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Executive Summary

ENVIron UK (ENVIron) has reviewed the EIS documentation associated with Shell E&P Ireland Limited’s (SEPIL) application to the Department of Communications, Energy and Natural Resources (DCENR) under Section 40 of the Gas Act 1976 (as amended) for the construction of the onshore and offshore Corrib gas pipeline. Overall, we conclude from our review of the EIS documentation that the development could be completed without significant adverse environmental and social impacts and without likely significant adverse affects on the short-term or long-term integrity of Natura 2000 sites with respect to Article 6(3) of the Habitats Directive.

The basis for these conclusions and the assumptions under which they are made are described below.

Background to the Application

In 2001 the Corrib Developers sought a number of consents and approvals to develop the Corrib Project. These included an application to the Minister for Communications, Energy and Natural Resources (the "Minister") for consent to construct the above pipeline developments pursuant to section 40 of the Gas Act 1976, as amended ("Pipeline Authorisation"). On the 15 April 2002 the Minister granted the Pipeline Authorisation to the Corrib Developers. Construction activities for the preparation of the offshore pipeline commenced in 2005.

However, local residents raised concerns regarding the onshore pipeline and in particular safety aspects associated with the proximity of the proposed pipeline route to residential areas. In the light of these concerns, construction of the onshore pipeline was suspended. Following independent review and public consultation, SEPIL undertook to evaluate changes to both the pipeline design pressure and the route of the onshore pipeline. However, in the meantime, work on the offshore elements of the development continued under the 2002 Pipeline Authorisation.

In May 2008 SEPIL submitted an application to the Minister for the consent to construct of a revised onshore pipeline design and route, including a new Environmental Impact Statement (EIS) for the onshore pipeline. That application was subsequently withdrawn and re-submitted in February 2009 to incorporate a number of minor route amendments. The development of the onshore section of the Corrib gas pipeline also requires approval by An Bord Pleanála (ABP) under Section 182C of the Planning and Development Act 2000, as amended (PDA). An application for the onshore gas pipeline was therefore also made in 2009 to ABP under Section 182C of the PDA. Approval for the application was refused by ABP, although it did conclude that “...it would be appropriate to approve the proposed onshore pipeline development should alterations be made to the proposed development”, and ABP invited the developer to make a number of specified alterations. In the light of this, the 2009 submission to the Minister under the Section 40 of the Gas Act was withdrawn.

Following re-routing and redesign of certain features of the proposed onshore gas pipeline, SEPIL submitted revised applications to both ABP and to the Minister in 2010. The 2010 Application to the Minister is the subject of the current review. The submission has been made in two phases as follows:
1. May 2010 Submission, comprising:
   a. The Corrib Offshore EIS, 2001
   b. The 2010 Offshore Supplementary Update Report
   c. The Corrib Onshore pipeline EIS, May 2010

2. November 2010 Submission comprising a range of Additional Information sources associated with the project, including a number of clarifications and additional assessments. The Additional Information was provided by SEPIL in response to queries from DCENR following their review of the May 2010 EIS submission.

ENVIRON's Scope of Work

ENVIRON is assisting the DCENR to undertake its statutory assessment of the Environmental Impact Statement (EIS) for the 2010 Application. The scope of ENVIRON's role is to:

- Screen to confirm whether an EIS is required under applicable legislation.
- Examine the submitted EIS and assess whether or not it meets the scope and quality requirements set out or implied by specific European and Irish Environmental Impact Assessment (EIA) legislation and guidelines;
- Appraise the EIS highlighting any deficiencies in respect of the statutory requirements of the EIS and detail the outcome and resolution of any such deficiencies;
- Undertake a high level examination of the pipeline design documentation elements of the EIS;
- Review third party submissions made to DCENR in regard of the Application, and
- Propose any relevant conditions arising from the assessment of the EIS that should be considered for inclusion in any Ministerial consent which may issue on foot of the Section 40 Application. In making such recommendations, we are mindful of the findings of the European Court of Justice (ECJ) ruling C-418/04 and direction given in Circular PD 2/07 that consent conditions cannot stipulate completing survey works for Natura 2000 sites or for protected species.

ENVIRON has been supported in this role by AEA Technology, MVA Consultants and Wilcocks Consultants.

Review Documentation

The full list of materials reviewed by ENVIRON is provided in Section 4.2 of this report and is summarised below:

- EIS documentation submitted to DCENR in May 2010, including:
  a. The Corrib Offshore EIS, 2001
b. The 2010 Offshore Supplementary Update Report

c. The Corrib Onshore pipeline EIS, May 2010

- A range of Additional Information submitted to DCENR in November 2010 in response to DCENR queries relating to the May 2010 EIS
- A range of ad-hoc associated information provided by DCENR.

Screening Assessment

On the basis of comparison with relevant EU and Irish legislation (e.g. the Gas Act, 1976 as amended, and the Petroleum and Other Mineral Development Act, 1960, as amended), we conclude that an EIS is required for the Corrib gas pipeline development.

Review of the adequacy of the Onshore EIS documentation

1. Our review of the Onshore EIS revealed a number of deficiencies against good practice requirements. However, the Additional Information presented as part of the November 2010 submission adequately resolved the identified issues to the extent that we consider the Onshore EIS and Additional Information in combination to:

- Adequately meet the material requirements for an EIS.
- Adequately demonstrate that the development could be completed without unacceptable adverse environmental and social impacts.
- Provide an adequate assessment of the potential impacts of the development on the Natura 2000 sites through which the proposed onshore pipeline is routed as part of an Appropriate Assessment process (as required under the Habitats Directive) and further provide an adequate demonstration that the development is not likely to significantly affect the integrity of these Natura 2000 sites.

2. The above conclusions are based on the following assumptions:

- While our reviews identified a number of residual issues and uncertainties within the Onshore EIS and Additional Information documentation, we consider that these may be adequately managed and resolved through the application of a range of consent conditions to be attached to any consent for the development granted by the Minister. These proposed consent conditions are summarised in Appendix B to this report.
- All mitigation and monitoring controls identified in the Onshore EIS and Additional Information must be appropriately managed and implemented through an appropriate environmental management system and associated plans/procedures that are to be agreed with DCENR.
Review of the adequacy of the Offshore EIS documentation

3. With regard to offshore construction elements completed prior to ENVIRON’s review process, we generally find the 2001 Offshore EIS (as updated by the 2009 Offshore Supplementary Report) to be adequate. While a number of relatively minor deficiencies and uncertainties have been identified, we consider that these relate to either minor technical deficiencies that do not materially affect the adequacy of the EIS, or else aspects that could reasonably be resolved through the application of appropriate mitigation and monitoring programmes within the EMPs associated with the completed phases of offshore construction. While ENVIRON has not reviewed the EMPs for previously completed construction activities, we understand that an appropriate process was followed whereby such EMPs were reviewed and agreed by DCENR and, further, that independent ecological oversight of the offshore construction activities to ensure compliance with the EMPs was undertaken on behalf of DCENR.

4. In relation to the on-going and future offshore construction activities, we find that the assessment presented in the 2010 Offshore Supplementary Update Report and the 2010 Offshore EMP provide a reasonable basis to demonstrate that the remaining construction activities could be completed without unacceptable adverse environmental and social impacts. This conclusion is made on the assumption that the proposed mitigation and monitoring controls are appropriately managed and implemented through management plans/procedures that are/will be agreed with DCENR.

