

17 INDIRECT, CUMULATIVE IMPACTS AND IMPACT INTERACTIONS

The purpose of this chapter is to assess the indirect (or secondary) and cumulative impacts of the proposed Corrib Onshore Pipeline development. Although the indirect impacts as they relate to particular issues (e.g. terrestrial ecology, air and noise) have generally been discussed within Sections B – D of the EIS, these are consolidated in this chapter. In addition, while Sections B – D establish the full extent of the direct impacts associated with the proposed development, this section provides a discussion on the inter-relationship of these impacts during the construction phase of the proposed development. The assessment has indicated that there will not be a significant environmental impact during the operational stage.

Section 17.1 below describes separately indirect (secondary) impacts of the proposed development and the impact inter-relationships are discussed in Section 17.2. Some overlap exists in the discussion between these impacts. Cumulative impacts relate to the proposed Corrib Gas Field development as a whole including the proposed Onshore Gas Pipeline and are discussed in Section 17.3.

The assessment of these impacts has been undertaken with regard to EPA documents 'Guidelines on the Information to be contained in Environmental Impact Statements 2002' and 'Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)' 2003. It has also been prepared with consideration to the EU 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions', prepared for the European Commission (1999).

17.1 INDIRECT (OR SECONDARY) IMPACTS

The EPA Guidelines for EIS describe indirect impacts as:

'impacts which are caused by the interaction of effects, or by associated or off-site developments'.

In the case of this development, indirect impacts are those which are considered to be caused by consequential associated development, i.e. not directly part of the project, but associated with the project, e.g. aggregate extraction. In addition to associated developments, some mitigation measures can also cause indirect impacts, e.g. the requirement for offsite surplus peat disposal as a result of using stone road construction to minimise environmental impacts in peatlands. These are described in Section 17.1.4.

17.1.1 Road Maintenance

The public road network will provide access to the temporary working area of the pipeline during the construction phase. The main route for hauling materials to the site will be via the R313, L1204, R314 and the L1202. As such this route has been upgraded during the last few years in connection with the Corrib Development, and will be maintained to a high standard in order to accommodate the level of construction traffic expected to occur as part of this project. This maintenance will have a limited indirect impact on the local communities along the local road network due to temporary and localised disturbance, with an overall positive indirect impact from maintenance of the road.

17.1.2 Aggregate Extraction

It is estimated that approximately 120,000m³ of stone will be required for the construction of the proposed development. Raw materials required during construction will be sourced from local suppliers. Where suitable, this may include the use of stone from local quarries and reuse of excavated materials in construction to minimise traffic impact. The extraction of this material will have a minor indirect negative impact on locally available natural resources (see Chapter 11). However, where possible, stone sourced on site from tunnelling works will be reused for temporary haul roads, construction of the stone road and compound construction. The sourcing and purchasing of materials will have a positive local economic impact.

17.1.3 Economic

In addition to the direct employment opportunities for construction of the onshore pipeline, indirect employment opportunities are expected to be created during the construction phase through increased demand for a range of goods and services, including construction materials and rental or guesthouse/hotel/B&B accommodation. This will have temporary socio-economic benefits for local residents, retailers and other commercial operators, e.g. accommodation services and transport companies, including increased workforce participation and income levels.

17.1.4 Indirect Impacts Resulting from Mitigation Measures

Table 17.1 summarises the main mitigation measures, which will result in a consequent indirect impact and associated secondary mitigation measures. These indirect impacts have been considered in Sections B-D of Volume 1 of this EIS and Volume 3 of the EIS, which describes the proposed peat deposition site at An Srath Mór (Srahmore) and the proposed operations to dispose of up to 75,000m³ of surplus peat from the construction of the onshore pipeline.

Table 17.1: Indirect Impacts resulting from Mitigation Measures.

Potential Direct Impact	Mitigation Measure	Indirect Impact	Mitigation Measure
Impact on marine environment	Segment lined tunnel under Sruwaddacon Bay.	Avoidance of potential impacts to the estuary. Positive impact.	n/a
		Requirement for temporary working areas at both ends of the tunnel	Tunnel from one side only, minimises impact at Gleann an Ghad (Glengad) and Poll an tSómais (Pollatomish) Careful siting of tunnelling compound to minimise impacts on human, natural environments and cultural heritage. Mitigation in design of lighting, noise attenuation, traffic management.
		Increased material transport such as tunnel lining, bentonite etc.	Reuse materials on site as much as possible Bentonite recycling
		Disposal of excavated materials – tunnel arisings and surplus stone after site reinstatement.	Reuse of tunnel arisings and stone, where possible. Appropriate disposal of remaining waste to authorised facilities.
		Disposal of water recovered from drilling fluid / tunnel arisings	Appropriate treatment of wastewater.
		Use of bentonite.	Careful monitoring and management of use and disposal of bentonite.
Impact on sensitive bog habitat (190m section east of Leenamore inlet)	Reduce impact on the bog by installing stone road.	Increased materials requirement.	Source local material to reduce traffic impacts and resultant emissions. Re-use stone from excavated materials where possible.
	Turving of peat	Compaction of peat on which turves are stored	Turves stored in a single layer.
	Avoid storage of excavated peat on top of surface of sensitive bog.	Offsite storage (within pipeline temporary working area) and disposal of surplus peat to An Srath Mór (Srahmore).	Appropriate disposal of excess peat to a permitted site (Srahmore). Traffic management plan
	Install inert plugs to prevent creation of preferential flow path, subsequent damage and drying out of the bog.	Preservation of any potential archaeological features preserved within the area of the bog around the stone road. Positive indirect impact.	n/a
Impact on local community	Construction of tunnel from one side only	Reduce impact on more densely populated communities situated along L1202 haul route. Positive Impact. Increase in Aghoos compound duration due to tunnelling from one direction only	Design of lighting at compounds, site access and pipe stringing areas to minimise disturbance. Installation of temporary 3m barrier (fence) designed to attenuate construction noise and reduce lighting and visual impact. Enclosing certain plant in sealed containers in compound to provide further noise attenuation.
Visual Impact associated with LVI	LVI compound will be dished to minimise visual impact	Excavation of soils and bedrock requires rock breaking and transport of excavated materials	Noise attenuation during construction to minimise disturbance Traffic Management Plan

17.2 IMPACT INTER- RELATIONSHIPS

The EIA Directive requires that the 'inter-relationships' and 'interactions' between specified environmental effects be considered. While almost all environmental aspects are inter-related to some degree only the significant interactions were taken into consideration in this assessment. For example, noise can interact with a number of environmental aspects. Noise issues primarily feature under the heading of 'Human Environment' and most of the standards and guidelines on noise relate exclusively to human beings. However, noise can also impact on terrestrial fauna such as birds and material assets in the form of commercial livestock and so it must be taken into account as part of the ecological and agricultural assessments.

Interactions have been clearly identified in the early stages of the project and where the potential exists for interaction between environmental impacts, the EIS specialists have taken the interactions into account when making their assessments. Where there is interaction between two disciplines, the impact of lesser relevance to one discipline has referred to the impact in the other discipline. This ensures that the main aspects of the proposed development are considered overall as well as separately.

