poor foraging habitat in the area.
Brown Long-eared bat	<i>Plecotus auritus</i>	IV Irish	Least concern	Known to occur in the locality. Scarce on site due to poor foraging habitat in the area.

5.5 NON-AVIAN TERRESTRIAL VERTEBRATES KNOWN TO OCCUR IN THE LOCALITY (CONT)

ORDER COMMON NAME	SPECIES	LEVEL OF PROTECTION/ LEGISLATION EU HABITATS DIRECTIVE ANNEX II, IV, V IRISH WILDLIFE ACTS (IRISH) OTHER PROTECTION	CURRENT CONSERVATION STATUS – IRISH RED LISTS	OCCURRENCE IN THE AREA
CHIROPTERA (BATS)				
Leisler's bat	<i>Nyctalus leisleri</i>	IV Irish	Least concern	Does occur in the area; relatively poor foraging habitat in the area. Recorded as present in locality, south of the R314 road.
Daubenton's bat	<i>Myotis daubentonii</i>	IV Irish	Least concern	May occur in the area; expected to be scarce due to lack of suitable foraging habitat in the area. One <i>Myotis</i> species recorded in area during studies (between Aughooose and Pollatomish, pre-2010).
AMPHIBIA				
Common Frog	<i>Rana temporaria</i>	V Irish	Least concern	Widespread in area, but only locally common. Frequent on wet grasslands, also pasture grasslands and marginal wet heath/bog habitats. Breeding sites known on site.
Smooth Newt	<i>Triturus vulgaris</i>	Irish	Least concern	Scarce. Known to occur in the locality of the Bellanaboy Bridge Gas Terminal.
REPTILIA				
Common Lizard	<i>Zootoca vivipara</i> (<i>Lacerta vivipara</i>)	Irish	Least concern	This is a widespread species occurring on bogs, heath, and a range of terrestrial habitats, but infrequently observed. Known to occur at Aughooose.

5.6 BIRD SPECIES RECORDED BETWEEN 2002 AND 2012

5.6.1 BIRD SPECIES RECORDED IN THE VICINITY OF THE ONSHORE PIPELINE ROUTE FROM ALL AQUATIC STUDIES, AND THEIR CONSERVATION STATUS

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS		
		EU BIRDS DIRECTIVE	REVISED BoCCI* (after Lynas et al. 2007)	PREVIOUS BoCCI (after Newton et al. 1999)
American Golden Plover	<i>Pluvialis dominica</i>		N/A	N/A
Auk sp.			N/A	N/A
Bar-tailed Godwit	<i>Limosa lapponica</i>	Annex I	Amber ⁸	Amber (W,E)
Blackbird	<i>Turdus merula</i>		Green	Green
Black Guillemot	<i>Cephus grylle</i>		Amber ¹⁽²⁾	Amber (E)
Black-headed Gull	<i>Larus ridibundus</i>		Red ^{2, 3, 6}	Amber (B)
Black-legged Kittiwake	<i>Rissa tridactyla</i>		Amber ⁶	Green
Black-tailed Godwit	<i>Limosa limosa</i>		Amber ^{1(2), 8}	Amber (W, E)
Chough	<i>Pyrrhocorax pyrrhocorax</i>	Annex I	Amber ^{1(3), 2}	Red (D)
Common Tern	<i>Sterna hirundo/ paradisaea</i>	Annex I	Amber ⁶	Amber (B)
Common Tern	<i>Sterna hirundo</i>	Annex I	Amber ⁶	Amber (B)
Common Gull	<i>Larus canus</i>		Amber ^{1(2), 3, 6}	Amber (E)
Common Sandpiper	<i>Actitis hypoleucos</i>		Amber ¹⁽³⁾	Green
Cormorant	<i>Phalacrocorax carbo</i>		Amber ⁶	Amber (B)
Curlew	<i>Numenius arquata</i>		Red ^{1(2), 2, 7, 8}	Red (D)
Dunlin	<i>Calidris alpina</i>	Annex I	Amber ^{1(3), 8}	Amber (W,E)
Eider	<i>Somateria mollissima</i>		Amber ⁸	Amber (W)
Fulmar	<i>Fulmaris glacialis</i>		Green	Green
Gannet	<i>Morus bassanus</i>		Amber ⁶	Amber (B)
Golden Plover	<i>Pluvialis apricaria</i>	Annex I	Red ²	Amber (B)
Great Black-backed Gull	<i>Larus marinus</i>		Amber ²	Green
Great-northern Diver	<i>Gavia immer</i>	Annex I	Green	Green
Greenfinch	<i>Carduelis chloris</i>		Green	Green
Greenshank	<i>Tringa nebularia</i>		Amber ^{5, 9}	Green
Grey Heron	<i>Ardea cinerea</i>		Green	Green
Hen Harrier	<i>Circus cyaneus</i>	Annex I	Amber ^{1(3), 3}	Red (B, W)
Herring Gull	<i>Larus argentatus</i>		Red ²	Green
Hooded Crow	<i>Corvus cornix</i>		Green	Green
House Martin	<i>Delichon urbica</i>		Amber ¹⁽³⁾	Green
Iceland Gull	<i>Larus glaucooides</i>		Green	Green
Jackdaw	<i>Corvus monedula</i>		Green	Green
Kestrel	<i>Falco tinnunculus</i>		Amber ¹⁽³⁾	Green
Lapwing	<i>Vanellus vanellus</i>		Red ²	Red (D)
Lesser Black-backed Gull	<i>Larus fuscus</i>		Amber ⁶	Green
Light-bellied Brent Goose	<i>Branta bernicla hrota</i>		Amber ^{1(3)8,9}	Amber (W)
Linnet	<i>Carduelis cannabina</i>		Amber ¹⁽²⁾	Green
Little Egret	<i>Egretta garzetta</i>	Annex I	Green	Amber (B)
Little Grebe	<i>Tachybaptus ruficollis</i>		Amber ³	Green

5.6.1 BIRD SPECIES RECORDED IN THE VICINITY OF THE ONSHORE PIPELINE ROUTE FROM ALL AQUATIC STUDIES, AND THEIR CONSERVATION STATUS (CONT)

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS		
		EU BIRDS DIRECTIVE	REVISED BoCCI* (after Lynas et al. 2007)	PREVIOUS BoCCI (after Newton et al. 1999)
Little Tern	<i>Sterna albifrons</i>	Annex I	Amber ^{1(3), 2, 6}	Amber (W,E)
Magpie	<i>Pica pica</i>		Green	Green
Mallard	<i>Anas platyrhynchos</i>		Green	Green
Meadow Pipit	<i>Anthus pratensis</i>		Green	Green
Merlin	<i>Falco columbarius</i>	Annex I	Amber ³	Amber (B)
Mistle Thrush	<i>Turdus viscivorus</i>		Green	Green
Mute Swan	<i>Cygnus olor</i>		Amber ⁹	Green
Oystercatcher	<i>Haematopus ostralegus</i>		Amber ⁸	Green
Peregrine Falcon	<i>Falco peregrinus</i>	Annex I	Green	Amber (E)
Pied Wagtail	<i>Motacilla alba</i>		Green	Green
Raven	<i>Corvus corax</i>		Green	Green
Razorbill	<i>Alca torda</i>		Amber ⁶	Amber (B)
Red-breasted Merganser	<i>Mergus serrator</i>		Green	Amber (W)
Redshank	<i>Tringa totanus</i>		Red ^{1(2), 2, 8}	Amber (B,W,E)
Red-throated Diver	<i>Gavia stellata</i>	Annex I	Amber ^{1(3), 5}	Amber (B,E)
Ringed Plover	<i>Charadrius hiaticula</i>		Amber ⁹	Green
Rock Dove	<i>Columba livia</i>		Green	Green
Rock Pipit	<i>Anthus petrosus</i>		Green	Green
Rook	<i>Corvus frugilegus</i>		Green	Green
Sand Martin	<i>Riparia riparia</i>		Amber ¹⁽³⁾	Amber (E)
Sanderling	<i>Calidris alba</i>		Green	Green
Sandwich Tern	<i>Sterna sandvicensis</i>	Annex I	Amber ^{1(2), 6}	Amber (B,E)
Shag	<i>Phalacrocorax aristotelis</i>		Amber ⁶	Green
Shelduck	<i>Tadorna tadorna</i>		Amber ⁸	Amber (W)
Shoveler	<i>Anas clypeata</i>		Red ^{1(3), 4, 7}	Green
Skylark	<i>Alauda arvensis</i>		Amber ¹⁽³⁾	Amber (B,E)
Snipe	<i>Gallinago gallinago</i>		Amber ¹⁽³⁾	Amber (B)
Sparrowhawk	<i>Accipiter nisus</i>		Green	Green
Spotted Redshank	<i>Tringa erythropus</i>		Green	Green
Starling	<i>Sturnus vulgaris</i>		Amber ¹⁽³⁾	Green
Stonechat	<i>Saxicola torquata</i>		Green	Amber (E)
Swallow	<i>Hirundo rustica</i>		Amber ¹⁽³⁾	Amber (E)
Teal	<i>Anas crecca</i>		Amber ³	Amber (B)
Tufted Duck	<i>Aythya fuligula</i>		Amber ^{1(3), 8}	Amber (W)
Turnstone	<i>Arenaria interpres</i>		Green	Green
Whimbrel	<i>Numenius phaeopus</i>		Green	Green
Whooper Swan	<i>Cygnus cygnus</i>	Annex I	Amber ^{5, 8, 9}	Amber (B,E)
Wigeon	<i>Anas penelope</i>		Amber ⁸	Amber (B)
Wren	<i>Troglodytes troglodytes</i>		Green	Green