5. While our reviews identified a number of residual issues and uncertainties within the 2010 Offshore Supplementary Update Report regarding future construction activities, we consider that these may be adequately managed and resolved through the application of a range of consent conditions to be attached to any consent for the development granted by the Minister. These proposed consent conditions are summarised in Appendix B.

High level examination of the Pipeline design elements

6. ENVIRON has undertaken a high-level examination of the pipeline design elements presented in the EIS documentation. The main conclusions of this review are as follows:

- A rigorous process appears to have been followed to ensure compliance with relevant regulatory standards for the pipeline from a technical perspective.

- The codes specified in the design are those relevant European and Irish codes and standards applicable to onshore pipelines and that a rigorous process appears to have been followed to ensure that an appropriate standards regime has been put in place.

- A process for providing safety management for the pipeline has been addressed.

- The fault condition of over pressurisation has been considered in the design brief contained within the Onshore EIS documentation.
Failure modes associated with gas composition have been considered in the design.

7. In addition to the above conclusions we also make the following recommendations:

- In consideration of this Application, DCENR should take due account of any findings and recommendations made by the independent pipeline safety and design consultant (Entec) that has undertaken a separate and detailed review of the technical and safety aspects of the development on behalf of DCENR. We understand that the findings of this review have been provided to DCENR in Entec Report “Report for DCENR, Corrib Pipeline, Statutory Assessment of Consent to Construct a Pipeline” (hereafter referred to as the ‘Entec Report’).

- An appropriate approach to surveillance of the pipeline to mitigate risks associated with third party interference/damage during operation needs to be developed by SEPIL and agreed with relevant authorities.

- In the event that pipeline repairs are required during the construction or operation of the pipeline, the approach to such repairs would need to be agreed with the relevant authorities to ensure that all technical, environmental and social standards are met. This is particularly important in relation to pipeline damage within the grouted tunnel under Sruwaddacon Bay.

**Consent Conditions**

8. Where we have proposed consent conditions (see above and Appendix B), these in some instances place requirements on DCENR (e.g. to review and approve plans, to oversee construction activities, or liaise with other stakeholders). In such cases we strongly recommend that before such consent conditions are issued DCENR puts into place appropriate oversight and review arrangements to be undertaken by suitably qualified personnel, including review of relevant plans/assessments and periodic inspections of construction activities and facilities, in order to confirm that all relevant mitigation controls and consent conditions are being adequately met by the project developer and its construction contractors.
Acronyms

AA  Appropriate Assessment
ABP  An Bord Pleanála
CLO  Community Liaison Officer
cSAC  Candidate Special Area for Conservation
DCENR  Department of Communications, Energy and Natural Resources
DEHLG  Department of Environment, Heritage and Local Government
EcIA  Ecological Impact Assessment
EIA  Environmental Impact Assessment
EIS  Environmental Impact Statement
EMP  Environmental Management Plan
EPA  Environmental Protection Agency
HCV  Heavy Commercial Vehicle
IFI  Inland Fisheries Ireland
LVI  Landfall Valve Installation
MAOP  maximum Allowable Operating Pressure
NIS  Natura Impact Assessment
NPWS  National Parks and Wildlife Service
OD  Ordnance Datum
PDA  Planning and Development Act
PDR  Planning and Development Regulations
pSPA  Proposed Special Protection Area
RSA  Road Side Accident
SAC  Special Area for Conservation
SEPIL  Shell E&P Ireland Limited
SI  Site Investigation
SPA  Special Protection Area
TBM  Tunnel Boring Machine
TIA  Traffic Impact Assessment
TMP  Traffic Management Plan
1 Introduction

Shell E&P Ireland Ltd. (SEPIL) is developing the Corrib Gas field off the coast of County Mayo. As part of this development SEPIL has submitted an application to the Department of Communications, Energy and Natural Resources (DCENR) under Section 40 of the Gas Act 1976 (as amended) for the construction of a gas pipeline from an offshore well head to a gas terminal that is currently under construction at Béal an Átha Búí (Bellanaboy).

ENVIRON is assisting the DCENR to undertake its statutory assessment of the Environmental Impact Statement (EIS) for the above Application. The scope of ENVIRON’s role is to:

- Screen to confirm whether an EIS is required under applicable legislation.
- Examine the submitted EIS and assess whether or not it meets the scope and quality requirements set out or implied by specific European and Irish Environmental Impact Assessment (EIA) legislation and guidelines.
- Appraise the EIS highlighting any deficiencies in respect of the statutory requirements of the EIS and detailing the outcome and resolution of any such deficiencies.
- Undertake a high level examination of the pipeline design documentation elements of the EIS.
- Review third party submissions made to DCENR in regard of the Application.
- Propose any relevant conditions arising from the assessment of the EIS that should be considered for inclusion in any Ministerial consent which may issue on foot of the Section 40 Application.

ENVIRON has been supported in this role by AEA Technology, MVA Consultants and Wilcocks Consultants.

The findings of these review tasks are presented in this report, which highlights any significant deficiencies in the EIS and associated materials against statutory requirements. The review findings include consideration of whether the level of information on Natura 2000 sites presented in the EIS is sufficient to inform an ‘Appropriate Assessment’ under Article 6(3) of the EU Habitats Directive, and whether the proposed development is likely to significantly adversely affect the integrity of Natura 2000 sites.

The report structure reflects the review tasks undertaken as follows:

Section 2: Screening of EIS Requirement

Section 3: Background to the Application

Section 4: Approach to the Review

Section 5: Onshore EIS Review

Section 6: Offshore EIS Review
Section 7: Examination of the Pipeline Design Documentation

Section 8: Assessment of Submissions

Section 9: Summary, Conclusions and Recommendations

In presenting the results of this review, and for the purposes of clarity and conciseness, it is important to note that the main body of the report focuses on areas of deficiency. As such it does not explicitly describe in detail those areas that are fully adequate/compliant.

It should also be noted that a number of recommendations for consent conditions, if consent were to be granted, are described in the report and these are summarised in Appendix B. These consent conditions are recommended to rectify omissions, or to ‘enforce’ actions that are described, but not firmly committed to in the EIS (or in supporting documents). We also note that further consent conditions have been proposed by statutory consultees (e.g. DEHLG) and that such proposed conditions should also be given due consideration by the DCENR.
2 Screening of EIS Requirement

2.1 Irish Legislation

2.1.1 Transposition of EU Directives

The EIA Directive (Community Directive 85/337/EEC as amended by 97/11/EC and 2003/35/EC) requires that certain developments be assessed for likely environmental effects (commonly known as environmental impact assessment (EIA)) before permission can be granted. When submitting an application for such a development, the applicant must also submit an Environmental Impact Statement (EIS). In Ireland, the EIA Directive was transposed through the European Communities (Environmental Impact Assessment) (Amendment) Regulations 1989 (S.I. 349 of 1989). These Regulations were subject to relatively minor amendments in 1994, 1996 and 1998 and more substantial amendment in 1999 through the European Communities (Environmental Impact Assessment) (Amendment) Regulations, 1999 (S.I. 93 of 1999). The latter amendments transposed the requirements of the 1997 amending Directive 97/11/EC.