Summary details on the main direct impacts that result in interactions between environmental effects are provided in Table 17.2 for the construction phase of the proposed development.

Table 17.2: Summary of Potential Interactions resulting from the Construction Phase of the proposed Corrib Onshore Pipeline Development.

Environmental Topic	Potential Impact	Inter-relationship	Potential Impact	Refer to Chapter / Section
Human Environment				
Traffic (Chapter 7)	Increase in traffic on local roads	Community	Reduced recreational amenity & residential quality	Chapter 6
		Terrestrial Ecology	Disturbance to wildlife	Chapter 12
Air Quality and Climate (Chapter 8)	Increase in dust/air emissions	Community	Reduced recreational amenity & residential quality	Chapter 8
		Ecology	Disturbance to wildlife	Section C
Noise and Vibration (Chapter 9)	Increase in noise	Community	Reduced recreational amenity & residential quality	Chapter 9
		Ecology	Disturbance to wildlife	Section C
		Material Assets	Disturbance to livestock	Chapter 11
Landscape and Visual Impact (Chapter 10)	Change in landscape character	Community	Reduced recreational amenity & residential quality	Chapter 10
		Ecology	Disturbance to wildlife	Section C
Natural Environment				
Terrestrial Ecology (Chapter 12)	Loss of habitat/species	Community	Reduced recreational amenity	Chapter 6
		Freshwater Ecology	Loss of habitat/species	Chapter 13
Soils and Geology (Chapter 15)	Contamination of soils / groundwater	Ecology	Loss of habitat/species	Chapter 15
		Groundwater / surface water	Reduced recreational amenity	Chapter 15
	Impact on drainage	Archaeology	Increased deterioration to adjacent potential archaeological features	Chapter 16
		Material Assets	Reduced farm productivity due to disturbed field drainage systems Loss of growing season, grazing and on permanent wayleave	Chapter 11
Cultural Heritage				
Archaeology (Chapter 16)	Disturbance of potential archaeological finds	Community	Impact on cultural heritage	Chapter 16

Table 17.2 shows that the inter-relationships identified during the construction phase of the project are mainly between each of the environmental aspects / impacts with ecology and community. However, as suitable mitigation measures will eliminate/reduce the possibility of these temporary effects during the construction phase, the above interactions will be avoided or significantly reduced.

17.2.1 Interaction of Construction Schedule and the Environment

It is expected that the overall construction phase will be carried out over twenty six months. Therefore, it will inevitably coincide with periods of environmental sensitivity including migrating salmonids in the March to May and July and August period, over-wintering birds in the October to March (inclusive) and nesting birds between March and August (inclusive). Construction will take place throughout the year, however the potential for impact due to interaction between construction activities and seasonal sensitivities are minimised through strict mitigation, as follows:

- Phasing of land based construction activities to avoid peat transport during winter.
- Use of a tunnel which will avoid surface disturbance, during construction of the pipeline route through Sruwaddacon Bay.
- Use of specialised fencing in site compounds to attenuate construction noise and reduce potential lighting impacts.
- Sound proofing will be used on plant producing high noise, such as generators and pumps, to reduce the levels of noise generated on site.
- Use of appropriately designed lighting at the tunnelling compound to minimise lighting spill, and impact on sensitive receptors.
- Implementation of detailed surface water management system at tunnelling compounds and LVI, including on site treatment facilities.
- Turving the relevant area of salt marsh prior to the excavation of the pipeline trench at the Leenamore river crossing.
- Pre-construction ecological surveys as identified in Section C.
- Watercourse crossings to be discussed and agreed with NWRFB prior to commencement of construction.

Environmental sensitivities have been outlined in the discussions of each environmental element in previous chapters of this EIS. A Natura Impact Statement, in respect of the potential for the proposed development to impact on the Natura 2000 site, is provided in Appendix P. Table 17.3 presents a summary of the key sensitivities that will coincide with construction activities.

Table 17.3: Potential Interaction of Key Environmental Sensitivities.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Construction Activities												
Migrating salmonids (see Chapter 13, 14)												
Over-wintering Birds (see Chapter 12)												
Nesting Birds (see Chapter 12)												

17.3 CUMULATIVE IMPACTS

A cumulative impact can be considered as an impact on the environment that results from incremental changes to environmental parameters when added to changes brought about by other past, present or reasonably foreseeable actions (European Commission, 1999). Cumulative impacts can result from individually minor but collectively significant actions taking place over the same period of time or/and within the same geographical area. Cumulative impacts therefore can cover all aspects of the environment.

While a single activity may itself result in a minor impact, it may, when combined with other impacts (minor or insignificant) in the same geographical area, and occurring at the same time, result in a cumulative impact that is collectively significant. This impact is known as a synergistic cumulative impact.

To address the cumulative impacts for the proposed development, an understanding and knowledge of historical, existing, and reasonably foreseeable future activities are essential. It was assumed that current day-to-day activities within the area would continue into the future. These activities include agriculture, forest management (felling in rotation) and other primary activities, residential development and generally moderate commercial activity. On examination of current activities and land-uses and the continuation of these activities it was deemed that they would not contribute significantly to compound an impact so were not considered further in this cumulative impact assessment.

In identifying proposals and projects for consideration in estimating cumulative impacts, only projects with a reasonable certainty of being executed within the next 15-20 years can be considered. The Corrib Gas Field Development is not currently designed to cater for future tie-ins from other gas field developments and any such tie-ins would require a design review of the project and a review of the statutory approvals process. In this regard, when considering cumulative impacts in the future, those developments which are currently in the planning process are considered reasonably foreseeable actions.

At the time of writing this EIS, no other committed developments, which would contribute to cumulative impacts, are planned in the local and wider area. However, it is worth noting that, though not yet committed, ESBI Ocean Energy Strategy are planning to develop 150MW of ocean energy by 2020 and have made an application for three foreshore exploration licences from the Department of Environment, Heritage and Local Government to undertake wave measurements and a sea-bed survey in the Achill / Blacksod area. Applications are being made for exploration licences to enable ESBI to deploy wave measurement buoys for a minimum period of 12 months in order to assess the wave climate at each site. ESBI will also undertake hydrographic surveys at each site to assess the sea-bed conditions. These works will take place over a 12 to 24 months period upon receipt of foreshore exploration licences commencing in 2010.