*Reasons for BoCCI Conservation Status as listed by Lynas et al. (2007) †

1 (Number) = SPEC 1, 2 or 3	4 = BI	7 = WDMp
2 = BDp (for Red listed) or BDMp (for Amber listed)	5 = BR	8 = WL
3 = BDr (for Red listed) or BDMr (for Amber listed)	6 = BL	9 = WI

5.6.2 BIRD SPECIES RECORDED IN THE VICINITY OF THE ONSHORE PIPELINE FROM
ALL TERRESTRIAL BIRD STUDIES, AND THEIR CONSERVATION STATUS

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS		
		EU BIRDS DIRECTIVE	REVISED BoCCI* (after Lynas et al. 2007)	PREVIOUS BoCCI (after Newton et al. 1999)
Blackbird	<i>Turdus merula</i>		Green	Green
Blackcap	<i>Sylvia atricapilla</i>		Green	Green
Blue Tit	<i>Cyanistes caeruleus</i>		Green	Green
Bullfinch	<i>Pyrrhula pyrrhula</i>		Green	Green
Chaffinch	<i>Fringilla coelebs</i>		Green	Green
Chough	<i>Pyrrhocorax pyrrhocorax</i>	Annex I	Amber ^{1(3), 2}	Red (D)
Coal Tit	<i>Pariparus ater</i>		Green	Green
Collared Dove	<i>Streptopelia decaocto</i>		Green	Green
Crossbill	<i>Loxia curvirostra</i>		Green	Green
Cuckoo	<i>Cuculus canorus</i>		Green	Amber (B)
Dunnock	<i>Prunella modularis</i>		Green	Green
Goldcrest	<i>Regulus regulus</i>		Green	Green
Goldfinch	<i>Carduelis carduelis</i>		Green	Green
Grasshopper Warbler	<i>Locustrella naevia</i>		Amber ^{2, 3}	Amber (B)
Great Tit	<i>Parus major</i>		Green	Green
Greenfinch	<i>Carduelis chloris</i>		Green	Green
Grey Wagtail	<i>Motacilla cinerea</i>		Green	Green
Hen Harrier	<i>Circus cyaneus</i>	Annex I	Amber ^{1(3), 3}	Red (D)
Hooded Crow	<i>Corvus cornix</i>		Green	Green
House Sparrow	<i>Passer domesticus</i>		Amber ¹⁽³⁾	Green
Jackdaw	<i>Corvus monedula</i>		Green	Green
Linnet	<i>Carduelis cannabina</i>		Amber ¹⁽²⁾	Green
Magpie	<i>Pica pica</i>		Green	Green
Meadow Pipit	<i>Anthus pratensis</i>		Green	Green
Merlin	<i>Falco columbarius</i>	Annex I	Amber ³	Amber (B)
Mute Swan	<i>Cygnus olor</i>		Amber ⁹	Green
Pheasant	<i>Phasianus colchicus</i>		N/A	Green
Pied Wagtail	<i>Motacilla alba</i>		Green	Green
Raven	<i>Corvus corax</i>		Green	Green
Redpoll	<i>Carduelis flammea</i>		Green	Amber (B)
Reed Bunting	<i>Emberiza schoeniclus</i>		Green	Green
Robin	<i>Erithacus rubecula</i>		Green	Green
Rook	<i>Corvus frugilegus</i>		Green	Green
Sand Martin	<i>Riparia riparia</i>		Amber ³	Amber (E)
Sedge Warbler	<i>Acrocephalus schenobaenus</i>		Green	Green
Siskin	<i>Carduelis spinus</i>		Green	Green
Skylark	<i>Alauda arevensis</i>		Amber ¹⁽³⁾	Amber (B,E)

5.6.2 BIRD SPECIES RECORDED IN THE VICINITY OF THE ONSHORE PIPELINE FROM ALL TERRESTRIAL BIRD STUDIES, AND THEIR CONSERVATION STATUS (CONT)

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS		
		EU BIRDS DIRECTIVE	REVISED BoCCI* (after Lynas et al. 2007)	PREVIOUS BoCCI (after Newton et al. 1999)
Snipe	<i>Gallinago gallinago</i>		Amber ¹⁽³⁾	Amber (B)
Song Thrush	<i>Turdus philomelos</i>		Green	Green
Sparrowhawk	<i>Accipiter nisus</i>		Green	Green
Stonechat	<i>Saxicola torquata</i>		Green	Amber (E)
Swallow	<i>Hirundo rustica</i>		Amber ¹⁽³⁾	Amber (E)
Treecreeper	<i>Certhis familiaris</i>		Green	Green
Tree Sparrow	<i>Passer montanus</i>		Amber ¹⁽³⁾	Green
Twite	<i>Carduelis flavirostris</i>		Red ^{2, 3, 5}	Red (B)
Water Rail	<i>Rallus aquaticus</i>		Amber ³	Amber (B)
Wheatear	<i>Oenanthe oenanthe</i>		Amber ^{1(3), 2}	Green
Whitethroat	<i>Sylvia communis</i>		Green	Green
Willow Warbler	<i>Phylloscopus trochilus</i>		Green	Green
Woodpigeon	<i>Columba palumbus</i>		Green	Green
Wren	<i>Troglodytes troglodytes</i>		Green	Green

*Reasons for BoCCI Conservation Status as listed by Lynas et al. (2007) †

1 (Number) = SPEC 1, 2 or 3	4 = BI	7 = WDMp
2 = BDp (for Red listed) or BDMp (for Amber listed)	5 = BR	8 = WL
3 = BDr (for Red listed) or BDMr (for Amber listed)	6 = BL	9 = WI

5.6.3 SPECIES RECORDED DURING BREEDING BIRD SURVEYS 2008 – 2012 AT THE
BELLANABOY BRIDGE GAS TERMINAL SITE

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS		
		EU BIRDS DIRECTIVE	REVISED BoCCI* (after Lynas et al. 2007)	PREVIOUS BoCCI (after Newton et al. 1999)
Blackbird	<i>Turdus merula</i>		Green	Green
Blackcap	<i>Sylvia atricapilla</i>		Green	Green
Black-headed Gull	<i>Larus ridibundus</i>		Red ^{2, 3, 6}	Amber ^(B)
Blue Tit	<i>Cyanistes caeruleus</i>		Green	Green
Bullfinch	<i>Pyrrhula pyrrhula</i>		Green	Green
Chaffinch	<i>Fringilla coelebs</i>		Green	Green
Chiffchaff	<i>Phylloscopus collybita</i>		Green	Green
Coal Tit	<i>Parus ater</i>		Green	Green
Collared Dove	<i>Streptopelia decaocto</i>		Green	Green
Common Gull	<i>Larus canus</i>		Amber ^{1(2), 3, 6}	Amber ^(E)
Cormorant	<i>Phalacrocorax carbo</i>		Amber ⁶	Amber ^(B)
Crossbill	<i>Loxia curvirostra</i>		Green	Green
Cuckoo	<i>Cuculus canorus</i>		Green	Amber ^(B)
Dunnock	<i>Prunella modularis</i>		Green	Green
Goldcrest	<i>Regulus regulus</i>		Green	Green
Goldfinch	<i>Carduelis carduelis</i>		Green	Green
Grasshopper Warbler	<i>Locustrella naevia</i>		Amber ^{2, 3}	Amber ^(B)
Great Tit	<i>Parus major</i>		Green	Green
Greenfinch	<i>Carduelis chloris</i>		Green	Green
Grey Heron	<i>Ardea cinerea</i>		Green	Green
Hooded Crow	<i>Corvus cornix</i>		Green	Green
Kestrel	<i>Falco tinnunculus</i>		Amber ¹⁽³⁾	Green
Linnet	<i>Carduelis cannabina</i>		Amber ¹⁽²⁾	Green
Long-tailed Tit	<i>Aegithalos caudatus</i>		Green	Green
Magpie	<i>Pica pica</i>		Green	Green
Mallard	<i>Anas platyrhynchos</i>		Green	Green
Meadow Pipit	<i>Anthus pratensis</i>		Green	Green
Pheasant	<i>Phasianus colchicus</i>		N/A	Green
Pied Wagtail	<i>Motacilla alba</i>		Green	Green
Redpoll	<i>Carduelis flammea</i>		Green	Amber ^(B)
Reed Bunting	<i>Emberiza schoeniclus</i>		Green	Green
Robin	<i>Erithacus rubecula</i>		Green	Green
Rook	<i>Corvus frugilegus</i>		Green	Green
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>		Green	Green
Siskin	<i>Carduelis spinus</i>		Green	Green
Skylark	<i>Alauda arvensis</i>		Amber ¹⁽³⁾	Amber ^(B,E)
Snipe	<i>Gallinago gallinago</i>		Amber ¹⁽³⁾	Amber ^(B)