Irish EIA requirements in the land-use planning sector (the primary development consent system) were consolidated in the Planning and Development Act 2000. The Act consolidates all previous Planning Acts and much of the Environmental Impact Assessment Regulations, and also contains many significant changes and new initiatives. The Planning and Development Regulations 2001 (S.I. No. 600 of 2001) implement the Planning and Development Act 2000 in its entirety, consolidating all previous Regulations made under the 2000 Act and replacing the Local Government (Planning and Development) Regulations 1994-2000.

Community Directive 2003/35/EC was adopted in May 2003, and intends to align the provisions on public participation in accordance with the Aarhus Convention on public participation in decision-making and access to justice in environmental matters. The European Communities (Environmental Impact Assessment) (Amendment) Regulations 2006 (S.I. No. 659 of 2006) were implemented in Ireland to provide for revised procedures to enhance public participation in the environmental impact assessment of projects having transboundary environmental impacts.

The Planning and Development Regulations 2006 (S.I No. 685 of 2006) update and amend the Planning and Development Regulations 2001, making changes and updates to the development management system, and underpinning the new strategic consent procedure established under the Planning and Development (Strategic Infrastructure) Act 2006. The Regulations were made effective from two separate dates: 31 January 2007 for the strategic infrastructure provisions and 31 March 2007 for the development management system provisions.

2.1.2 The Gas Act

Section 40 of the Gas Act 1976, as amended, prohibits the construction or operation of a gas pipeline on, over or under the surface of the land or of any sea bed without the consent of the Minister for Communications, Energy and Natural Resources (the “Minister”).

Section 40 of the Act also requires the developer to prepare an EIS for any proposed gas pipeline of a class specified under Article 24 of the European Communities (Environmental Impact Assessment) Regulations 1996.
Impact Assessment) Regulations, 1989. The relevant specifications under Article 24 of the Regulations are:

First Schedule, Part I, Paragraph 16  “Pipelines for the transport of gas, oil or chemicals with a diameter of more than 800mm and a length of more than 40km”

First Schedule, Part II, Paragraph 10, i (ii)  “Gas pipelines and associated installations not included in Part I of this Schedule, where the design pressure would exceed 16 bar and the length of new pipeline would exceed 40 kilometres”

The EIS must accompany the application for consent to construct a pipeline. The EIS must also be published and copies provided to certain prescribed bodies for comment.

Section 40 of the Act also allows the Minister to impose conditions on any consent for the construction or operation of a pipeline, to ensure that reasonable measures are taken to protect sites of architectural, historic, archaeological, geological or natural interest.

2.1.3 The Petroleum and Other Mineral Development Act (POMD)

A Petroleum Lease is required under Section 13 of the Petroleum and Other Mineral Development Act 1960, as amended. The terms of the Petroleum Lease can require a Plan of Development to be supplied to the Minister, which is to be supported by an EIS for any developments meeting the specifications in Article 24 of the European Communities (Environmental Impact Assessment) (Amendment) Regulations, 1989 (as described above).

2.2 Screening Assessment of the Corrib Pipeline

A screening assessment has been undertaken to determine whether an EIS is required under current Irish legislation, and specifically the Gas Act and the POMD. This was accomplished by assessing whether the Project, as defined by the EIS within the Project Description, falls within the meaning of relevant current Irish legislation and this is summarised in Table 1 below.

On the basis of this analysis we conclude that an EIS is required for the Corrib pipeline.
### Table 1 EIA Requirements under the Gas Act and the POMD

<table>
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<th><strong>Gas Act</strong></th>
<th><strong>Text</strong></th>
<th><strong>EIA Req. for Corrib Pipeline</strong></th>
<th><strong>Basis</strong></th>
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<td>Section 40</td>
<td>“A statement of the likely effects on the environment (hereafter in this section referred to as an ‘environmental impact statement’) of a proposed pipeline of a class for the time being specified under Article 24 of the European Communities (Environmental Impact Assessment) Regulations, 1989,”</td>
<td></td>
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<tr>
<td></td>
<td>The relevant Specification in Article 24 of the Regulations are:</td>
<td></td>
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<td></td>
<td>• “Pipelines for the transport of gas, oil or chemicals with a diameter of more than 800 millimetres and a length of more than 40 kilometres”, and;</td>
<td>No</td>
<td>Pipeline length greater than 40 km although diameter less than 800 mm</td>
</tr>
<tr>
<td></td>
<td>• “Gas pipelines and associated installations…., where the design pressure would exceed 16 bar and the length of new pipeline would exceed 40 kilometres”</td>
<td>Yes</td>
<td>Design pressure exceeds 16 bar and length exceeds 40 km</td>
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<th><strong>POMD</strong></th>
<th><strong>Text</strong></th>
<th><strong>EIA Req. for Corrib Pipeline</strong></th>
<th><strong>Basis</strong></th>
</tr>
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<tr>
<td>Section 13</td>
<td>A Development Plan submitted in accordance with the terms of a Petroleum Lease is to be accompanied by an EIS for developments meeting the relevant specifications in Article 24 of the European Communities (Environmental Impact Assessment) Regulations, 1989:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• “Pipelines for the transport of gas, oil or chemicals with a diameter of more than 800 millimetres and a length of more than 40 kilometres”, and;</td>
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<td>Yes</td>
<td>Design pressure exceeds 16 bar and length exceeds 40 km</td>
</tr>
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3 Background to the Application

3.1 History of the Application
As part of the development of the Corrib Gas field, SEPIL proposes to construct a gas pipeline that comprises.

- An offshore pipeline section between the wellhead and the landfall at Glengad.
- An onshore pipeline section from the landfall site to the Bellanaboy gas terminal.

In 2001 the Corrib Developers sought a number of consents and approvals to develop the Corrib Project. These included an application to the Minister for Communications, Energy and Natural Resources (the “Minister”) for consent to construct the above pipeline developments pursuant to section 40 of the Gas Act 1976, as amended (“Pipeline Authorisation”). On the 15 April 2002 the Minister granted the Pipeline Authorisation to the Corrib Developers and offshore construction activities commenced in 2005.

However, local residents raised concerns regarding the onshore pipeline and in particular safety aspects associated with the proximity of the proposed pipeline route to residential areas. In the light of these concerns, construction of the onshore pipeline was suspended. Following independent review and public consultation, SEPIL undertook to evaluate changes to both the pipeline design pressure and the route of the onshore pipeline. However, in the meantime, work on the offshore elements of the development continued under the 2002 Pipeline Authorisation.

In May 2008 SEPIL submitted an application to the Minister for the consent to construct a revised onshore pipeline design and route, including a new Environmental Impact Statement (EIS) for the onshore pipeline and re-submission of the 2001 Offshore EIS with an associated 2008 Offshore Supplementary Update Report. After submission of the 2008 application, additional information was collected which indicated that minor re-alignment of the onshore pipeline would avoid sensitive ecological habitats. The application was withdrawn in December 2008 / January 2009, and re-submitted in February 2009 to incorporate these minor route alterations (together with other minor project and informational amendments). As the onshore pipeline route proposed in the 2009 application utilised the same landfall location as the original route, no changes to the offshore pipeline were proposed and hence the EIS for the offshore route remained unaltered from the original 2001 application, although new supplemental information was provided based on the results of recent baseline surveys.