The following elements, which have the potential to contribute to cumulative impacts, were addressed as part of the cumulative impact assessment for the proposed development:

1. Corrib Gas Project, which consists of the following elements in addition to the proposed Onshore Gas Pipeline considered in this EIS:
 - a. Offshore gas field development including seabed installations and offshore pipeline (works completed in Summer 2009).
 - b. Offshore umbilical (to be installed in mid 2011).
 - c. Bellanaboy Bridge Gas Terminal (Construction ongoing; likely to be complete Q4 2010. Finalisation of landscaping, water treatment and reinstatement will be completed after completion of onshore pipeline construction).
 - d. Srahmore Peat Deposition Site (Deposition from Terminal completed in 2007)

- e. An Srahmore Peat Deposition Site (Deposition from onshore pipeline) (see Volume 3 of the EIS)
2. Bord Gáis Éireann Mayo to Galway pipeline (Constructed 2005 – 2006 and final tie-in to Bellanaboy Bridge Gas Terminal 2009)

In all cases, the residual impacts arising from each proposal have been identified and assessed for their cumulative impacts at a national (see Section 17.3.1) and regional scale (see Section 17.3.2). The potential cumulative impact of the works associated with the construction of onshore pipeline and the pre-commissioning of the offshore pipeline have been considered separately in Section 17.3.3 below.

Site investigation works undertaken in Sruwaddacon Bay associated with works for the Corrib Onshore Pipeline will take place prior to the construction of the onshore pipeline, and will not have a cumulative impact with the construction of the onshore pipeline.

17.3.1 National

The impacts of the Corrib Gas Field Development have been considered in the context of effects on the national economy and compliance with national policy.

The Goodbody Report¹ (2007) identifies that the Corrib Natural Gas Field Development will contribute over €3bn to Ireland's GDP over its lifespan, supplying up to 60% of the country's natural gas needs at peak production. The gas field is estimated to yield approximately one trillion cubic feet of natural gas over an operating life of fifteen to twenty years.

The Corrib Gas Project supports Ireland's proposed national strategic fuel switch from solid fuel and oil to natural gas and renewables and so contributes to Ireland's target to limit national greenhouse gas emissions while ensuring security of energy supply (see Preamble). A fuel switch from oil and coal gas will also result in lower NO_x and SO_x emission levels nationally.

The Corrib Gas Field Development will make a significant contribution to Ireland's national energy supply by moderating Ireland's dependence on imported energy. It will also provide stable and economic energy supplies, enhancing the sustainability of existing industry in the Border Midlands and Western Region.

As well as providing natural gas for homes in the region, the Corrib Gas Field Development will contribute to making the North West a more attractive investment destination. Potential investors will be attracted by the availability of natural gas as a reliable source of energy. In addition, the availability of natural gas may lead to electricity generation in the area, which could improve the reliability of electricity supplies. As well as being a benefit for the residents of the area, this is in line with the national need to promote balanced regional development.

17.3.2 Local & Regional

At a local and regional level, impacts of the Corrib Gas Project and the Bord Gáis Éireann Mayo to Galway Pipeline have been considered. Cumulatively there are positive local and regional economic impacts anticipated from these developments as a result of direct employment in construction, indirect employment in supporting services during construction and longer term community gain arising from developments.

As the majority of the elements are below ground and will have limited emissions in the operational phase, no long-term cumulative impacts are anticipated for air or noise. Visually, the LVI and the Terminal will be the only long term visible elements and cumulatively these elements are expected to result in a moderate impact for surrounding sensitive receptors. There will also be land-use restrictions

¹ Economic Assessment of the Corrib Gas Project, Goodbody Economic Consultants, November 2007

on forestry and development restrictions on the permanent wayleave. Ecology has some of the greatest potential for cumulative impacts through disturbance, fragmentation and loss.

Consequently the cumulative impact assessment has focused on impacts arising from construction activities. However, it should be noted that the majority of impacts during the construction phase will be short term, will be transient in nature and will in general only impact on environmental resources on a local basis.

From a local perspective construction activities associated with the Corrib Gas Field Development have been ongoing since 2004 including:

- construction of the Gas Terminal and associated peat removal since 2004;
- preparation of the landfall for the offshore pipeline in 2005; and
- Laying of the offshore pipeline completed in 2009 and associated landfall works at Gleann an Ghad (Glengad)

It is anticipated that works for the construction of the onshore pipeline, including associated peat disposal will begin in 2011 and will continue to 2013. These construction activities will result in additional traffic, noise, dust and visual disturbance in the immediate area of the works. The continuous nature of construction works associated with these elements of the Corrib Gas Field Development has the potential to result in significant cumulative impact on those living in immediate area of the works and those living on the haul route to an Srath Mór (Srahmore). However, these potential impacts will be mitigated as outlined in Sections B – D of the EIS. Potential cumulative impacts on the local community and on the local environment will be therefore be minimised.

For the purposes of this cumulative impact assessment, the accumulation of temporary construction impacts of all elements (regardless of whether works are completed or about to be completed) are considered with the accumulation of temporary construction impacts within the planned construction phase of the proposed Corrib Onshore Pipeline development (approximately 26 months) commencing in early 2011 (see Figure 17.1). It is anticipated that works associated with the installation of the offshore umbilical and the construction of the onshore pipeline will overlap for a period during this time, although work will be suspended briefly on LVI construction during the pull-in of the offshore umbilical. Any cumulative impacts resulting from increased traffic, noise, dust and visual disturbances associated with this activity will be minimal and only last for approximately three months.

An overview of the impacts arising from each of the distinct elements of the development on the human, natural environment and cultural heritage are provided below in sections 17.3.3 – 17.3.5 and Table 17.4, together with an assessment of the cumulative impact.

A separate assessment of the cumulative emissions of greenhouse gas emissions arising from the construction and operation of the Corrib Gas Field Development is provided in Section 17.3.6.

17.3.3 Pre-Commissioning of Offshore Pipeline

It is planned to begin the pre-commissioning of the Offshore Pipeline at Gleann an Ghad (Glengad) during the summer of 2012. The pre-commissioning of the Offshore Pipeline will involve marine based activities which are best carried out during clement weather conditions.

The Offshore Pipeline is currently filled with seawater containing corrosion inhibitor. Pre-commissioning of the Offshore Pipeline will involve the following steps (subject to receipt of all necessary permits and approvals of the Corrib Project).

- Tie-in of Offshore Pipeline to completed LVI;
- Connection of a temporary PIG trap to the offshore end of the Offshore Pipeline on the sea bed;

- Connection of a temporary PIG trap to the Offshore Pipeline at the LVI (downstream of the in-line ball valve);
- Water in the Offshore Pipeline will be expelled (into the sea) using a PIG propelled by nitrogen gas. This will be launched from the temporary PIG trap downstream of the LVI;
- Nitrogen gas will be generated at the landfall site using specialised plant and compressors. This will be pumped into the offshore pipeline via the temporary pig trap; and
- When the pig reaches the temporary pig trap on the sea bed, the offshore pipeline will be completely filled with nitrogen gas. Nitrogen gas within the Offshore Pipeline will be used later in the commissioning of the onshore pipeline.

The pre-commissioning works will involve the use of a nitrogen generation plant and compressors, which will be located at the landfall site for a period of approximately 2 weeks. A 3m high noise attenuation fence will be installed around the site for the duration of the pre-commissioning works. The construction activities associated with the offshore pipeline pre-commissioning will be temporary in nature, and will involve setup of the site in which the generators will be contained, and small numbers of traffic to transport the plant to the site.