5.6.3 SPECIES RECORDED DURING BREEDING BIRD SURVEYS 2008 – 2012 AT THE BELLANABOY BRIDGE GAS TERMINAL SITE (CONT)

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS		
		EU BIRDS DIRECTIVE	REVISED BoCCI* (after Lynas et al. 2007)	PREVIOUS BoCCI (after Newton et al. 1999)
Song Thrush	<i>Turdus philomelos</i>		Green	Green
Spotted Flycatcher	<i>Muscicapa striata</i>		Green	Amber ^(B,E)
Starling	<i>Sturnus vulgaris</i>		Amber ¹⁽³⁾	Green
Swallow	<i>Hirundo rustica</i>		Amber ¹⁽³⁾	Amber ^(E)
Whitethroat	<i>Sylvia communis</i>		Green	Green
Willow Warbler	<i>Phylloscopus trochilus</i>		Green	Green
Woodpigeon	<i>Columba palumbus</i>		Green	Green
Wren	<i>Troglodytes troglodytes</i>		Green	Green

† Key to abbreviations used:

- Global Conservation Status (IUCN): Qualification: IUCN Globally Threatened; Critically Endangered, Endangered or Vulnerable = Red list.
- This criterion uses the most recent IUCN Red list to identify species of global conservation concern in Ireland.
- European Conservation Status (SPEC): Qualification: SPEC 1 = Red list; SPEC 2 and 3 = Amber list (except species that do not breed in Ireland).
- This criterion places the status in Ireland into a European context as assessed in 'Birds in Europe' (BirdLife International, 2004). SPEC 1 species are of global conservation concern, SPEC 2 species are of unfavourable status and concentrated in Europe, and SPEC 3 species are of unfavourable status but not concentrated in Europe.
- Decline in Breeding Population (BDp, BDMp): Qualification: Population Decline \geq 50% over 25 years = Red list; 25-50% over 25 years = Amber list (range: 7-33 years). This criterion is based on the best available data for trends in breeding bird populations including Countryside Bird Survey (CBS), Breeding Bird Survey (BBS), Seabird 2000 (Mitchell et al. 2000) and other species specific surveys.
- Decline in Breeding Range (BDr, BDMr): Qualification: Range Decline \geq 70% over 25 years = Red list; 35-70% over 25 years = Amber list (range: 20-28 years). This criterion is based on data from the two Breeding Atlases of Britain and Ireland (Sharrock 1976, Gibbons et al. 1993).
- Decline in Population during the Non-breeding Season (WDp, WDMp): Qualification: Population Decline \geq 50% over 25 years (range 15-25 years) = Red list; 25-49% over 25 years = Amber list. This criterion is based on data from IWeBS and WeBS.
- Historical Decline in Breeding Population (HD): Qualification: Severe Historical Population Decline during 1800-1995 = Red list. This criterion is based on data presented by various studies, predominantly Holloway (1996) and Gibbons et al. (1993).
- Breeding Rarity (BR): Qualification: Less than 100 pairs = Amber list. This criterion is based on data collated by the Irish Rare Breeding Birds from 2000-2006.
- Localised Breeding (BL) and non-breeding (WL) species: Qualification: at least 50% of the breeding or non-breeding population occurs at ten or fewer sites = Amber list. This criterion is based on data from Seabird 2000 (Mitchell et al. 2000), IWeBS and WeBS.
- International Importance during the Breeding (BI) or non-breeding season (WI): Qualification: at least 20% of the European breeding or non-breeding population occurs in Ireland = Amber list. This criterion is based on data from various sources such as BirdLife International (2004), Seabird 2000 (Mitchell et al. 2000).

5.6.4 SEABIRDS KNOWN TO OCCUR IN THE VICINITY OF THE OFFSHORE PIPELINE (2008)

COMMON NAME	SCIENTIFIC NAME	CONSERVATION STATUS		
		EU BIRDS DIRECTIVE	REVISED BoCCI* (after Lynas et al. 2007)	PREVIOUS BoCCI (after Newton et al. 1999)
Great-northern Diver	<i>Gavia immer</i>	Annex I	Green	Green
Northern Fulmar	<i>Fulmarus glacialis</i>		Green	Green
Cory's Shearwater	<i>Calonectris diomedea</i>		Amber	Amber
Great Shearwater	<i>Puffinus gravis</i>		Green	Amber
Sooty Shearwater	<i>Puffinus griseus</i>		Red	Amber
Manx Shearwater	<i>Puffinus puffinus</i>		Amber	Amber
European Storm Petrel	<i>Hydrobates pelagicus</i>	Annex I	Amber	Amber
Wilson's Storm Petrel	<i>Oceanites oceanicus</i>		Green	Green
Leach's Storm Petrel	<i>Oceanodroma leucorhoa</i>	Annex I	Amber	Amber
Northern Gannet	<i>Morus bassanus</i>		Amber	Amber
Great Cormorant	<i>Phalacrocorax carbo</i>		Amber	Amber
European Shag	<i>Phalacrocorax aristotelis</i>		Amber	Green
Common Scoter	<i>Melanitta nigra</i>		Green	Red
Grey Phalarope	<i>Phalaropus fulicarius</i>		Green	Green
Pomarine Skua	<i>Stercorarius pomarinus</i>		Green	Green
Arctic Skua	<i>Stercorarius parasiticus</i>		Green	Green
Great Skua	<i>Stercorarius skua</i>		Amber	Green
Common Gull	<i>Larus canus</i>		Amber	Amber
Herring Gull	<i>Larus argentatus</i>		Red	Green
Lesser Black-backed Gull	<i>Larus fuscus</i>		Amber	Green
Great Black-backed Gull	<i>Larus marinus</i>		Amber	Green
Sabine's Gull	<i>Larus sabini</i>		Green	Green
Black-legged Kittiwake	<i>Rissa tridactyla</i>		Amber	Green
Little Tern	<i>Sterna albifrons</i>	Annex I	Amber	Amber
Sandwich Tern	<i>Sterna sandvicensis</i>	Annex I	Amber	Amber
Common Tern	<i>Sterna hirundo</i>	Annex I	Amber	Amber
Arctic Tern	<i>Sterna paradisaea</i>	Annex I	Amber	Amber
Common Guillemot	<i>Uria aalge</i>		Amber	Amber
Razorbill	<i>Alca torda</i>		Amber	Amber
Atlantic Puffin	<i>Fratercula arctica</i>		Amber	Amber
Black Guillemot	<i>Cephus grylle</i>		Amber	Amber

5.7 FRESHWATER SPECIES RECORDED IN STREAMS/LOCAL SMALL WATERCOURSES

5.7.1 SUMMARY OF THE RESULTS YIELDED FROM THE FIELD STUDY OF WATERCOURSES TRAVERSED BY THE PIPELINE

CROSSING/ SAMPLING SITE (IRISH NATIONAL GRID REFERENCE)	Q-VALUE RATING ¹⁵ 2010 (EIS)	Q-VALUE RATING MARCH 2012	AQUATIC FLORA	HABITAT DESCRIPTION	IMPORTANCE/ CLASSIFICATION
1 (F82063 38465)	Q3-4	Not Sampled	<i>Montia fontana</i> (Blinks) present marginally.	Very little wetted channel, so that both diversity and numbers of fish likely to occur would be low. For this reason, and the fact that the stream was immediately upstream of the seashore, it was decided not to electro-fish it .	Low ecological value. This stream runs into the Glenamoy Bog complex SAC.
2	N/a	N/a	N/a	Marine Habitat	High Ecological Value as Migratory Route for Salmon and Sea Trout. Lies within the Glenamoy Bog Complex SAC.
3 (F85882 35062)	Q 4-5, 10m up-stream*	Q4-5	Devoid of in-channel flora at crossing point, <i>Fontinalis</i> moss upstream, <i>Fucus</i> (brown seaweed) downstream).	Moderate to slow flow glide, coarse (angular cobble substrate).	Low to moderate ecological value. Probably used by eel, and intermittently by trout; gobies immediately downstream. This stream runs into an inlet which lies within the Glenamoy Bog Complex SAC.
4 (F86477 34520)	Q4	Q4	<i>Potamogeton</i> sp. and <i>Callitriche stagnalis</i> present at water surface.	Very slow-flow, canal-like stream with typical macroinvertebrate types present (water beetles, damselfly larvae, water boatmen etc).	Moderate to low ecological value; unsuitable at the crossing site for salmonid fish or lamprey, although these could be present further downstream. Lies outside the Glenamoy Bog Complex SAC.

*Estuarine influence at the proposed route crossing point thus unsuitable for Q-rating. Instead Q-value rating was undertaken 10m upstream of the proposed crossing point.