The development of the onshore section of the Corrib gas pipeline also requires approval by An Bord Pleanála (ABP) under Section 182C of the Planning and Development Act 2000, as amended (PDA). An application for the onshore gas pipeline was therefore also made in 2009 to ABP under Section 182C of the PDA. Approval for the application was refused by ABP, although it did conclude that “...it would be appropriate to approve the proposed onshore pipeline development should alterations be made to the proposed development”, and ABP invited the developer to make a number of specified alterations.

In the light of the conclusions of ABP in response to the 2009 application under Section 182 of the PDA, the 2009 submission to the Minister under Section 40 of the Gas Act was
withdrawn while SEPIL undertook a design and re-routing exercise for the onshore gas pipeline.

Following re-routing and redesign of certain features of the proposed onshore gas pipeline, in May 2010 SEPIL submitted:

- **A revised application to ABP for the development of the onshore Corrib gas pipeline under Section 182C of the PDA.**
  Oral Hearings in respect of this application were held in August-September 2010 (the “2010 Oral Hearings”).

- **A revised application to the Minister for the development of the Corrib gas pipeline under Section 40 of the Gas Act 1976, as amended.**
  This application covered the development of both the offshore and onshore gas pipelines elements. A period of statutory consultation in respect of this application took place from Wednesday 30th June 2010 to Friday 30th July 2010. SEPIL subsequently submitted Additional Information to the DCENR in relation to the Section 40 application, and a further period of statutory consultation took place from Tuesday 9th November 2010 to Friday 10th December 2010. This Additional Information was provided in response to queries raised by the DCENR following review by DCENR (assisted by ENVIRON and Entec) of the May 2010 submission documentation. Review of this revised application (including the Additional Information) is the subject of this report.

### 3.2 Key features of the 2010 Submission

A full description of the proposed development facilities is provided in the EIS submission documentation. In summary, the proposed development comprises the following facilities:

- Offshore subsea wellheads and production manifold (for gathering and co-mingling the gas from all the wells) in the Corrib field.

- Landfall Valve Installation (LVI). The LVI is to be located approximately 50m east of the landfall at Glengad (see Figure 1 below). The purpose of the LVI is to limit the pressure in the onshore pipeline to a maximum allowable operating pressure (MAOP) of 100 barg.

- Offshore gas pipeline. The offshore gas pipeline is 20 inches in diameter and connects the subsea production manifold to the LVI near the Glengad landfall. The offshore gas pipeline is approximately 84km in length.

- Onshore Pipeline. The onshore gas pipeline will be 20 inches in diameter and will connect the LVI to the Bellanaboy gas terminal. The onshore pipeline will comprise tunnelled and trenched sections as follows:
  - Where the pipeline is to be routed under Sruwaddacon Bay it is to be construction within a concrete lined tunnel with an inside diameter of 3.5m. The tunnelled section is shown by the dotted red line in Figure 1. A tunnel boring machine (TBM) will be used to construct the tunnel and during the construction phase temporary facilities will include a tunnelling compound and pipe stringing.
area at Aghoos and a tunnelling reception compound at Glengad, as shown on Figure 1. The tunnelled section will be 4.9km in length of which 4.6km will be beneath Sruwaddacon Bay.

- Elsewhere the onshore pipeline will be buried within a trench approximately 2-3m wide and to a minimum depth of cover of 1.2m below ground level. In peatland areas, the pipeline will be laid within a ‘stone road’ (see the Onshore EIS for further description of the stone road method).

- Service umbilicals. The umbilicals will run between the Bellanaboy gas terminal and the subsea manifold. The services contained in the umbilicals include power/signal lines, methanol lines, hydraulic lines, produced water lines (to discharge at the subsea manifold treated produced water that is generated at the gas terminal from processing of the gas). The umbilicals are to be routed largely adjacent to the gas pipeline and in the onshore section will be installed in the pipeline trench/tunnel.

- Outfall pipe. The outfall pipe runs from the Bellanaboy gas terminal to an offshore discharge point approximately 13km from the Glengad landfall and is used to discharge treated surface water runoff from the gas terminal. In the onshore section the outfall pipe will be installed in the pipeline trench/tunnel.

Figure 1 Overview of Onshore Facilities (Not to Scale)
Figure 1 shows the previous onshore pipeline routes that were proposed in the 2001 Application (black line) and proposed in the 2009 Application (blue line), together with the route proposed in the 2010 Application (red line).

The 2009 Application route involved two short crossing of Sruwaddacon Bay, in the upper and lower portions of the bay respectively. These crossings were to be constructed by micro-tunnelling under the bay and would have required a temporary tunnelling compound at each end of each crossing. The 2010 Application route involves a single, longer tunnel of significantly greater diameter that runs length-wise under Sruwaddacon Bay. From an environmental perspective we note the following differences in the 2010 Application route as compared to the 2009 Application route:

- The 2010 proposed route has no direct physical footprint on the north side of Sruwaddacon Bay and hence:
  - There is now no requirement for tunnelling compounds on the north side of the bay.
  - There is now no physical footprint in the protected peat area of the Glenamoy Bog Complex to the north of the bay (see Figure 1).

However, we also note that:

- A larger compound is proposed on the southern side of the bay at Aghoos (this is required to accommodate the longer distance and greater diameter tunnelling process).

- The overall duration of the construction period will increase due to the proposed tunnelling route and methodology.

- The management of waste and traffic elements will increase due to waste arisings from the proposed tunnelling and associated compound areas.

- The activities and potential impacts associated with the TBM tunnelling activities differ from those associated with the previously proposed construction techniques (which involved much shorter length and smaller diameter drilled sections under Sruwaddacon Bay).
4 Approach to the Review

4.1 Scope
The scope of the review is restricted to an assessment of the EIS and associated documentation pertaining to the development of the offshore and onshore Corrib gas pipeline. The documentation reviewed by ENVIRON under its scope of work is identified in Section 4.2 below.

The EIS for the onshore pipeline includes (as an appendix) an EIS for the Srahmore Peat Deposition site, where it is proposed to dispose of excess peat resulting from the construction of the onshore pipeline (peat generated from the construction of the terminal at Bellanaboy was also deposited at the Srahmore site). Planning permission for the Srahmore Peat Deposition site was originally granted at the same time as the Planning Authority granted planning permission for the terminal at Bellanaboy. The developer has applied for a change of use at the site and this has been included in the Onshore EIS so that the Planning authority can consider planning permission in this regard.

There is accordingly no requirement for the DCENR to consider this site as it does not form part of the actual pipeline application, or the amendment to the Plan of Development. Therefore, ENVIRON has not reviewed the Srahmore Peat Deposition EIS, although we make note that an application for a change of use has been made.