Noise from the plant could result in a significant increase in noise levels in the Gleann an Ghad (Glengad) area. The compressors will be enclosed to reduce noise from source. However, potential noise from nitrogen compressors and associated compressors means that this activity would need to be restricted. If further noise attenuation measures can be identified and proven to reduce noise levels to an acceptable target, it is proposed to carry out this work on a 24-hr basis. Should further noise attenuation not be available, this activity will be curtailed, and not carried out during the period 22:00 – 07:00.

This activity will last for a short period only and impacts are predicted to be temporary and moderate. It is anticipated that there will be only minimal construction works occurring in Gleann an Ghad (Glengad) at this time, therefore only a negligible cumulative impact is anticipated during this time.

The nitrogen plant will require the use of mobile diesel generator units, which will generate emissions of combustion gases. The predicted cumulative impact to air quality of the operation of the generators during the construction of the Corrib Onshore Pipeline on the nearest residential dwellings will be a slight adverse impact of a temporary nature. The levels will remain at all times well below the limits for the protection of human health. The nearest residential receptors affected are those approximately 200m south of the compound. Based on the EPA air quality index, the air quality in this area will remain in the range of “good” to “very good” with the generators in operation. The potential for cumulative impact of generator emissions from this plant on the cSAC is considered negligible.

	2004				2005				2006				2007				2008				2009				2010				2011				2012				2013							
	Q1	Q2	Q3	Q4																																								
Gas Terminal																																												
Peat Removal & Srahmore Deposition Site																																												
Mayo to Galway Pipeline*																																												
Offshore Gas Field (incl. Wells)																																												
Offshore Pipeline & Landfall (incl. Outfall Pipeline)**																																												
Onshore Pipeline Landfall to Terminal																																												
Offshore Umbilical Installation																																												

Figure 17-1: Corrib Project Construction Progress to date and Proposed Construction Programme (indicative only and subject to timely regulatory approval)

Note: Figure 17.1 provides indicative periods during which activities may occur.

*Pipe tie-in (Mayo – Galway pipeline) to Corrib pipeline in Q1 2009.

**This includes offshore pipeline pre-commissioning in Q2 and Q3 in 2012 (for approximately 2 weeks) and offshore rock placement in Q2 and Q3 in 2010.

17.3.4 Human Environment

17.3.4.1 Local Employment

Bellanaboy Bridge Gas Terminal

Up to 1,000 people have been employed during construction of the Gas Terminal providing a positive impact on the local economy during the construction period with enhanced opportunities for local service providers.

Peat Removal and Srahmore Peat Deposition Site

An estimated 50-55 people were required for the peat Srahmore Peat Deposition Site in 2005 / 2007. These included existing / returning temporary employees.

Mayo to Galway Gas Pipeline

Approximately 500 people were employed during construction and reinstatement of the Mayo to Galway Pipeline. In addition, short-term benefits to local communities in terms of increased income in shops, pubs, cafes/restaurants and accommodation and indirect employment were predicted as a result of pipeline construction activities.

Offshore Development

Construction of the Offshore Seabed Installation involved a workforce of approximately 200 to 300 people over the construction period. However, this was mainly an international specialist workforce with limited local benefits. Construction of the landfall and the subsequent laying of the offshore pipeline in 2009 involved a workforce of approximately 300 to 400 with a positive impact on the local economy, with enhanced opportunities for local service providers. These included increased trade in local shops, pubs, restaurants, and service providers. There were also opportunities for supply of equipment, catering, transport and delivery of goods. There will also be tangible economic benefits to Killybegs from the offshore components of the project.

Onshore Corrib Gas Pipeline

Construction of the Onshore Pipeline is predicted to result in a significant and positive impact on the local economy from major employment opportunities and construction of the pipeline. During construction it is estimated that 120 to 140 personnel will be employed on the onshore pipeline project. The onshore pipeline is predicted to have an overall positive economic impact on the existing community.

Peat removal from the Onshore Pipeline will also provide direct and indirect job creation during the peat deposition activity.

Cumulative Impact

As detailed in the Goodbody Report, construction of the Development will result in significant benefits for the local economy. It is estimated that the local Mayo economy will directly benefit by approximately €181m as a result of the Corrib Development. In excess of 800 jobs will be created during the construction phase including direct, indirect and induced employment. This will result in a positive cumulative impact during construction.

17.3.4.2 Tourism and Recreation

Bellanaboy Bridge Gas Terminal

The EIS for the Gas Terminal predicted a negligible negative short term impacts on visitors to the area during the construction period. Whilst Bed & Breakfast and self catering type accommodation would benefit from increased trade, visitors to the local area who pass the Terminal site would notice site activity, increased traffic movements and construction activity.

Peat Removal and Srahmore Peat Deposition Site

Most major tourist attractions in the area are sufficiently remote from the Srahmore Peat Deposition Site to be unaffected by the peat deposition activity.

Mayo to Galway Gas Pipeline

The Mayo to Galway Pipeline was completed in 2006. Negligible short term impacts existed on visitors to the area during the construction period.

Offshore Development

The Offshore Seabed Installation is thought to have resulted in imperceptible impacts on tourism and recreation. The offshore pipeline was laid in the summer of 2009. Attractions were sufficiently remote from the offshore activities and therefore associated visitors were unaffected during construction.

Onshore Corrib Gas Pipeline

The development will have a slight to moderate temporary negative impact upon visiting communities of the local and wider vicinity of the proposed route during the construction phase.

Cumulative Impact

None of the construction activities associated with the elements of Corrib Gas Field Development are expected to impact significantly on tourism and recreation. As all elements will not occur simultaneously, cumulative impacts will be limited to the umbilical lay and onshore pipeline construction where some overlap is expected. Where cumulative impacts do occur they will be temporary in nature and are not expected to be significant.

17.3.4.3 Traffic

Bellanaboy Bridge Gas Terminal

The local road network, including the upgraded haul road L1204, adequately catered for traffic volumes generated during the construction phase of the Bellanaboy Bridge Gas Terminal.

Peat Removal and Srahmore Peat Deposition Site

In terms of the movement of peat from the Terminal to the Srahmore Peat Deposition Site, the traffic assessment concluded that the local road network could adequately cater for traffic volumes generated by the construction of the project. The main traffic impact was predicted to result from damage to the road pavement due to heavy construction traffic. This was mitigated through extensive upgrading of local roads.

The Traffic Impact Assessment and Traffic Management Plan provided in Chapter 7 and Appendix E & F has taken account of the cumulative impact of all traffic associated with the movement of peat to An Srath Mór (Srahmore) from the construction of the Onshore Pipeline.

Mayo to Galway Gas Pipeline

The Mayo to Galway Pipeline was predicted to result in moderate adverse short-term impacts on local traffic along the proposed pipeline route as a result of construction traffic associated with the delivery of pipe, equipment, fencing, hardcore, sand padding and supplies to construction areas and, and the subsequent removal of temporary facilities upon completion.

Offshore Development

The existing road network has adequately catered for the volumes of traffic generated during construction associated with the landfall for the offshore development. Traffic associated with the installation of the offshore umbilical will be minimal.