5.7.1 SUMMARY OF THE RESULTS YIELDED FROM THE FIELD STUDY OF WATERCOURSES TRAVERSED BY THE PIPELINE (CONT)

CROSSING/ SAMPLING SITE (IRISH NATIONAL GRID REFERENCE)	Q-VALUE RATING ¹⁵ 2010 (EIS)	Q-VALUE RATING MARCH 2012	AQUATIC FLORA	HABITAT DESCRIPTION	IMPORTANCE/ CLASSIFICATION
5 (F86258 34069)	N/a	N/a This site has sensitive invertebrates elements which suggest good water quality. Strictly speaking, it's small size and physical character is unsuitable for Q-Value appraisal.	In-stream vegetation at crossing point, some Flote grass (<i>Glyceria sp.</i>) and Water starwort (<i>Callitriche stagnalis</i>) immediately upstream.	Very small flow over soft organic (peat) substrate; overgrown with bankside vegetation so that the channel was not visible. Too small and unsuitable habitat for electrofishing.	Low ecological and fisheries value at the site; trout, eel and lamprey known from further down in the catchment (Leenamoy River). Lies outside the Glenamoy Bog Complex SAC.
6 (F86023 334183)	N/a	Q4-5	Marginal stands of <i>Rorippa</i> & <i>Eleocharis</i> .	Pea gravel & organic silt 15-20cm deep – moderate flow (coloured).	High Ecological Value as possible Migratory Route for Sea Trout.
7 (F86025 334167)	N/a	Q4-5	Fontinalis and <i>Batrachospermum</i> on boulders. Marginal stands of <i>Callitriche sp</i> , <i>Rorippa</i> and <i>Agrostis</i> .	Gravel and scattered boulders with shallow (12-15cm) moderate flow.	High Ecological Value as possible Migratory Route for Sea Trout.

*Estuarine influence at the proposed route crossing point thus unsuitable for Q-rating. Instead Q-value rating was undertaken 10m upstream of the proposed crossing point.

5.7.2 MACROINVERTEBRATES TAKEN IN KICK-SAMPLES IN 2010 & MARCH 2012

A. 60M UPSTREAM OF THE LEENAMORE CROSSING

TAXA	EPA QUALITY CATEGORY (2010)	ABUNDANCE RATING (2010)	EPA QUALITY CATEGORY (2012)	ABUNDANCE RATING (2012)
EPHEMEROPTERA				
<i>Heptagenia</i>	A	F	A	
<i>Rhithrogena</i>	A		A	F
<i>Ecdyonurus</i>	A		A	F
<i>Baetidae</i>	C	F	C	C
PLECOPTERA				
<i>Isoperla</i>	A	F	A	D
<i>Chloroperla</i>	A		A	F
<i>Nemoura spp</i>	B		A	F
<i>Amphinmura</i>	B		A	
<i>Leuctra</i>	B	F	B	F
TRICHOPTERA				
<i>Hydropsyche sp.</i>	C	F	C	N
<i>Polycentropidae</i>	C		C	
<i>Rhyacophila sp.</i>	C	F	C	C
<i>Tinodes</i>	C	F	C	
<i>Limnephilidae</i>	C		C	N
<i>Silo</i>	B	F	B	F
<i>Sericostoma</i>	B	F	B	F
<i>Glossomatidae</i>	B		B	
COLEOPTERA				
<i>Dytiscidae</i>	C		C	N
<i>Elmidae</i>	C	F	C	N
DAMSEL FLIES (ODONATA)				
<i>Zygoptera indet</i>	B		B	
DIPTERA				
<i>Dicranota</i>	C	F	C	C
<i>Tipula sp.</i>	C		C	
<i>Chironomidae</i>	D	F	C	C
<i>Simuliidae</i>	C		C	
<i>Diptera sp.</i>	~		~	
CRUSTACEA				
<i>Gammarus</i>	C	C	C	C
<i>Asellus</i>	D		D	

KEY TO ABUNDANCE RATING:

Few (F): 1 - 5 individuals

Common (C): 6 - 20 individuals

Numerous (N): 21 - 50 individuals

Dominant (D): 51 - 75 individuals

Excessive (E): >75% of total abundance

A. 60M UPSTREAM OF THE LEENAMORE CROSSING (CONT)

TAXA	EPA QUALITY CATEGORY (2010)	ABUNDANCE RATING (2010)	EPA QUALITY CATEGORY (2012)	ABUNDANCE RATING (2012)
MOLLUSCA				
<i>Ancylus</i>	C		C	
<i>Sphaeriidae</i>	D		C	F
<i>Potamopyrgus jenkinsi</i>	D	F	C	
HIRUDINAE				
<i>Helobdella stagnalis</i>	D		D	
<i>Glossiohonia</i>	D	F	D	F
ANNELIDA				
<i>Oligochaetae</i>	E	C	E	N
FLATWORMS (TRICLADIA)				
<i>Polycelis</i>	D		C	
Q- VALUE		N/A	N/A	Q 4-5

B. FOREST STREAM 2010 & MARCH 2012

TAXA	EPA QUALITY CATEGORY (2010)	ABUNDANCE RATING (2010)	EPA QUALITY CATEGORY (2012)	ABUNDANCE RATING (2012)
EPHEMEROPTERA				
<i>Heptagenia</i>	A		A	
<i>Rhithrogena</i>	A		A	
<i>Ecdyonurus</i>	A		A	
<i>Baetidae</i>	C		C	
PLECOPTERA				
<i>Isoperla</i>	A		A	
<i>Chloroperla</i>	A		A	
<i>Nemoura spp</i>	B	N	A	D
<i>Amphinmura</i>	A		A	
<i>Leuctra</i>	B		B	
TRICHOPTERA				
<i>Hydropsyche sp.</i>	C		C	
<i>Polycentropidae</i>	C		C	F
<i>Rhyacophila sp.</i>	C		C	
<i>Tinodes</i>	C		C	
<i>Limnephilidae</i>	C	C	C	F
<i>Silo</i>	B		B	
<i>Sericostoma</i>	B		B	
<i>Glossomatidae</i>	B		B	
COLEOPTERA				
<i>Dytiscidae</i>	C	F	C	F
<i>Elmidae</i>	C		C	

B. FOREST STREAM 2010 & MARCH 2012 (CONT)

TAXA	EPA QUALITY CATEGORY (2010)	ABUNDANCE RATING (2010)	EPA QUALITY CATEGORY (2012)	ABUNDANCE RATING (2012)
DAMSEL FLIES (ODONATA)				
<i>Zygoptera indet</i>	B	C	B	C
DIPTERA				
<i>Dicranota</i>	C		C	
<i>Tipula sp.</i>	C		C	
<i>Chironomidae</i>	D		C	D
<i>Simuliidae</i>	C		C	F
<i>Diptera sp.</i>	~		~	
CRUSTACEA				
<i>Gammarus</i>	C		C	
<i>Asellus</i>	D	F	D	
MOLLUSCA				
<i>Lymnaea peregra</i>	D	C	D	
<i>Sphaeriidae</i>	D	F	C	
<i>Potamopyrgus jenkinsi</i>	D		C	
HIRUDINAE				
<i>Helobdella stagnalis</i>	D		D	
<i>Glossiohonia</i>	D		D	
ANNELIDA				
<i>Oligochaetae</i>	E	N	E	F
FLATWORMS (TRICLADIA)				
<i>Polycelis</i>	D		C	
Q- VALUE		N/A		N/A

KEY TO ABUNDANCE RATING:

Few (F): 1 – 5 individuals

Common (C): 6 – 20 individuals

Numerous (N): 21 – 50 individuals

Dominant (D): 51 – 75 individuals

Excessive (E): >75% of total abundance

C. LEENAMORE RIVER IMMEDIATELY UPSTREAM AND DOWNSTREAM OF THE CONFLUENCE OF THE
TERMINAL STREAM – MARCH 2012

TAXA	EPA QUALITY CATEGORY (2012)	ABUNDANCE RATING LEENAMORE U/S TERMINAL STREAM CONFLUENCE	ABUNDANCE RATING LEENAMORE D/S TERMINAL STREAM CONFLUENCE
EPHEMEROPTERA			
<i>Baetidae</i>	C		C
PLECOPTERA			
<i>Isoperla</i>	A	N	D
<i>Chloroperla</i>	A		F
<i>Nemoura spp</i>	A	N	N
<i>Amphinmura</i>	A		
<i>Leuctra</i>	B	F	F
TRICHOPTERA			
<i>Hydropsyche sp.</i>	C		
<i>Polycentropidae</i>	C	F	N
<i>Rhyacophila sp.</i>	C		
<i>Tinodes</i>	C		
<i>Limnephilidae</i>	C	F	C
<i>Silo</i>	B		
<i>Sericostoma</i>	B		C
<i>Glossomatidae</i>	B		C
<i>Coleoptera</i>			
<i>Dytiscidae</i>	C		
<i>Elmidae</i>	C		F
DAMSEL FLIES (ODONATA)			
<i>Zygoptera indet</i>	B		

C. LEENAMORE RIVER IMMEDIATELY UPSTREAM AND DOWNSTREAM OF THE CONFLUENCE OF THE
TERMINAL STREAM – MARCH 2012 (CONT)

TAXA	EPA QUALITY CATEGORY (2012)	ABUNDANCE RATING LEENAMORE U/S TERMINAL STREAM CONFLUENCE	ABUNDANCE RATING LEENAMORE D/S TERMINAL STREAM CONFLUENCE
DIPTERA			
<i>Dicranota</i>	C		F
<i>Tipula sp.</i>	C	F	
<i>Chironomidae</i>	C	D	F
<i>Simuliidae</i>	C		
<i>Diptera sp.</i>	~		
CRUSTACEA			
<i>Gammarus</i>	C	C	D
<i>Asellus</i>	D	C	
MOLLUSCA			
<i>Ancylus</i>	C		
<i>Sphaeriidae</i>	C		C
<i>Potamopyrgus jenkinsi</i>	C		
HIRUDINAE			
<i>Helobdella stagnalis</i>	D	F	
<i>Glossiohonia</i>	D		
ANNELIDA			
<i>Oligochaetae</i>	E	N	N
FLATWORMS (TRICLADIA)			
<i>Polycelis</i>	C		F
Q- VALUE			Q 4-5