4.2 Review Documentation
SEPIL submitted a Section 40 application for the Project to the Minister in May 2010. In response to queries raised by DCENR following their review of this Application, SEPIL subsequently made a further submission of Additional Information in November 2010. ENVIRON has reviewed the following documentation associated with the two Project submissions:

<table>
<thead>
<tr>
<th>EIS Submission May 2010 (collectively the “EIS”)</th>
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<tbody>
<tr>
<td><strong>Review Item ID</strong></td>
<td><strong>Title</strong></td>
</tr>
<tr>
<td>1</td>
<td>Corrib Onshore Pipeline Environmental Impact Statement, May 2010 (the “Onshore EIS”)</td>
</tr>
<tr>
<td>2</td>
<td>Corrib Offshore Environmental Impact Statement, 2001 (the “Offshore EIS”)</td>
</tr>
<tr>
<td>3</td>
<td>Offshore Supplementary Update Report, 2010.</td>
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</tbody>
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<tr>
<th>Additional Information Submission November 2010 (collectively the “Additional Information”)</th>
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<tr>
<td><strong>Review Item ID</strong></td>
<td><strong>Title</strong></td>
</tr>
<tr>
<td>4</td>
<td>Corrib Pipeline Development 2010 Environmental Impact Statement - Further Information Non-Technical Summary</td>
</tr>
<tr>
<td>5</td>
<td>Reprint of Appendix J1 of the May 2010 Corrib Onshore EIS (to include previously omitted figures).</td>
</tr>
</tbody>
</table>
ENVIRON has also reviewed third party submissions made to the Minister during the two consultation periods (see Section 8 for further details).

In addition to the above submission documentation, the following associated material has been made available by DCENR for review:

<table>
<thead>
<tr>
<th>Review Item ID</th>
<th>Title</th>
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<tbody>
<tr>
<td>15</td>
<td>2010 Marine Pipeline Works Environmental Management Plan, SEPIL Document COR-14-SH-050 REV-02</td>
</tr>
<tr>
<td>16</td>
<td>DCENR Approval letter for the SEPIL 2010 Marine Pipeline Works Environmental Management Plan, 19th April 2010</td>
</tr>
<tr>
<td>17</td>
<td>Corrib Gas Pipeline – Consent to Discharge Chemicals Associated with Pipeline Installation &amp; Testing – Phase 4, submission letter from SEPIL to DCENR, 9th April 2008</td>
</tr>
<tr>
<td>18</td>
<td>Discharge permit for Corrib Offshore Pipeline Installation and Testing – Phase 4, approval letter from DCENR to SEPIL, 19 August 2008.</td>
</tr>
<tr>
<td>20</td>
<td>Various briefs of evidence from the ABP 2010 Oral Hearings.</td>
</tr>
<tr>
<td>21</td>
<td>2010 Offshore EMP</td>
</tr>
</tbody>
</table>
4.3 Review Methodology

The EIS and associated documentation for both the onshore and offshore pipelines have been assessed through:

- High-level compliance review against the scope and requirements of the EIA Directive and relevant Irish regulations.
- A detailed appraisal of the assessment methods and conclusions of the EIS.

The most significant issues identified through this detailed review process are discussed in more detail in Section 5 (for the onshore pipeline EIS) and Section 6 (for the offshore pipeline EIS).

In presenting the results of the review it is important to note that, for the purposes of clarity and conciseness, the report focuses on identified areas of deficiency. As such it does not explicitly describe in detail those areas that are fully adequate/compliant. This report provides commentary on:

1. Issues identified in the EIS documentation provided in the May 2010 Application (i.e. Review Items 1 to 3).

2. Further commentary on the extent to which such issues have been addressed by the provision of the Additional Information provided in the November 2010 submission (i.e. Review Items 4 to 14).

The review is undertaken on the basis of the information provided in the EIS and associated documentation defined in Section 4.2 and it is beyond the scope of this review to assess information beyond these sources. In particular:

- Review of baseline characterisation is based on an assessment of the presented methodology and the relevance and quality of the data/information presented in the EIS. It is beyond the scope of this review to assess the completeness or accuracy of the presented baseline data via comparison with other external data sources / literature searches.

- Impact assessments are reviewed in terms of the adequacy of the methods described in the EIS. This includes review of the appropriateness of predictive models used in the EIS (although detailed calculations to check specific results of modelling work presented in the EIS are beyond the scope of this review).

Our review only considers the environmental, social and archaeological aspects of the project. While this includes review of aspects relating to the consequences of pipeline leaks, commentary on the detailed design integrity of the pipeline is beyond the scope of this review.

In our review, we highlight specific areas where we consider certain actions should be enforced using consent conditions (if such consent were to be granted). In making such recommendations, we are mindful of the findings of the European Court of Justice (ECJ)
ruling C-418/04 and direction given in Circular PD 2/07 that consent conditions cannot stipulate completing survey works for Natura 2000 sites or for protected species. Our approach is to review:

i) whether significant impacts are realistically likely;

ii) whether additional surveys would be required at a future time to determine the actual location of mobile species (e.g. otters) during construction, or;

iii) whether further surveys are required before approval.

Where consent conditions are proposed requirements may be placed on DCENR (e.g. to review and approve plans, to oversee construction activities, or liaise with other stakeholders). In such cases we strongly recommend that before such consent conditions are issued DCENR puts into place appropriate oversight and review arrangements to be undertaken by suitably qualified personnel, including review of relevant plans/assessments and periodic inspections of construction activities and facilities, in order to confirm that all relevant mitigation controls and consent conditions are being adequately met by the project developer and its construction contractors. The recommended consent conditions are discussed on an issue-by-issue basis in Sections 5 and 6, and are summarised in Appendix B.
5    Onshore EIS Review

5.1    General Approach and Structure

5.1.1    Description of the development

We find that the Onshore EIS provides a generally good description of the proposed project development. The precise boundaries of the onshore project with the other elements of the wider Corrib Gas Development, for example the landfall between the onshore and offshore, is not explicitly described. However, we do not consider this to be a significant deficiency and furthermore note that all relevant aspects of the pipeline are addressed between the offshore and onshore EIS.

One area of uncertainty relates to the possible need for an intervention pit. Issues relating to the uncertainty over the intervention pit are discussed in Section 5.2.8.

5.1.2    Description of the Site

The description of the project sites and their setting are generally adequately described within the Onshore EIS and forms a suitable basis for the assessments presented therein. Specific issues relating to the adequacy of the site description are discussed on an issue-by-issue basis in Section 5.2.

At the time of production of the Onshore EIS (Review Item 1), the results of geotechnical investigation works undertaken in Sruwaddacon Bay (along the proposed pipeline tunnel route under the bay) during 2010 were not available. However, these results were made available as part of the Additional Information package (Review Items 7 and 14). We find that the results of the geotechnical data investigation presented in the Additional Information package support the baseline assumptions made in the Onshore EIS.

5.1.3    Scoping

Although a dedicated scoping section is not provided in the main body of the Onshore EIS, a scoping document is attached as Appendix B to the Onshore EIS that describes the primary issues together with methods of investigation and consultation. However, we find that the scoping assessment provided in Appendix B does not provide a systematic approach to the identification of potential impacts (for example through a ‘source-pathway-receptor’ approach). Furthermore, we note that the scoping document provided in Appendix B dates from 2007 and has not been updated for the proposed re-route of the pipeline underneath Sruwaddacon Bay.

However, despite the lack of clarity in the reported approach to the scoping assessment, overall we find that the key potential impacts associated with the construction have nonetheless been identified and assessed within the Onshore EIS. Commentary on the adequacy of the assessment of specific aspects within the Onshore EIS is described in the following sections.