Onshore Corrib Gas Pipeline

In terms of the Onshore Pipeline, the traffic impact assessment has predicted that the road network surrounding the development is capable of facilitating the construction activities. There will however be a moderate impact on the local road network surrounding the development during the construction stage but this will be temporary in nature. Maintenance works will result in a local positive impact for local road users. Adverse traffic impacts during construction can be satisfactorily mitigated and the overall residual traffic impact will be imperceptible.

Cumulative Impact

Construction traffic associated with all elements of the Corrib Field Development project has, and will continue to result in increased traffic volumes and may cause intermittent noise, vibration, dust and delays to other road users for the duration of the construction. However, for future works only traffic associated with the installation of the offshore umbilical and construction of the onshore pipeline will occur simultaneously. Although there may be some overlap in 2011, which will lead to a cumulative traffic impact on the local road network, the impact will be slight. This will be further reduced through the implementation of a Traffic Management Plan (see Appendix F) and the maintenance of local road network.

17.3.4.4 Air Quality

Bellanaboy Bridge Gas Terminal

Construction of the Gas Terminal has resulted in emissions of dust, and emissions from traffic and machinery; however construction activities are not predicted to result in significant negative air quality impacts.

Peat Removal and Srahmore Peat Deposition Site

During peat deposition from the Terminal, the Srahmore Peat Deposition Site was predicted to result in a minor localised impact on air quality through dust generated during positioning of peat at the depository, and exhaust fumes from haulage on onsite vehicles and equipment. Similar impacts will arise from peat deposited from the onshore pipeline.

Mayo to Galway Gas Pipeline

The Mayo to Galway Pipeline was predicted to result in a minor localised impact on air quality through exhaust fumes from machinery used during construction.

Offshore Development

The Offshore Seabed Installation was not predicted to have a significant impact on air quality in view of the short duration or periodic nature of most of the activities associated with the offshore works. In general, there were no resident sensitive receptors offshore and impacts were negligible. Given the location of the offshore development, no cumulative impact with onshore pipeline construction is expected.

Onshore Corrib Gas Pipeline

The Onshore Pipeline will result in emissions of dust (during dry weather only) from construction and emissions from construction traffic. However this is not predicted to result in significant air quality impacts. The local impacts to air quality along the proposed haul routes as a result of construction traffic are considered to be temporary slight negative.

Cumulative Impact

Construction activities associated with all elements of developments will result in temporary impacts on local air quality. In terms of cumulative impacts it is anticipated that only works associated with installation of the offshore umbilical and construction of the Onshore Gas Pipeline will occur

simultaneously. Where cumulative impacts do occur they will be slight and temporary in nature. Peat deposition will not result in an increased cumulative impact on air quality as An Srath Mór (Srahmore) is located sufficiently far away from the other elements of the Corrib development.

17.3.4.5 Noise and Vibration

Bellanaboy Bridge Gas Terminal

The construction of the Gas Terminal was predicted to give rise to increased noise and vibration levels. However, as the site is remote, compliance with normal construction noise and vibration controls has been achieved. Any particularly noisy operations are planned in advance in order to ensure that appropriate community liaison can be put in place.

Peat Removal and Srahmore Peat Deposition Site

Peat deposition from the Terminal to the Srahmore Peat Deposition Site was predicted to result in minor short-term impacts on noise generated by the transfer of material to the site and movement within the site during construction. Similar impacts will arise from peat deposited from the Onshore Pipeline.

Mayo to Galway Gas Pipeline

The Mayo to Galway Pipeline was predicted to result in minor temporary short-term impacts on noise during construction as a result of rock breaking and excavation.

Offshore Development

The Offshore Seabed Installation (offshore component) resulted in negligible noise impacts on noise. At 65km offshore, the drilling rig and vessel activities have been too far from human sensitive receptors to be of concern. The Offshore Pipeline Installation (nearshore component) has not resulted in significant impacts on noise. Vessels normally worked at night, with minimal disturbance to local residents. Pulling in of the pipeline to the landfall resulted in a slight increase in normal daytime noise levels and a significant increase in noise levels in the evening and at night when the area would normally be quiet. This activity lasted for a short period only and therefore impacts were temporary. Dredging in Broadhaven Bay in 2009 involved re-excavation of the previously infilled trench. This activity did not generate noise at levels that had more than a negligible and temporary impact on the receiving environment. It is anticipated that the offshore umbilical will be installed in 2011. Some rock placement will also occur in 2010.

Onshore Corrib Gas Pipeline

The Onshore Pipeline is predicted to result in a significant, although short term negative noise and vibration impacts during construction as a result of construction traffic and general construction activities.

There will be noise associated with 24 hour works required at the tunnelling compound in na hEachú (Aghoos). There will also be noise and vibration from the tunnelling, but this is considered to have an imperceptible impact on the human and ecological aspects.

Cumulative Impact

During construction there will be increased noise and vibration from construction works and traffic associated with each of the elements of the project. In terms of cumulative impacts only works associated with the installation of the offshore umbilical, pre-commissioning of the offshore pipeline and construction of the onshore pipeline could give rise to cumulative noise impacts.

As increased traffic associated with the installation of the offshore umbilical (though considered to be minimal) and construction of the onshore pipeline may occur simultaneously, there may be potential for cumulative noise impacts along the local road network. However, these impacts which will be

slight and temporary in nature, will be limited to normal working hours and will be further managed through the implementation of a Traffic Management Plan (see Appendix F).

17.3.4.6 Visual Impact

Bellanaboy Bridge Gas Terminal

The Gas Terminal is predicted to result in minor temporary visual disturbance as a result of construction activities including the presence of large plant and cranes.

Peat Removal and Srahmore Peat Deposition Site

During construction, short term adverse visual impacts are associated with peat transfer traffic to the Srahmore Peat Deposition Site.

Mayo to Galway Gas Pipeline

The Mayo to Galway Pipeline resulted in minor short-term visual impacts during construction as a result of site facilities and working widths.

Offshore Development

The Offshore Seabed Installation (nearshore component) resulted in short term adverse visual impacts on highly scenic views at Gleann an Ghad (Glengad) as a result of temporary activity within the nearshore areas of Broadhaven Bay including the mooring of the large pipelay vessel, workboats, etc. Similarly, short term adverse visual impacts resulted from construction activity in the vicinity of the landfall including the beach. Any visual impacts associated with the installation of the offshore umbilical be temporary in nature.

Onshore Corrib Gas Pipeline

The Corrib Onshore Pipeline is predicted to result in substantial negative temporary / short term visual impacts as a result of construction activities. This is because the viewer sensitivity is high for the protected views designated along the scenic routes in the area. Visually, the LVI will be the only long term visible element which will result in a moderate impact for surrounding sensitive receptors.

Cumulative Impact

Visually, the LVI and the Terminal will be the only long term visible elements and cumulatively these elements are expected to result in a moderate impact for surrounding sensitive receptors. Construction activities associated with all elements of the project will result in localised temporary / short term moderate visual impacts. There will be no increased cumulative visual impact resulting from installation of the offshore umbilical, or from the peat deposition at An Srath Mór (Srahmore) as it is located sufficiently far away from the other elements of the Corrib Gas Field development.