D. "TERMINAL" STREAM, MARCH 2012

TAXA	EPA QUALITY CATEGORY (2012)	ABUNDANCE RATING LEENAMORE TERMINAL STREAM
PLECOPTERA		
<i>Isoperla</i>	A	
<i>Chloroperla</i>	A	
<i>Nemoura spp</i>	A	D
<i>Amphinmura</i>	A	
<i>Leuctra</i>	B	F
TRICHOPTERA		
<i>Hydropsyche sp.</i>	C	
<i>Polycentropidae</i>	C	N
<i>Rhyacophila sp.</i>	C	
<i>Tinodes</i>	C	
<i>Limnephilidae</i>	C	F
<i>Silo</i>	B	
<i>Sericostoma</i>	B	
<i>Glossomatidae</i>	B	
COLEOPTERA		
<i>Dytiscidae</i>	C	
<i>Elmidae</i>	C	
DAMSEL FLIES (ODONATA)		
<i>Zygoptera indet</i>	B	
DIPTERA		
<i>Dicranota</i>	C	
<i>Tipula sp.</i>	C	F
<i>Chironomidae</i>	C	C
<i>Simuliidae</i>	C	C
<i>Diptera sp.</i>	~	

D. "TERMINAL" STREAM, MARCH 2012 (CONT)

TAXA	EPA QUALITY CATEGORY (2012)	ABUNDANCE RATING LEENAMORE TERMINAL STREAM
CRUSTACEA		
<i>Gammarus</i>	C	F
<i>Asellus</i>	D	F
MOLLUSCA		
<i>Ancylus</i>	C	
<i>Sphaeridae</i>	C	D
<i>Potamopyrgus jenkinsi</i>	C	
HIRUDINAE		
<i>Helobdella stagnalis</i>	D	
<i>Glossiohonia</i>	D	
ANNELIDA		
<i>Oligochaetae</i>	E	D
FLATWORMS (TRICLADIA)		
<i>Polycelis</i>	C	
Q- VALUE		N/A

5.8 ENVIRONMENTAL MONITORING PROGRAMMES

5.8.1 OFFSHORE – MARINE MAMMAL MONITORING PLAN ¹⁶

Post-construction monitoring will focus on assessing the differences in usage of the Bay between survey periods, to determine if the installed pipeline is having an effect on the movements of marine mammals. Reference will be made to the baseline monitoring carried out by CMRC to inform the assessment. It is however too early for any detailed conclusions to be made and longer term monitoring is essential in order to determine whether changes observed may be related to annual or seasonal variation in marine mammal usage of Broadhaven Bay or of an actual change related to the construction work.

METHODOLOGY

The same general monitoring methods will be used for the post-construction phase as were used during construction.

OBSERVATION SITES

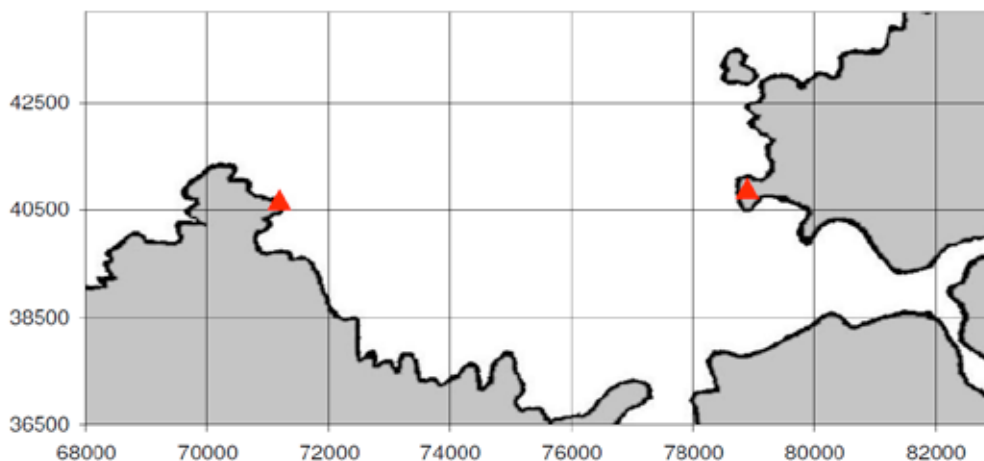
Shore-based effort for monitoring will be performed from the cliff top locations of Doonanierin and Gubastuckaun (Figure 2). These locations were used in previous CMRC surveys and provide observers with a good view over the areas in which much of the construction activity will be taking place. This approach will also maximise the ability of the monitoring team to detect marine mammals entering the inner bay area from both sides of Broadhaven Bay.

CLIFF-BASED OBSERVATION METHODS

In order to ensure that the monitoring follows the work undertaken by CMRC in 2001-2002 and 2005 as closely as possible, and that the data generated are comparable, similar optical monitoring equipment will be used – including a tripod mounted wide-angle telescope of 32x magnification and a monopod-mounted pair of binoculars (10x50).

To accurately determine the position of sighted animals and to track their movements, a surveyor's theodolite will be used at the Doonanierin site. A theodolite provides an observer with an accurate vertical and a horizontal angle (± 5 second of arc) to a target seen through a monocular 30x eyepiece. Using the exact location and height of the observer, vertical angles recorded for each sighting will be used to derive a range measurement and the horizontal angles (calibrated using a known reference point at the tower of Barnacuille) to derive a bearing. These range and bearing calculations are used to derive positions for each sighting, corresponding to Irish Ordnance Survey co-ordinates.

Cliff top monitoring will be conducted on each survey day for as long as daylight and weather conditions permit. It will consist of repeated scan samples of the visible study area from the monitoring site using both the telescope and binoculars in succession. Each observation session will be of a minimum of 60 minutes in duration, but will vary depending on whether or not marine mammals are seen. When possible, each full scan of the study area will be followed by a period of 30 minutes during which the observer is encouraged to rest their



CLIFF-BASED MONITORING SITES IN BROADHAVEN BAY, SHOWING THE SITE AT ERRIS HEAD IN THE WEST AND THE SITE AT DOONANIERIN ON THE EAST SIDE OF THE BAY.

¹⁶: From: EMP 2008, Appendix F Cetaceans Mitigation and Monitoring

eyes. The observer at Gubastuckaun will resume scanning when positive identification of species and approximate position is determined using VHF to aid the Doonanierin observer. It is expected that 2-3 observers will be present in the Broadhaven Bay area during a typical survey day.

The information recorded, for each marine mammal sighting will include; species identification and position, estimated group size and composition (number of adults, juveniles and calves), behaviour (foraging/social/travel, etc), sighting cues, and any associations with birds, boats or other species. Survey effort and environmental conditions (e.g. glare, wind strength, swell height) will also be recorded. For a more detailed description of survey methods see CMRC reports (*Ó Cadhla et al., 2003* and *Englund et al., 2006*).

ANALYSIS OF SHORE-BASED MONITORING DATA

The derived Irish Ordnance Survey co-ordinates, calculated from theodolite data will be used to plot the occurrence and movement patterns of marine mammals on maps of the study area. All data will be compiled using Microsoft Access database and summaries of marine mammal observations presented using ArcView. Sighting data will be analysed in relation to shore-watch effort, tidal state and weather conditions using Microsoft Excel and statistical software.

BOAT-BASED MONITORING METHODS

The survey methodology used for boat transects will mainly be the same as that conducted previously by CMRC. Boat-based surveys (line-transects) will be carried out during the construction and post construction phases using a vessel suitable for this purpose.

Line-transect surveys will be carried out in sea states less than Beaufort 3 and with observers simultaneously working from cliff-based monitoring sites. The standard survey route developed in 2002 consisting of nine parallel transect lines spread 1 km apart will be used for this purpose. When possible, a dual observer approach will be employed whereby one observer will conduct a visual survey on one side of the moving boat, from 0° (ahead) to 90° (abeam). The second observer will duplicate this from the other side of the boat. These were adapted on methods used offshore by *Ó Cadhla et al. (2002)* and *Pollock et al. (1997)* allowing simultaneous collection of marine mammal data alongside ancillary data of other interesting species such as sharks and turtles.

Whenever bottlenose dolphins are encountered during line transect surveys, photo-ID will be conducted and an attempt made to photograph all individuals in the group. The resulting photographs will be compared to those obtained during the survey period of 2001-2002 in order to investigate the level of "residency" to the study area.

Opportunistic boat surveys will be conducted when possible, for example when acoustic equipment is serviced or for the purpose of photo identification of bottlenose dolphins when this species is present in the survey area.