5.1.4    Consultation

A brief summary of the issues raised by both statutory consultees and local communities is presented in Chapter 2 of the Onshore EIS. We find that in some instances the presentation of these issues is high-level and in particular it is not clear in some instances how issues raised during the public consultation process have been addressed in the Onshore EIS;
these are discussed further, together with commentary on the extent to which such issues have been resolved via the Additional Information, on an issue-by-issue basis in Section 5.2.

5.1.5 Consideration of Alternatives

Alternative options for the overall pipeline route (including both offshore and onshore sections) between the offshore manifold and the Bellanaboy gas terminal appear to have been appropriately assessed during earlier EIS submissions, including assessment of different landfall locations. Following this process the preferred landfall location was selected to be at Glengad. Following the ruling of ABP in 2009 (see Section 3.1), the alternatives for the onshore pipeline route between the Glengad and the Bellanaboy gas terminal have been reassessed as part of the 2010 Onshore EIS. This re-assessment included consideration of a new alternative whereby the pipeline route would be installed within a tunnel constructed underneath Sruwaddacon Bay. Overall, and in the context of the history of previous submissions for the onshore pipeline, we find the consideration of alternatives presented in the 2010 Onshore EIS to be reasonable.

5.1.6 Assessment Methods

We find that the approach to assigning the significance of impacts (for example as being ‘slight’, ‘moderate’ etc. in line with Irish Environmental Protection Agency (EPA) guidelines\(^1\)) is not consistent throughout the Onshore EIS and is not always clear. While standard methods are utilised and described in some sections of the Onshore EIS (e.g. visual/landscape), in other sections the definition of the significance rankings is not clear. However, we understand from the Onshore EIS authors that unless otherwise stated, the significance of impacts has been assessed using the EPA guideline approach.

The interpretation and use of the term ‘residual impact’ throughout the EIS is inconsistent and often non-standard. The standard use of the terminology in the context of environmental assessment (e.g. EPA guidelines\(^1\)) is that a residual impact is any impact that will remain following the implementation of proposed mitigation measures. However, in the EIS ‘residual impacts’ are often seemingly determined only in terms of longer-term, post-construction impacts and residual impacts during construction are not always clearly assessed. The significance of this is discussed on an issue-by-issue basis in Section 5.2.

5.1.7 Environmental Management Plan (EMP)

The EMP is referred to throughout the Onshore EIS as the working document relating to mitigation measures and monitoring. We note that management plans and procedures must be developed prior to commencement of construction and recommend that these are reviewed and agreed by DCENR prior to construction (see also Appendix B Consent Condition 1). Specific elements required in such management plans and procedures are discussed in the following subsections.

\(^1\) Guidelines on the information to be contained in Environmental Impact Statements, Irish EPA, 2002.
5.2 Issue-specific aspects

5.2.1 Construction Techniques

This section addresses issues identified in our review that relate to construction techniques proposed by SEPIL. As useful background to this section we refer the reader to the detailed description of the proposed construction techniques presented the 2010 Onshore EIS.

Protective concrete slabs

The Onshore EIS contains proposals to lay protective concrete slabs above the pipeline at stream crossings, but there is little detail in the Onshore EIS of the construction methodology that would be employed. This query was raised by the DCENR at the 2010 Oral Hearing, and adequate details were provided in additional information provided by SEPIL (Review Item 9).

However, later in the 2010 Oral Hearing (in the brief of evidence for construction, Review Item 20) SEPIL stated that ABP might consider it appropriate for protective concrete slabs to be placed along the entire length of the non-tunnelled sections of the pipeline (not just at stream crossings as had been proposed in the Onshore EIS).

At the time that this statement was presented, the potential hydrological, ecological and geotechnical implications of the proposal had not been assessed. This is particularly relevant in areas of peatland. For example, there was no consideration of whether the concrete slabs would adversely affect the hydrological / hydrochemical (and hence ecological) characteristics of the re-instated peat placed above them. There was also no assessment of whether this proposal would affect the findings of the ground stability assessments presented in Appendix M2 of the Onshore EIS.

Furthermore, in SEPIL’s response to the DCENR’s queries regarding the construction of concrete slab protection at water courses (see above) it was stated that the slabs would be founded on a ‘firm stratum’. The proposal to extend the protective slab along the whole length of the pipe trench (if required by ABP) contained no explanation of how slabs would be founded on ‘firm stratum’ in the sections of the pipeline that traverse peat.

SEPIL provided additional information on these issues (Review Items 10 and 12) that included detailed descriptions and diagrammatic cross sections to illustrate the design of the proposed concrete slab protection. It was confirmed that the slab would cover only the umbilical line and water discharge pipe, and it would not extend beyond the confines of the trench into natural ground.

The location of the slab in the vertical profile was also clarified. In areas of deep peat, it would be placed within the stone road, upon a reasonable thickness of stone fill, and a further layer of stone fill would be laid above the slab to separate it from the reinstated peat turves. In areas of thin peat, where the pipe trench would be excavated into mineral soil, the slab would be placed upon stone fill and a layer of re-worked peat laid above it to reduce water leakage through the base of the stone road.

In light of the additional information, it is accepted that there would be negligible risk of lateral instability associated with the presence of a concrete slab. The risk of significantly increased settlement is also unlikely, as the slab would be uniformly supported by stone fill. The clarifications also demonstrated that the hydrology of the reinstated turves is highly
unlikely to be affected by the slab protection as there is an appreciable thickness of stone fill between the slabs and the base of the turves, and the slab will not extend across the full width of the trench.

A summary of the potential impact of the slabs upon peat hydrochemistry was also provided by SEPIL (Review Item 12). This indicated that the chemical constituents of peat water would not be significantly altered, and the original groundwater pH would rise by only a small amount (0.2pH units). The full details of the assessment were not provided for review, but it is considered that the very slow groundwater velocities and rate of reaction processes noted in the summary would in themselves be sufficient to prevent any discernable impact on peat hydrochemistry.

### Aggregate for stone road

It is noted in several parts of the Onshore EIS that selected aggregate from tunnelling arisings will be used in the construction of the stone road. The physical selection criteria are broadly outlined in the Onshore EIS, but there is no mention of chemical selection criteria (e.g. that the aggregate will not contain calcareous material etc). It is suggested that an appropriate condition is included in any consent (see Appendix B Consent Condition 9).

### Bentonite Breakout

Bentonite is used as the drill mud during the construction of the tunnelled pipeline section. Bentonite ‘break-out’ (i.e. uncontrolled loss of bentonite) into Sruwaddacon Bay during the tunnelling process is identified in the Onshore EIS as being of “very low” probability and “extremely unlikely”. Furthermore, the ecological impact of a bentonite release is assessed as imperceptible/negligible (groundwater impacts are assessed as slight to moderate in the event that major water-bearing fractures are also encountered). However, we consider this conclusion to be insufficiently demonstrated by the information provided in the Onshore EIS and, in particular, we note the maximum credible volume of bentonite needs to be understood in order to assess the significance of such a release.

The assessment of bentonite breakout was subsequently addressed in the Additional Information package. It is estimated in the Additional Information that the maximum credible ‘break-out’ release of bentonite is 7m³. This is based on the size of the tunnel’s working chamber and an automatic by-pass of this chamber if the chamber pressure drops. We concur that a release of 7m³ of bentonite would not lead to significant impacts on the bay. We nonetheless recommend that the practicality of the TBM systems being able to ensure that any break-out release can indeed be contained to around 7m³ needs to be confirmed based on the detailed design of the TBM (see Appendix B Consent Condition 10).