17.3.5 Natural Environment

17.3.5.1 Terrestrial Ecology

Bellanaboy Bridge Gas Terminal

The Gas Terminal was predicted to result in short-term negligible or minor impacts on terrestrial flora and fauna during construction as a result of vegetation clearance and disturbance to habitats of low ecological interest.

The Terminal site covers an area of approximately 160 hectares but only habitats under the terminal footprint, access roads and some small drainage channels are permanently lost (13ha). Habitats affected include grassland, immature conifer plantation and small pockets of scrubland.

Peat Removal and Srahmore Peat Deposition Site

The Srahmore Peat Deposition Site was predicted to result in a number of temporary impacts on terrestrial flora and fauna during construction as a result of disturbance, including temporary loss of habitat.

Approximately 450,000m³ of peat excavated from the Terminal site was deposited in a cutover peatland at An Srath Mór (Srahmore). Up to 75,000m³ of peat will be deposited at An Srath Mór (Srahmore) as a result of construction of the Onshore Pipeline. Deposition of the peat takes place within an area of approximately 63 ha.

This site is one from which peat has been harvested for a local power station and is saucer shaped with an extensive drainage infrastructure that was installed for industrial peat extraction. On completion, the site has been allowed to recolonise with natural species. This promotes the re-establishment of peat-forming conditions and re-instates a peatland ecosystem in place of the original Atlantic blanket bog complex. The vegetation succession will lead to a more varied habitat which will contribute to local biodiversity and complement the ecological significance of the adjacent rehabilitated cutover areas. Over time the habitats will blend with the existing fringe habitats that currently border the development site. The long term prospect is therefore considered to be positive, with permanent beneficial impacts on the development site. The residual impacts overall are considered to be significantly positive given that they should result in habitat rehabilitation and increased local biodiversity.

Mayo to Galway Gas Pipeline

The Mayo to Galway Pipeline was predicted to result in temporary short-term impacts on terrestrial flora and fauna during construction as a result of disturbance. Short term impacts on fauna were limited to the working area, with works timed to minimise disturbance. Potential impacts on flora were minimised through route selection and appropriate construction and re-instatement techniques.

There were six Block Valve Installations (BVIs) along the 150km Galway to Mayo pipeline route, the site areas of which are estimated to be approximately 35m x 35m, except for BV4 (see Table 17.4) which incorporates a pigging station and requires an area of approximately 50m x 50m. This required the permanent loss of the following habitats at each Block Valve Installation (BVI):

Table 17.4 Habitats at Block Valve Installations

Station	Habitat Type
BVI 1	Mixed cutover bog and conifer
BVI 2	Cutover rushy grassland
BVI 3	Improved grassland and hedgerow / scrub
BVI 4	Improved agricultural land
BVI 5	Agricultural land
BVI 6	Agricultural land / stone wall

In addition to permanent habitat loss due to the six BVIs, approximately 13km of the Galway to Mayo Pipeline traversed conifer plantations, which were required to be felled. As the pipeline working width was 40m this meant that there was a permanent removal of approximately 52ha of conifer trees. Conifer felling should be seen in the context of local forest management which has seen extensive (ongoing) clearfelling of large areas of mature conifer plantation in recent years. The felling of trees for this pipeline should be viewed as an extension of the forest management in the area, as the mature conifers would be due for felling in rotation.

Offshore Development

The work required to install the offshore pipeline was relatively minor, and the route through the cliff at the landfall was re-instated fully following construction. No long term impacts on any species are predicted.

Seabed disturbance from the installation of the field facilities resulted in permanent habitat loss of benthic faunal communities and crustaceans over a footprint of 392m² of the seabed (combined footprint for the gathering manifold and pipeline end manifold).

Installation of the pipeline on the seabed resulted in a permanent loss of benthic habitat. The total seabed area actually taken up by the offshore pipeline is approximately 4.28ha. Increased turbidity during construction and smothering of organisms underneath the pipeline will result in permanent but minor habitat change. Within Broadhaven Bay, the pipeline was trenched for approximately 13km from the landfall site and therefore no permanent habitat loss occurred. The offshore umbilical will be trenched along a similar route, with no permanent habitat loss anticipated. It is estimated that approximately 2 ha of the seabed will be taken up by the placement of rock on the offshore pipeline. This will occur in 2010.

Onshore Corrib Gas Pipeline

The impact of the proposed Onshore Pipeline on terrestrial ecology in the area is considered neutral or slight negative in the long-term as a result of disturbance during construction. No long-term significant impacts on species of conservation interest present on site, such as otters, badgers, bats and frogs are expected.

Permanent loss of habitat of the onshore pipeline occurs at the LVI, along the access road to the LVI and the tree felling of conifers. This represents approximately 3.5ha. Again, the felling of trees for this pipeline should be viewed as an extension of the forest management in the area, as the mature conifers would be due for felling in rotation.

Cumulative Impact

Construction activities associated with all elements of the Project would result in temporary slight negative impacts on terrestrial ecology. However, these impacts will not be additive in terms of temporary loss (i.e. in combination they do not result in a greater impact) on ecological resources such as cSAC or natural habitats.

Peat deposition at An Srath Mór (Srahmore) will result in habitat rehabilitation and increased local biodiversity, resulting in a positive impact on terrestrial ecology, which will add to the overall cumulative impact.

Approximately 76 ha of permanent habitat loss will be associated with the various elements of the Corrib Gas Field Development. The impacts from the loss outlined will not be additive (i.e. in combination they do not result in a greater cumulative impact) on ecological resources such as SAC or natural habitats. In addition it should be noted that the peat deposition site at An Srath Mór (Srahmore) can be seen as a positive habitat change and is therefore not included in the above figure.

17.3.5.2 Freshwater Ecology

Bellanaboy Bridge Gas Terminal

The Gas Terminal was predicted to result in temporary short-term negligible or minor impacts on freshwater aquatic ecology during construction, as pollution control measures, including run-off control has been successfully implemented.

Peat Removal and Srahmore Peat Deposition Site

The Srahmore Peat Deposition Site was predicted to result in negligible impacts on freshwater aquatic ecology with the implementation of appropriate mitigation measures to control discharges.

Mayo to Galway Gas Pipeline

Discharge of hydrostatic test water into the freshwater aquatic environment as a result of the construction of the Mayo to Galway Pipeline was predicted to result in negligible impacts on aquatic ecology.

Offshore Development

There were no predicted impacts to the aquatic (freshwater) ecology from the construction of the offshore pipeline (and its associated umbilical).

Onshore Corrib Gas Pipeline

At watercourse crossings work will be carried out in isolation of stream flow to avoid disturbance and to prevent water escaping onto the temporary working area. Robust surface water management systems, including on site treatment facilities, will be put in place during construction. Residual impacts on freshwater ecology, including salmonids, post construction are predicted to be slight to negligible.