Casual surveys will also take place, consisting of an observer on board the project vessels while they may be chartered for other operations. Casual surveys will also be implemented in the event that weather conditions deteriorate during the boat based transects beyond Beaufort Force 3-4, but only when health and safety of surveyors is not compromised.

ACOUSTIC MONITORING

Three TPODs, located in the same positions used in the CMRC study will be utilised for the entire survey period. The original positions were used to determine cetacean usage of the inner Broadhaven Bay area, and will therefore be appropriate to the construction monitoring. Deployment of this equipment will involve 3 separate moorings. The 3 moorings will be designated Listening Stations 1, 2 and 3 and will be placed approximately 500m apart in a line, or in areas where they will not be physically affected by construction operations.

DEPLOYMENT METHODS

The TPODs will be attached to concrete moorings and fixed approximately five meters below the waters surface and marked with two surface buoys.

ACOUSTIC DATA ANALYSIS

The data collected by TPODs will be downloaded on a monthly basis, and processed using specific software to determine the levels of cetacean activity in the vicinity of the construction work. Dedicated TPOD software (www.chelonia.demon.co.uk) will be used to analyse the data and detections made will be exported into Microsoft Excel spread sheets as detection positive minutes (DPM) and summarised per day and in relation to tide and time. All data will be compiled into a Microsoft Access Database.

MARINE MAMMAL STRANDING EVENTS

In the event of a stranded marine mammal, dead or alive, occurring within Broadhaven Bay SAC, Shell/RSK will be responsible for informing the National Parks & Wildlife Service. An appropriate scientific assessment will take place and work will proceed on NPWS instruction.

CONSTRUCTION MONITORING

During the construction period on each day scan surveys from Doonanierin will, weather permitting, commence 30-60 minutes prior to construction commencing, this is intended to ensure that any marine mammals in very close proximity to the construction area are detected, and they are given an opportunity to move away before construction commences. In the event that marine mammals are seen close to the construction area before construction commences, a nominated cetacean "coordinator" on the construction vessel will be informed by VHF radio.

SHORE-BASED MONITORING – NEARSHORE SENSITIVE LOCATIONS

While Doonanierin provides an effective base for making observations of cetaceans and pinnipeds, it may also be necessary to enhance this approach by monitoring from lower altitude sites, which are focused on particularly sensitive areas of the bay (e.g. the nearshore regions where observations from the cliffs are more difficult). The monitoring of such areas would not be as frequent as that at the cliff-top locations, however observers would be present during periods of construction activity that have the potential to impact on such sensitive areas. The observers will be in contact with the "co-ordinator" on the construction vessel by VHF, who will be in a position to request a temporary cessation in work if the degree of impact is considered unacceptably high.

While dedicated scan surveying will be abandoned by the CMRC surveyors when the wind strength increases beyond Beaufort sea state 3-4 (during such conditions the detectability of marine mammals is severely compromised), alternative observation points may be utilised – as construction will continue in all sea states (except for repositioning of platform which can only be done in less than 1m swell). Such observation points have been identified closer to the pipeline construction area and in a more sheltered location.

BUFFER/SAFETY ZONES

During construction activities generating high noise levels a safety/buffer zone may need to be established. The radius of this zone surrounding the

point at which construction disturbance takes place depends on the nature of the construction work and will be specific to the marine mammal species involved. The zone will be monitored by shore-based observers. Further information on recommendations surrounding the working area are provided in the Code of Conduct (Appendix 1).

It is expected that the degree of noise impact resulting from the majority of the construction operations is likely to be low, therefore the periods over which greater safety zones might need to be established would be short, and few in number.

POST-CONSTRUCTION MONITORING

In order to assess if there has been an effect on the marine mammal usage of Broadhaven Bay, the post-construction monitoring will as far as is possible be the same as that employed by CMRC in 2001-2002 and in 2005. The CMRC reports show that the greatest number of sightings of marine mammals were in the summer months of June to September. Carrying out post-construction monitoring at the same time of year will enable a more robust comparison to be made with previous data.

The methods to be used are documented in the CMRC reports and will in most aspects be the same as for construction monitoring using the same cliff-top monitoring locations and acoustic monitoring sites with the option of an additional acoustic monitoring site at the entrance of Broadhaven Bay. Standard boat-based monitoring including line-transect surveys and photo-ID of bottlenose dolphins will also be performed.

The same transect lines utilised during the CMRC survey in 2002 will be used for the post-construction monitoring including survey tracklines outside of the bay area in order to establish occurrence of species that may not enter the SAC. These surveys may utilise a towed hydrophone array if this is possible logistically. While the pipeline construction is likely to impact only a small area of the inner Bay, all 9 previously run transect lines will be used in the post-construction monitoring. This will enable a comparison of "background" conditions to be made – i.e. the marine mammal activity occurring around the seaward boundary of the SAC is unlikely to be affected by the construction works carried out in 2008, should any significant increase or decrease in marine mammal activity be recorded in the outer area of Broadhaven Bay, then it

would be expected that such a natural change in activity would be reflected in the inner sections of the Bay.

APPENDIX 1 – CODE OF CONDUCT FOR VESSELS AND PERSONNEL OPERATING WITHIN BROADHAVEN BAY SAC

The following protocol is based on a Code of Practice to protect small cetaceans in the Shannon Estuary and on Guidelines set up by the Department of Communications, Marine and Natural Resources (Marine Notice No. 15). This Code of Conduct is designed to reduce the potential for vessel- and person-related impacts on local marine mammal populations, their natural behaviour and habitats in Broadhaven Bay SAC, Co. Mayo. This code of conduct refer only to vessel traffic involved, if any other work, for example rock breaking or multibeam sonar will be used, then additional measures and suitable safety distances will need to be applied.

Under current National Legislation – S.I No. 94 of 1997, Natural Habitat Regulations, Cetaceans are listed, and regulations prohibit the deliberate disturbance of these species. Included are several measures proposed for the offshore and near shore construction vessels, which will be operating within the SAC. Craft that do encounter any species are encouraged to log all sightings and to advise officers of the National Parks and Wildlife Service, which is a division of the Department of Environment Heritage, and Local Government. Marine mammal species likely to be encountered during works are: European otter (*Lutra lutra*), Grey seal (*Halichoerus grypus*), Harbour seal (*Phoca vitulina*), and various cetacean (i.e. whale and dolphin) species including Bottlenose dolphin (*Tursiops truncatus*), Harbour porpoise (*Phocoena phocoena*), Common dolphin (*Delphinus delphis*) and Minke whale (*Balaenoptera acutorostrata*) (See: O’Cadhla et al., 2003; Englund et al., 2006).

Listed below are the guidelines to be followed to minimise the effects of the vessels on marine mammals:

1. Any vessel and/or person(s) shall attempt to maintain a minimum distance of 100m from any individual marine mammal or group thereof. Vessels that are themselves approached by marine mammals may remain but should gear their engines into Neutral providing this does not cause a safety hazard
2. No vessel and/or person(s) shall approach or remain within 100m of any marine mammal(s) at any time for more than 30 minutes. Boats do not need to move off if they have been approached by the mammal. However in the case where a boat is working or otherwise the behaviour of marine mammals should be recorded and provided to CMRC personnel, especially in the event of a change in the conduct of work on or immediately surrounding the vessel
3. No vessel shall, when less than 100m from the marine mammal(s), exceed a speed of 5 knots. Providing this does not cause a safety hazard
4. No vessel shall alter speed or course suddenly when less than 100m from any marine mammal(s)
5. No person or vessel shall deliberately approach to less than 100m from any marine mammal(s) situated on land except under licence from the Minister or unless approved to do so by the relevant authority
6. Persons ashore that are approached by marine mammals shall carefully make the animal(s) aware of their presence and shall allow the animal(s) free access and ample opportunity to move into the water. Under no circumstances shall a person behave in an obtrusive or noisy manner around the animal(s)
7. No vessel shall use underwater acoustic transmitters, except navigational echo sounders, when less than 1000m from any marine mammal
8. No unauthorised divers should be allowed to enter the water within 100m of any marine mammal. This will be in the interest of health and safety of the divers as well as any marine mammal. Commercial divers should be aware that they might be approached by mammals during the course of their work
9. Nothing in these guidelines shall operate to prohibit anything done for the preservation of life at sea or in the interests of public safety.
10. Nothing in these guidelines shall operate to restrict the obligations on persons and vessels to obey rules for the prevention of collision at sea and the regulations enacted by statutory Harbour Authorities.