### 5.2.2 Community and Socio-Economic

#### Public Consultation

The principal purpose of the engagement activities, carried out in spring 2010, was to inform the public of the route modification and construction methodology and to gather stakeholder feedback on the most recent Project adjustments. The information presented in the Onshore EIS provides a reasonable, although brief, overview of the specific key issues raised during the public consultation. This includes a table (Table 2.3 of the Onshore EIS) of key issues/concerns that were raised and cross-reference to where each issue has been addressed in the Onshore EIS. The presentation of the key issues is generally appropriate, although further clarification was required on some issues as follows:
• **Community consent.** It is reported in Table 2.3 of the Onshore EIS that the issue of community consent was raised during the public consultation and that this issue is addressed in Section 2 and 3 of the Onshore EIS. However, we find that little information is provided in these sections of the Onshore EIS regarding the level of community support to the project. We note that the primary purpose of a consultation process is to ensure that specific public concerns are appropriately identified and addressed in the Onshore EIS, and that it is not a requirement of a consultation process to provide an ‘opinion poll’ of overall community support for the project. We therefore consider the lack of assessment of overall community support in the Onshore EIS to be acceptable, but we do consider the statement made in Table 2.3 to be unclear on this point. Therefore, further clarification on the purpose of the consultation process undertaken for the project was requested, and this was provided in the Onshore EIS Addendum (Review Item 6), which we consider to resolve this issue.

• **Traffic-Related Concerns.** We note that the list of issues raised during the public consultation process presented in the Onshore EIS did not include any specific concerns in relation to traffic impacts/management. However, further information was provided in the Onshore EIS Addendum (Review Item 6), which stated that during the April 2010 Public Consultation Process all traffic issues were of a ‘general’ rather than specific nature. We consider this to be adequately addressed for the purposes of the Onshore EIS, although we recommend that ongoing monitoring of traffic impacts during the construction phase will be required as described in Item 17 of Chapter 7 of the Onshore EIS Addendum (see also below for grievance/complaints procedures, and Section 5.2.7 for further details on transport monitoring).

• **Household Insurance.** The potential impact of the project on household insurance premiums was identified as a key concern during the consultation process, but we find that insufficient assessment of this issue was presented in the Onshore EIS. This issue has been addressed in the Additional Information package and specifically in Review Item 10. The Additional Information includes details of discussions held by the Onshore EIS authors and a number of insurance companies who confirmed that they had no concerns with insuring properties “in relation to [their] proximity to gas pipelines”. It is also stated in Review Item 10 that: “If necessary, SEPIL may facilitate liaison with the insurance companies on behalf of community members that are particularly concerned about the issue”. We therefore consider that the Additional Information adequately addresses this issue.

**Public Safety**

The Onshore EIS does not specifically consider the aspect of public safety associated with construction and trenching activities. This issue is adequately resolved in Review Item 10, which identifies a number of safety features, including the use of palisade fencing, security staff, and specific on-site safety measures.
Oyster Farm Licence.
The Onshore EIS and EIS Addendum make reference to an "inactive oyster producing licence and facility" (license T10/081) in Sruwaddacon Bay and on this basis no impacts on commercial aquaculture were identified. However, we understand from submissions made by the owner of the licence at the 2010 Oral Hearings that the licence is still valid and that seed has been ordered for use in 2011. Subsequently, potential impacts of the Project on the oyster farm were further assessed in Review Item 10. Following assessment of Review Item 10, we concur that under normal construction activities the oyster farm will not be subject to significant adverse impact. However, we recommend that conditions should be applied (see Appendix B Consent Condition 11) to any consent such that in the event of:

- A bentonite break-out in the vicinity of the oyster farm, monitoring of any potential damage is required should the licence be active at that time (see Section 5.2.1 for further details on bentonite break-out risks).

- The need for an intervention pit, SEPIL should confirm whether the oyster license is active and if so then an impact assessment should be undertaken (see Section 5.2.8 for further details of the assessment of potential impacts from an intervention pit).

Public Grievances and Workers’ Code of Conduct
During the 2010 Oral Hearings, public concerns were raised in relation to the historical conduct of security companies during construction of the offshore segment of the pipeline. The Onshore EIS does not address these aspects and is factually silent on the fact that the Project uses private security companies. We consider that worker Codes of Conduct, outlining behavioural rules and norms, should be applied to all workers, including private security companies and that such a Code of Conduct should be consistent with international benchmark standards (e.g. see International Finance Corporation Performance Standard 4 and associated Guidance Note2). We recommend that conditions should be applied to any consent to require that a suitable workers code of conduct be developed and that enforcement is ensured through contractual arrangements between SEPIL and its contractors (see Appendix B Consent Condition 12).

It is stated in the Onshore EIS that complaints are managed through Community Liaison Officers (CLOs). However, no detail is provided on formal mechanisms related to the management of grievances, beyond the presence of CLOs. We recommend that conditions should be applied to any consent that require the adoption of such a mechanism by SEPIL and that the mechanism must be easily accessible to the public (see Appendix B Consent Condition 13).

5.2.3 Road Traffic
A number of omissions and deficiencies were identified in relation to the traffic impact assessment (TIA) and traffic management plan (TMP) presented in the Onshore EIS (Review Item 1). However, all of these issues were adequately resolved via the Additional Information package, and in particular the EIS Addendum (Review Item 6) and SEPIL’s Response to DCENR queries dated 15th September 2010 (Review Item 10).

2 Available at www.ifc.org
A summary of the traffic-related issues identified in the Onshore EIS by ENVIRON and how these were resolved by the information and analysis presented in the Additional Information is provided below on a topic-by-topic basis.

**Impact Assessment Methodology**

Traffic impacts are assessed in the Onshore EIS, although the criteria used to describe impact significance are not clearly defined. In our opinion it would be preferable, and in line with international best practice, to include an explicit description of the criteria and metrics that have been used to evaluate the significance of the resultant impacts. However, we acknowledge that this approach is not a mandatory requirement under Irish regulations and hence do not consider this issue to represent a major deficiency in the TIA presented in the Onshore EIS.

**Road Safety**

Accident statistics are presented in the Onshore EIS as part of the description of the existing road network. However, no assessment or comment is made regarding the safety implications of construction traffic on the wider road network in the Onshore EIS. Without suitable consideration of project-related traffic on accident risks the Onshore EIS cannot be considered adequate.

However, the Additional Information (and specifically the EIS Addendum, review Item 6) provided further information outlining the traffic management structures and measures which have previously been employed (during the offshore construction phase), and which should continue to mitigate future risks.

The EIS Addendum also addressed the impact of the additional personnel vehicles on key junctions off the HCV haul route. However, the accident data presented in the EIS Addendum shows a cluster on the stretch of the R313 from Belmullet to the R314 junction, that we considered merited further investigation and specifically more information on accident data over the last five years in order to determine the likelihood of impacts resulting from increased traffic levels. In its 15th September response to DCENR queries (Review Item 9) SEPIL provided Road Side Accident (RSA) data from 2002 to 2008 on a map and has also produced a table with corresponding analysis. Also provided were mitigation measures to improve safety features taking into account the updated accident statistics.