Cumulative Impact

Construction activities associated with all elements of the development will result in imperceptible or slight temporary impacts on freshwater ecology. Cumulative impacts however will be limited as impacts on aquatic ecology will generally be local to individual elements of the overall development.

17.3.5.3 Marine Ecology

Bellanaboy Bridge Gas Terminal

There are no predicted impacts to the marine ecology associated with the construction phase of the Terminal.

Peat Removal and Srahmore Peat Deposition Site

There are no predicted impacts to the marine ecology associated with the peat removal and the An Srahmore Peat Deposition site.

Mayo to Galway Gas Pipeline

There are no predicted impacts to the marine ecology associated with the Mayo to Galway Gas pipeline.

Offshore Development

The installation of the umbilical will cause some temporary localised disturbance to the seabed sediments, but it is expected that recovery and recolonisation by benthic communities will occur fairly rapidly. Where rock armour or concrete matting is laid on the seabed the existing seabed habitats will be permanently lost, however the new introduced hard substrates may attract new species to the area. Overall, the predicted impact to benthic communities is considered negligible, with the exception of the rock-placement works in Broadhaven Bay, which is considered minor, due to the extent of the rock placed area. Projected noise levels associated with the rock-placement operations are not anticipated to have significant impacts. It is considered likely that marine mammals within 200m of operations would demonstrate an avoidance response. Controls to limit any impacts to marine mammals from the generation of noise during remaining near-shore construction will be implemented, and the construction techniques that will be used do not generate high noise levels. Any effect is likely to be transient and restricted to a behavioural response (avoidance).

Onshore Corrib Gas Pipeline

In the unlikely event that emergency surface intervention should be required during tunnelling there would be a potential to cause some disturbance of the seabed predominantly due to altered sediment

mobility around temporary structures causing scour and deposition. Allowing for mitigation and coupled with the fact that most of the scour will naturally refill with mobile re-deposited material post construction, the residual impacts are expected to be neutral to negative or imperceptible to slight.

Cumulative Impact

The Offshore Seabed Installation and offshore pipeline (including rock placement) are predicted to impact on marine ecology. In the unlikely event that temporary surface intervention is required during tunnelling underneath Sruwaddacon Bay, the cumulative impacts are predicted to be imperceptible in the short term.

17.3.5.4 Soils and Geology

Bellanaboy Bridge Gas Terminal

Construction of the Gas Terminal resulted in the excavation of approximately 450,000m³ of local peat and excavation of both weathered and unweathered bedrock. However, there was no predicted negative impact on the geology of the area.

Peat Removal and Srahmore Peat Deposition Site

The Srahmore Peat Deposition Site was predicted to have no adverse impacts on soils and geology with the implementation of mitigation measures including appropriate timing of works.

Mayo to Galway Gas Pipeline

The Mayo to Galway Pipeline was predicted to have a number of potential impacts on soils and geology during construction associated with the crossing of peat areas, the crossing of flood plain areas, the crossing of low-lying sand and gravel areas, areas underlain by karstified limestone, and areas of shallow hard rock. Mitigation measures were identified to minimise such impacts on soils and geology including minimising the length of crossings in these areas.

Offshore Development

The Offshore Seabed Installation (offshore component) was predicted to have only a minor adverse geological impact, as it is not an area that is known to be especially important in geological terms. The drilling of wells will locally impact the solid geology in the removal of a core of rock during the drilling operation. Locally adjacent to the well site there was some local impact on the seabed geology, in that cuttings arising from the well drilling operation could be expected to settle nearby. Installation of the pipeline and umbilical will disturb the seabed and shallow sub-seabed geology temporarily during the construction phase. The umbilical will be buried and the seabed is expected to return to its present morphology within a matter of weeks after construction. Rock placement and any concrete mattresses introduced for seabed sediment scour protection will permanently impact seabed geology by smothering.

Onshore Corrib Gas Pipeline

In the short-term, there will be a slight impact due to the localised loss and/or compaction of peaty soils during construction. A stone road will remain permanently in place for the section of the pipeline route in peatland. A 4.9km grouted tunnel will also be in place. The LVI will be placed within a dished area in Gleann an Ghad (Glengad), which will be excavated. Once construction has been completed and after the full implementation of the mitigation measures there will be an imperceptible impact on soils and geology.

Cumulative Impact

A number of the individual elements of the project have the potential to result in localised impacts on geology and soils. Any cumulative impacts would not be synergistic, i.e. the combination of these impacts will not result in a more significant impact on soils and geology. Therefore the cumulative impact is considered to be slight.

17.3.5.5 Hydrology and Hydrogeology

Bellanaboy Bridge Gas Terminal

Construction of the Gas Terminal will result in localised minor adverse impacts on hydrology. The most noticeable feature would be the possible decrease in baseflow to the watercourse immediately downstream of the Gas Terminal. However it is anticipated that this impact would be negligible by the time this watercourse reaches the Bellanaboy River.

Peat Removal and Srahmore Peat Deposition Site

With the implementation of appropriate mitigation measures to treat and control discharges, the Srahmore Peat Deposition Site results in negligible impacts on watercourses adjacent to the site.

Mayo to Galway Gas Pipeline

The Mayo to Galway Pipeline was predicted to result in negligible adverse impacts as a result of changes to drainage during construction.

Offshore Development

The Offshore Seabed Installation was predicted to result in minor or negligible impacts to the aqueous environment as releases to the environment, if any, would be both small in quantity and of very low toxicity.

Onshore Corrib Gas Pipeline

In the short-term, there will be a slight impact due to the localised loss and/or compaction of peaty soils during construction. There will be a localised impact in the areas where the stone road is constructed. Once construction has been completed and after the full implementation of the mitigation measures there will be an imperceptible impact to the original drainage pattern.

Cumulative Impact

A number of the individual elements of the Project have the potential to result in localised impacts on hydrology and hydrogeology. However, each element is committed to stringent pollution prevention measures that are considered sufficient to address any impacts. Therefore the cumulative impact is considered to be imperceptible.

In terms of impact on habitats arising from the effects of the development on hydrology, no elements of the Corrib Gas Field Development will result in cumulative impacts on the cSAC or on the natural habitats traversed by the proposed Corrib Onshore Pipeline as each of the elements lie within a different catchment.

17.3.6 Cultural Heritage

17.3.6.1 Archaeology

Bellanaboy Bridge Gas Terminal

No impacts on known archaeological sites were predicted as a result of the construction of the Gas Terminal. During earthworks no archaeological features were discovered.

Peat Removal and Srahmore Peat Deposition Site

No archaeological features were discovered.

Mayo to Galway Gas Pipeline

No impacts on known archaeological sites were predicted as a result of the Mayo to Galway Pipeline. Possible minor/moderate impacts on unknown sites were identified.

Offshore Development

No impacts on known archaeological sites were predicted as a result of the Offshore Seabed Installation. Possible discovery of unknown archaeological material was identified but none were found.