5.8.2 ONSHORE PIPELINE ¹⁷

5.8.2.1 EMP TABLE 9-1 ECOLOGICAL MONITORING – FLORA AND FAUNA

	PRE- CONSTRUCTION	DURING CONSTRUCTION	POST- CONSTRUCTION
HABITATS/ VEGETATION	Habitat quality inspections and photographic record at: <ul style="list-style-type: none"> Shorelines at the landfall Glengad dune system foredunes Intertidal zones & fringe salt marsh by SC3 at Aughoose. 	Habitat quality inspections and photographic record at: <ul style="list-style-type: none"> Shorelines at the landfall Glengad dune system foredunes Intertidal zones & fringe salt marsh by SC3 at Aughoose. 	Habitat quality inspections and photographic record at: <ul style="list-style-type: none"> Shorelines at the landfall Glengad dune system foredunes Intertidal zones & fringe salt marsh by SC3 at Aughoose.
	Glengad cliff: Habitat condition inspections and photographic record, including cliff sections on either side of previous reinstatement.	Glengad cliff: Habitat condition inspections and photographic record, including cliff sections on either side of previous reinstatement.	Glengad cliff: Habitat condition inspections of reinstated cliff, with an annual botanical survey.
	Glengad onshore sections: Landfall to and including LVI, SC1, TWAs and SC2. Walkover and botanical assessment.	Glengad onshore sections: Inspection of the condition of terrestrial habitats (including field boundaries) adjacent to TWA.	Glengad onshore sections: Landfall to and including LVI, SC1, TWAs and SC2. Survey any vegetated field boundaries which were disturbed during construction.
	Recovering blanket bog to the west of SC3. Assess habitat quality immediately prior to construction.	Recovering blanket bog to the west of SC3. Annual survey of permanent quadrats.	Recovering blanket bog to the west of SC3. Annual survey of permanent quadrats.
	Aughoose compounds, peat storage areas and biodiversity areas: Survey of habitats outside the TWA – walkover and habitat assessment.	Peat storage areas at Aughoose and areas outside TWA. Annual survey of permanent quadrats in habitats outside the TWA. Monitor vegetation elements in peat storage areas. Monitor reinstatement.	Reinstated areas at Aughoose compounds, peat storage areas and biodiversity areas. Set up permanent quadrats in reinstated areas and survey.
	Leenamore River inlet – saltmarsh and intertidal: Survey of existing quadrats. Sample macroinvertebrates in benthic layer.	Leenamore River inlet – saltmarsh and intertidal: Monitor temporary habitat translocation (turving) and reinstatement. Monitor condition of turves and intertidal habitat elements during storage. Monitor translocation, storage and reinstatement of cobbles (with attached fucoids) and top benthic sediment (macroinvertebrate) layer.	Leenamore Inlet – saltmarsh and intertidal. Set up permanent quadrats in reinstated areas of saltmarsh and in the intertidal areas of fucoids. Monitoring the recovery of the top benthic (macroinvertebrate) layer at 6 and 12 months post construction.

17: From the Onshore Pipeline EMP, Appendix A Environmental Monitoring Programme, as amended in 2013 (Note: EMP table numbers are included for reference)

5.8.2.1 EMP TABLE 9-1 ECOLOGICAL MONITORING – FLORA AND FAUNA (CONT)

	PRE- CONSTRUCTION	DURING CONSTRUCTION	POST- CONSTRUCTION
HABITATS/ VEGETATION (CONT)	Recovering Blanket Bog – 190m. Annual survey of quadrats.	Recovering Eroded Blanket Bog – 190m. Monitor temporary habitat translocation (turving) and reinstatement. Monitor condition of turves during storage. Survey permanent quadrats outside TWA.	Recovering Eroded Blanket Bog – 190m. Survey existing quadrats outside the TWA and set up new permanent quadrats in reinstated section.
	Conifer plantations. Walkover and habitat assessment.	Conifer plantations. Monitor wayleave planting and habitat creation during reinstatement.	Conifer plantations. Ecological monitoring in conjunction with landscape architect’s monitoring.
	Tunnel route: macroinvertebrates.	Tunnel route: macroinvertebrates.	Tunnel route: macroinvertebrates.
BIRDS	HW & LW weekly waterbird surveys of Sruwaddacon Bay area (Winter and summer periods) – winter survey includes Brent Goose. Breeding bird surveys: includes general terrestrial and target species surveys: <ul style="list-style-type: none"> ■ Sand Martin, ■ Heronry at Bellagelly ■ Merlin at Aughoose. Walkover surveys will be undertaken throughout onshore sections of the route in order to ensure that no nesting birds are present on lands to be disturbed, including ground nesting species.	HW & LW weekly surveys of Sruwaddacon Bay area (Winter and summer periods) – winter survey includes Brent Goose. Breeding bird surveys (includes general terrestrial and target species surveys – Sand Martin). Monitoring implementation, and success, of mitigation measures. Carcass surveys.	HW & LW Year 1 to 3: fortnightly (reducing to monthly thereafter) surveys of Sruwaddacon Bay (Winter and summer periods) – winter survey includes Brent Goose. Breeding bird surveys for 1 to 3 years, depending upon species (includes target species surveys – Sand Martin). Duration of post construction surveys to be agreed in consultation with NPWS.

5.8.2.1 EMP TABLE 9-1 ECOLOGICAL MONITORING – FLORA AND FAUNA (CONT)

	PRE- CONSTRUCTION	DURING CONSTRUCTION	POST- CONSTRUCTION
<p>FAUNA/ NON-AVIAN</p> <p>TARGETED SPECIES:</p> <ul style="list-style-type: none"> ■ Otter ■ Badger ■ Bats ■ Common Frog. 	<p>Pre-construction fauna surveys:</p> <ul style="list-style-type: none"> ■ Otter: a full sprint and resting place survey of the Sruwaddacon Bay area (ongoing since April 2011) ■ Badger: full survey for badger activity, presence of setts and feeding signs (1 to 3 months prior to construction. (30m either side of the route) ■ Bat roost survey and survey of activity ■ Common frog survey: surveys of potential frog breeding sites during the breeding season ■ General fauna: standard fauna survey based on a search for signs, including occasional direct observations ■ Regular checks on known mammal burrows in the vicinity of the TWA at Glengad. 	<p>Monitoring of vegetation clearance (scrub/ plantation): survey for badger signs/setts at targeted areas.</p> <p>Monitor implementation of mitigation measures as required for all targeted species.</p> <p>Seasonal otter surveys of the Sruwaddacon Bay area (3 to 4 per year).</p> <p>Monitoring as deemed necessary – depending upon the findings of pre-construction surveys. Eg. if deemed necessary monitor activity at possible sett/holt locations* and carry out regular checks on known mammal burrows.</p> <p><i>*Note: No active/breeding holts or breeding setts have been found within the zone of influence during surveys to date, including:</i></p> <ul style="list-style-type: none"> – historic surveys from 2002 to 2009 – EIS surveys in early 2010) – pre-/during construction monitoring surveys in 2011 and 2012 to date (May 2012). 	<p>Surveys for targeted species and general fauna surveys including checks on known mammal burrows.</p> <p><i>Otter:</i> Survey of all known holts/resting places: 3 months after construction.</p> <p>Full survey of otter activity: up to 3 times per year (and at least bi-annually) for a period of at least 3 years, then annually – subject to review.</p> <p><i>Badger:</i> 3 months after habitat reinstatement and annually for 2 years post construction.</p> <p><i>Bats:</i> Survey of activity – annual for 2 years post construction.</p> <p><i>Common frog:</i> Surveys of known frog breeding sites and translocation receptor sites, annually during the breeding season for 2 years post construction.</p> <p><i>Other fauna species:</i> standard fauna survey – annually for 2 years post construction.</p>

5.8.2.2 EMP TABLE 9-2 POST-CONSTRUCTION MONITORING PROGRAMME
FOR HABITATS AND VEGETATION

SITE/LOCATION	HABITAT INSPECTION INTERVALS, YEARS POST CONSTRUCTION			VEGETATION QUADRAT SURVEY §	INDICATIVE DURATION POST CONSTRUCTION
	1ST YEAR	2ND YEAR	3RD YEAR (onwards)		
Glengad Landfall (cliff) to and including LVI and all TWAs (including SC2).	Quarterly	Bi-annually – if recovery is good – otherwise more frequently.	Bi-annually – if recovery is good – otherwise more frequently.	Annual	3 to 5 years depending upon rehabilitation progress. †
Shorelines at the landfall and foredunes and intertidal zones & saltmarsh north of SC3 at Aughoose.	Quarterly	Bi-annually	Annual		Detailed survey not required unless adverse effects noted during first year.
Aughoose compounds, peat storage areas and biodiversity areas.	Monthly	Quarterly	Bi-annually	Annual	5 to 7+ years depending upon the site's rehabilitation.
Recovering Eroded blanket bog to the west of SC3.	Annual	Annual	Annual	Annual	
Leenamore Inlet – saltmarsh and intertidal reinstatement.	Monthly	Bi-annually – if recovery is good – otherwise more frequently.	Bi-annually – if recovery is good – otherwise more frequently.	Annual	3 to 5+ years depending upon the site's rehabilitation.
Fields on either side of the Leenamore inlet.	Monthly	Quarterly	Bi-annually	Annual	3 to 5+ years depending upon the site's rehabilitation.
Recovering Blanket Bog – 190m.	Monthly	Quarterly	Bi-annually	Annual	5 to 7+ years depending upon the site's rehabilitation.
Conifer plantations – wayleave planting and created wetland habitat.	Bi-monthly	Bi-annually – if recovery is good – otherwise more frequently.	Bi-annually – if recovery is good – otherwise more frequently.	Detailed vegetation survey not required because not semi-natural vegetation.	3 to 5+ years minimum depending upon the site's rehabilitation.

† The proposed schedule is based upon the experience of monitoring following reinstatement at Glengad in 2002 and 2009.

5.8.2.3 ECOLOGICAL MONITORING – FRESHWATER

The freshwater biological monitoring programme as set out in Table 9-3 has been agreed, in consultation with Inland Fisheries Ireland (IFI). It is proposed that sampling locations would be restricted to those sites listed in the table below. The parameters measured during the surveys will be the same as previously conducted (undertaken as part of the Revised Corrib Onshore EIS 2010) in order to maintain continuity. The frequency and duration of post construction monitoring will be agreed in consultation with IFI once the 3-month post-construction sampling results are available.

EMP TABLE 9-3 ECOLOGICAL MONITORING – FRESHWATER AQUATIC HABITATS

	PRE-CONSTRUCTION	DURING CONSTRUCTION	POST-CONSTRUCTION
LEENAMORE	<p>Macroinvertebrates and Fish Sampling including site descriptions and photographs.</p> <p>1-4 weeks before construction.</p>	<p>Macroinvertebrates and Fish Sampling including site descriptions and photographs.</p> <p>Bi-annually.</p>	<p>Macroinvertebrates and Fish Sampling including site descriptions and photographs.</p> <p>3 months after reinstatement.</p>
FOREST STREAM	<p>Macroinvertebrates including site descriptions and photographs (at the crossing site and in the forest about 500m d/s).</p> <p>1-4 weeks before construction.</p>	<p>Macroinvertebrates including site descriptions and photographs (at the crossing site and in the forest about 500m d/s).</p> <p>Bi-annually.</p>	<p>Macroinvertebrates including site descriptions and photographs (at the crossing site and in the forest about 500m d/s).</p> <p>3 months after reinstatement.</p>
UPPER LEENAMORE	<p>Macroinvertebrates including site descriptions and photographs (u-s and d-s confluence with the main Leenamore).</p> <p>1-4 weeks before construction.</p>	<p>Macroinvertebrates including site descriptions and photographs (u-s and d-s confluence with the main Leenamore).</p> <p>Bi-annually.</p>	<p>Macroinvertebrates including site descriptions and photographs (u-s and d-s confluence with the main Leenamore).</p> <p>3 months after reinstatement.</p>

5.8.2.4 ECOLOGICAL MONITORING – INTERTIDAL (MACROINVERTEBRATES)

Monitoring of intertidal (benthic) macroinvertebrates will be undertaken as follows:

■ *Leenamore inlet:*

- *Pre-and post construction sampling will be undertaken as set out in Table 9-1 Ecological Monitoring – Flora and Fauna at 5.8.2.1 above.*

■ *Tunnel route:*

- *Monitoring will be done in conjunction with bathymetric surveys*
- *The macro-invertebrate communities will be sampled along the route in 1 km blocks relating to 3 transects (pre – tunnelled, just tunnelled, previously tunnelled)*
- *Repeated transects will overlap with the previous block in order to provide time series of impact/recovery*
- *The separation of transects will be at 500m intervals, with sampling sites on the tunnel route and with controls located at approximately 100m on either side.*

5.8.2.4 EMP TABLE 9-4 OPTIMAL SEASONS FOR ECOLOGICAL SURVEYS

HABITAT/SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JULY
BLANKET BOG/WET HEATH†							
GRASSLAND/GRASS-DOMINATED HABITATS†							
FAUNA (GENERAL)*							
OTTER†							
BADGER†							
BATS – BREEDING ROOSTS*							
BATS – WINTER ROOSTS*							
COMMON FROG†							
BREEDING BIRDS (GENERAL) †							
OVERWINTERING BIRDS (GENERAL) †							
GEESE AND SWANS†							
AQUATIC INVERTEBRATES (GENERAL) †							

	OPTIMAL
	SUB-OPTIMAL
	INAPPROPRIATE

AUG	SEP	OCT	NOV	DEC	COMMENT
					It is possible and acceptable to assess the habitat quality of western lowland blanket bog vegetation at all times of the year.
					Optimal season depends upon how wet or dry the season is and the species composition. Can extend (May to August).
					Faunal signs may be observed throughout the year, but the preferred season is during winter months when the growth of vegetation cover is less luxuriant.
					This is particularly so when surveying for otter holts and badger setts.
					Survey time and frequency varies depending up on the species of bat and habitat type in which the survey is being undertaken.
					Optimal season varies depending upon species. Eg. From February for Grey Heron; and to August for Sand Martin.
					Varies to some degree depending upon species and location. For the Sruwaddacon Bay area the survey season is extended to include April and the second half of September.

† From NRA *Ecological Surveying Techniques for Protected Flora and Fauna during the planning of National Road Schemes* (Appendix II Optimal seasonal survey timings)

* From NRA (2006) *Guidelines for the Assessment of Ecological Impacts of National Road Schemes* (Appendix 7). For detailed guidelines on survey times and frequency for individual species of bat according to habitat types please refer to Appendix 3, National Roads Authority, 2005. *Best Practice Guidelines for the Conservation of Bats during the Planning of National Roads Schemes*. Dublin: NRA at: <http://www.nra.ie>

5.8.3 BELLANABOY BRIDGE GAS TERMINAL – TERRESTRIAL FLORA & FAUNA MONITORING PROGRAMME ¹⁸

AREA	DURING CONSTRUCTION	OPERATIONAL PHASE	COMMENT
FAUNA/ NON-AVIAN Targeted Species: <ul style="list-style-type: none"> ■ Badger ■ Otter ■ Pine Marten ■ Common Frog ■ Bats. 	<ul style="list-style-type: none"> ■ All vegetation (scrub/ woodland) clearance should be monitored prior to principal construction works commencing ■ Annually – check on otter and pine marten activity at the frog breeding season ■ Monitoring as deemed necessary – to include: <ul style="list-style-type: none"> – Regular consultation with engineering staff – Site visits during construction – Inspection of impacts (if any) on wildlife species of concern. 	<ul style="list-style-type: none"> ■ Monitoring as required/ deemed necessary ■ Consultation with engineers on site/others ■ Mitigation measures will be assessed over a period of 2 years following construction. The likely intervals for this are: <ul style="list-style-type: none"> ■ 1st year: 3-monthly ■ 2nd year: 6-monthly ■ Regular checks thereafter to ensure that faunal mitigation measures continue to function correctly ■ Annual monitoring of Pine Marten and Bat boxes. 	<ul style="list-style-type: none"> ■ During – and post – construction requirements will depend upon the ongoing status of faunal species on site ■ The duration of monitoring during the operational phase will depend upon the success of implementation of any mitigation measures ■ Monitoring and maintenance of Pine Marten and Bat boxes will be necessary for the duration of the life of the Terminal.
BIRDS	<ul style="list-style-type: none"> ■ Monitor bird activity in habitats unaffected by, but adjacent to the construction works at intervals – particularly during: <ul style="list-style-type: none"> – The breeding season(s); and the – Autumn migration period if deemed necessary. 	<ul style="list-style-type: none"> ■ Monitoring as required/ deemed necessary. ■ The affect of the gas terminal installation on bird activity will be assessed by surveying in the 1st and 2nd years during: <ul style="list-style-type: none"> – Breeding season; and – Autumn migration ■ As they become established, newly reinstated areas will also require monitoring for birds ■ Annual monitoring of nest boxes. 	<ul style="list-style-type: none"> ■ During and post-construction monitoring requirements will depend upon the ongoing status of bird species and habitats on site. The duration of monitoring during the operational phase will depend upon the success of implementation of any mitigation measures and the status of bird species and habitats on site ■ It may be appropriate to extend the monitoring into the 3rd, 4th or even 5th year post-construction ■ Monitoring and maintenance of nest boxes will be necessary for the duration of the life of the Terminal.

5.8.3 BELLANABOY BRIDGE GAS TERMINAL – TERRESTRIAL FLORA & FAUNA MONITORING PROGRAMME¹⁸ (CONT)

AREA	DURING CONSTRUCTION	OPERATIONAL PHASE	COMMENT
VEGETATION/ HABITAT	<ul style="list-style-type: none"> ■ Monitor willow scrub and any other vegetation clearance to ensure that no more is removed than necessary ■ Site visits to check on the ongoing protection of habitats to be preserved ■ Input to reinstatement. 	<ul style="list-style-type: none"> ■ Input to reinstatement, habitat creation and other biodiversity enhancement measures ■ Monitoring progress of re-vegetation – including the planting (deliberate) of and the natural spread of native species by seed or vegetative means ■ Monitoring of “new” habitats including the created wetlands, areas of deciduous tree and shrub planting and any biodiversity area. 	<ul style="list-style-type: none"> ■ The duration of monitoring during the operational phase will depend upon the success of implementation of mitigation measures ■ Annual monitoring of created habitats (eg wetlands and reinstated areas in general) will be necessary for at least five years post reinstatement. The duration of monitoring will be subject to regular review.

Back Cover Images: Lady's Bedstraw at Glengad
Leenamore River south of the inlet
Bog Beetle (*Carabus clatratus*) at Aughoose
Brent Geese at Glengad
Ringed Plover nest at Glengad



CORRIB DEVELOPMENT
BIODIVERSITY ACTION PLAN 2014-2019

Please note that Corrib is now operated by VEPIL; we are pleased to continue this important biodiversity work. You can find more information at www.vermilionenergy.ie