Onshore Corrib Gas Pipeline

The proposed Onshore Pipeline route avoids all recorded archaeological monuments and specific sites of archaeological potential. As a result none of these known or potential archaeological sites will be directly impacted. However, one recorded archaeological site lies adjacent to the temporary working area and four other sites of archaeological potential remain within the temporary working area or lie adjacent to it. As such, these sites are considered to be indirectly impacted by the proposed development. The potential exists to reveal previously unknown and buried archaeological sites in the future as part of an archaeological testing strategy.

Cumulative Impact

As there is potential for unknown archaeological material to be discovered, archaeological monitoring has been, and will be, undertaken during construction for all elements to ensure the recognition and recording of any such remains.

As all vegetation clearance and excavation has taken place for all elements of the proposed development except the Onshore Pipeline and no impact on archaeology occurred, no cumulative impacts are expected.

17.3.7 Assessment of Total Greenhouse Gases

An assessment of the cumulative emissions of greenhouse gas emissions arising from the construction and operation of the Corrib Gas Field Development is provided below. This cumulative assessment includes the carbon losses arising from peat disturbance for the Corrib Gas Field Development, details of which are provided in Chapter 8 Appendix G.

Bellanaboy Bridge Gas Terminal

The total greenhouse gas emissions associated with the construction of the Gas Terminal were 43,340 tCO₂eq, of which 6,369 tCO₂eq was due to peat removal to the Srahmore Peat Deposition Site.

Mayo to Galway Gas Pipeline

The total estimated greenhouse gas emissions are presented in Table 17.5 below. Details relating to the construction of the Mayo to Galway Pipeline were limited in the EIS and where data was not available, scaled up construction details from the Corrib Onshore Pipeline have been included.

Table 17.5 Total GHG Emissions of the Mayo to Galway Pipeline

Item	Estimated GHG Emissions (tCO ₂ eq)
Construction Materials	37,764
Metals (pipeline Steel)	86,474
Plant Emissions	1,056
Peat Removal	29,670
Material Transport	3786
Personnel Transport	269
Total GHG Emissions	159,019

Offshore Development

The total greenhouse gas emissions for the offshore element of the project have been calculated to be 164,499 tCO₂eq.

Corrib Onshore Gas Pipeline

The total estimated greenhouse gas emissions for the onshore element of the project have been calculated to be 30,590 tCO₂eq, 4,059 tCO₂eq of which are the carbon losses from peat.

Cumulative Impact

Table 17.6 below provides an estimate of the total greenhouse gas emissions associated with the construction and operation of the Corrib Gas Field development.

Table 17.6 Summary of Total Estimated Greenhouse Gas Emissions associated with the Corrib Gas Field Development

Project	Construction Emissions (tCO ₂ eq)	Operational Emissions (tCO ₂ eq)	Total Emissions (tCO ₂ eq)
Offshore Pipeline & Well Installation	164,499	-	164,499
Onshore Gas Pipeline	30,590	-	30,590
Bellanaboy Bridge Gas Terminal	43,340	691,725	735,065
BGE Mayo to Galway Pipeline	159,019	-	159,019
Total	397,448	691,725	1,089,173

Note: 1. Assumes 15 years of Terminal Operations and 46,115 tonnes per year (Chapter 14 Terminal EIS)

From the above figures, the estimated total greenhouse gas emissions including those from carbon losses from the construction phase of the Corrib Onshore Gas Pipeline represent 7.7% of the total estimated greenhouse gas emissions associated with the construction of the Corrib Gas Field Development. The estimated contribution from carbon loss due to peat removal of 4,059 tCO₂eq from the construction of the Corrib Onshore Pipeline represents approximately 1% of the total Greenhouse Gas Emissions associated with the construction of all elements of the Corrib Gas Field Development.

17.4 CONCLUSIONS

Table 17.7 summarises the potential cumulative impact for each environmental topic discussed in Sections 17.3.3-17.3.5

Table 17.7: Summary of Potential Cumulative Impacts during the Construction Phase

Environmental Topic	Significance	Duration
Local Employment	Positive	Temporary
Tourism and Recreation	Imperceptible	Temporary
Traffic	Imperceptible	Short term*
Air Quality	Slight	Short term*
Noise	Slight	Short term*
Visual	Moderate	Temporary / short term
Terrestrial Ecology	Slight to Moderate	Short Term
Freshwater Ecology	Imperceptible	Short Term
Marine Ecology**	Imperceptible	Short Term
Soils and Geology	Slight	Short Term
Hydrology and Hydrogeology	Imperceptible	Temporary
Cultural Heritage	None	n/a
Carbon Loss	Slight	Permanent

* Short term cumulative impact, but activities will only coincide for short periods

** Emergency surface intervention (not expected to be required).

The above assessment of cumulative impacts on the environment indicates that the overlap in the installation of the offshore umbilical and the construction of the Onshore Pipeline has the potential to result in cumulative impacts on the local community as a result of increased traffic, noise, dust and visual disturbances. However, these impacts, all of which will be temporary or short term in nature will be minimised with the implementation of mitigation measures. In addition, the period of overlap between the construction of onshore pipeline and installation of the umbilical will be minimal (three months). There is also potential for noise and air quality cumulative impacts from the pre-commissioning of the offshore pipeline in 2012, but this will be for a very short duration (approximately 2 weeks).

There will be a positive cumulative impact on local employment. The other elements of the Corrib Field Development have either been completed (Mayo to Galway Pipeline) or in the case of the laying of the offshore umbilical in 2011 will not result in significant cumulative impacts on the local community due to the geographic location of the works.

In terms of cumulative impacts on the natural environment, potential impacts on the freshwater and marine environments will arise during construction. However, as these environments are transient in nature and capable of recovering in the short term no cumulative impacts are predicted to arise. Although the terrestrial environment will take longer to reinstate, the combined impacts of each element of development will not result in a more significant cumulative impact. This is due to the geographic locations of each element of the works, i.e. the combined post-construction impacts on the Mayo to Galway pipeline and the Corrib Onshore Pipeline do not give rise to a more significant synergistic impact.

It is expected that approximately 76 hectares of permanent habitat loss will be associated with the various elements of the Corrib Gas Field Development. However, the impacts from the loss outlined will not be additive (i.e. in combination they do not result in a greater cumulative impact) on ecological resources such as cSAC or natural habitats. Furthermore, it should be noted that since peat deposition was completed at An Srath Mór (Srahmore) from construction of the Terminal, the site has revegetated, providing additional habitat and reducing the potential for sediment run-off and thus having a positive impact on ecology. Areas subject to peat deposition from construction of the onshore pipeline, will also be allowed to revegetate, thus increasing the positive impact.

The above assessment of cumulative impacts concludes that impacts arising from the operation of each element of the Corrib Gas Field Development will not give rise to cumulative impacts on the human and natural environment. This is because the Terminal is the only element which requires operational activities with the potential for impact. Although the combined impacts during the

installation of the offshore umbilical, pre-commissioning of the offshore pipeline and the construction of the onshore pipeline and peat deposition will give rise to the potential for cumulative impacts, these will be short term in nature.