ENVIRON is satisfied that the above initial concerns raised from review of the Onshore EIS have been adequately resolved by the Additional Information.

We also found that the Onshore EIS provided insufficient consideration of the potential safety risks that project-related construction traffic may pose to cyclists and pedestrians. However, this issue was resolved in the EIS Addendum, which included:

- Non-vehicle count data that quantify the level of pedestrian and cyclist activity in the project-affected area.
- Outline details of proposed mitigation measures to adequately minimise the safety risk to pedestrians and cyclists.
Public Transport Impacts
While it is stated in the Onshore EIS that “There will be no significant impact on public transport within the study area”, we consider that insufficient evidence was provided to support this statement. However, further information on this issue was provided in the EIS Addendum (Review Item 6), including:

• Outline details of the Driver Code of Conduct that will help increase driver awareness of bus passenger safety, hence reducing the potential for impacts on public transport passengers.

• Confirmation that most local buses only share 2.4km of their route (along the R313) with the construction HCV, which hence limits the potential for construction vehicles to impact on public transport.

We consider that the additional information provided in the Onshore EIS Addendum adequately supports the conclusion that no significant impacts on public transport are likely to occur. Nonetheless, we recommend that SEPIL demonstrates to DCENR that it has liaised with the relevant authority (i.e. Mayo County Council) to agree an appropriate TMP that includes monitoring of potential impacts on bus journey times as necessary (see also Appendix B Consent Condition 14).

Other Aspects
In addition to the issues discussed above, we identified a number of other more minor, though nonetheless noteworthy, issues in relation to the TIA and TMP presented in the Onshore EIS. However, these issues were adequately resolved through the Additional Information and assessment materials presented in the EIS Addendum (Review Item 6), and in particular:

• Additional information that clarified the approach and calculation methodology used to analyse the existing road network capacity.

• Additional information that resolved a number of traffic-related data inconsistencies identified in the different sections of the Onshore EIS (e.g. inconsistent traffic volume data presented in the main body of the Onshore EIS and the TIA and TMP appendices). There remain some minor differences in traffic volumes presented in the EIS Addendum (e.g. Figure TR009). However, we do not consider these minor differences to be significant and generally where discrepancies remain, the junction capacity analyses are based on the higher traffic volumes, and are therefore conservative.

• Improved graphical presentation of traffic movements to enable easier interpretation of movement data is provided in the EIS Addendum, for example figures that clearly illustrate HCV and personnel 2-way movements associated with construction.

• The EIA Addendum provides capacity analysis for road junctions that were previously omitted from the Onshore EIS, thus providing a comprehensive capacity analysis of all relevant road junctions.
• Additional information is provided in the EIS Addendum to better describe the road junctions (e.g. surface conditions and visibility), which is required as underpinning information for an appropriate traffic analysis.

• Additional information to clarify the rationale for how proposed HCV speed limits along the haul road have been derived by SEPIL. It is emphasised in the EIS Addendum that all speed limits will be subject to review and approval by Mayo County Council.

• The EIS Addendum provides further clarification on the operation of HCV convoys along the L1202, including previous experience of similar convoy systems on the same road during the offshore pipeline construction phase. This provides sufficient detail to demonstrate that the proposed convoy approach is appropriate for the nature of the road and the scale of necessary HCV traffic flows.

• Additional detail was provided in the EIS Addendum regarding the location of breakdown services and associated mitigation measures that adequately demonstrate that disruption to general traffic from the breakdown of construction-related vehicles can be minimised in an appropriate manner.

• The Onshore EIS indicated that under some circumstances project-related HCVs may access the Glengad site via the western end of the L1202 through Barnatra, Inver and Graghill. However, the Onshore EIS did not provide evidence of the suitability of this route or a description of the nature of circumstance under which this route would be used. However, we understand that this route would in fact only be used under exceptional circumstances and at the express direction of the local Garda and we consider this approach to be appropriate. Proposed amendments to the TMP addressing this issue were provided in the EIS Addendum.

• The impact of the temporary closure of the L1202 during the pipeline crossing construction was not addressed in the Onshore EIS. However, this issue was adequately resolved in the EIS Addendum which outlines the methodology for the partial road closure, its duration, and the length of time for vehicles to traverse the affected area (42 seconds). The stated duration of partial road closure within the EIS Addendum is short (about one day).

• Additional detail is provided in the EIS Addendum that provides necessary clarification on the proposed arrangements for vehicle access to the Aghoos compound. We consider the proposed arrangements to be appropriate.

• Additional detail is provided in the EIS Addendum that provides necessary clarification on the use of alternative landfills and alternative water sources in relation to impacts on traffic routes.

• Additional detail is provided in the EIS Addendum regarding how the Drivers’ Code of Conduct will be used to help mitigate impacts/risks associated with the visual amenity of the L1202, which is identified as a Scenic Route under the County Mayo Development Plan. We consider these mitigation controls to be appropriate.
5.2.4 Air Quality and Climate

Presentation in the Onshore EIS (Chapter 8 and Appendix G) of the results of the air quality impact assessment for the Aghoos compound is limited and this makes the impact conclusions presented in the Onshore EIS, especially on the cSAC, difficult to confirm. However, we consider that these issues were adequately resolved in the Additional Information (Review Items 6 and 10), which demonstrates that air quality impacts will be within statutory limits. In particular, the Additional Information package provides further information on:

- The locations of the sensitive residences around the construction compounds for which air quality impact assessment results are presented in Table 8.4 of the Onshore EIS. This information enables the results presented in the Onshore EIS to be more readily interpreted by the reader.

- The location of the key air emission sources (power generators) at the Aghoos compound used in the air quality assessment presented in the Onshore EIS. This information was necessary to enable full interpretation of the results presented in the Onshore EIS. The further assessment presented in the Additional Information is sufficient to demonstrate that no breaches of NO2 air concentrations or N2 deposition rates in the cSAC would occur for the ‘most likely’ locations of the key emission sources within the Aghoos compound. Furthermore, even in the highly conservative worst-case scenario in which all key emission sources are artificially located at the northern perimeter of the Aghoos compound nearest the cSAC, exceedance of the ecological NO2 air concentration limit in the cSAC are predicted to be spatially very small.

- Modelling results for the air quality impacts on the nearest residence to the Aghoos compound based on the ‘most likely’ generator locations. This assessment demonstrates that air quality impacts at residences around the Aghoos compound are predicted to be well within statutory limits.

It is stated in the Additional Information that no air quality monitoring will be required during construction. On the basis of the presented results we concur that this is an acceptable approach.

During hydrotesting and pre-commissioning of the onshore pipeline air emissions are likely to result from, for example, nitrogen generators and pumps etc. However, the impact of such emissions for the onshore pipeline was not addressed in the Onshore EIS. Air quality impacts during hydrotesting are assessed in the EIS Addendum (Review Item 6), based on the assumption that nitrogen generators etc. will be located at the Bellanaboy Terminal. The assessment predicts that air quality standards will not be breached beyond the boundary of the terminal. We recommend that a condition is applied to any consent to ensure that the compressors/nitrogen generators required for hydrotesting of the onshore pipeline will be located at the Bellanaboy terminal only (see Appendix B Consent Condition 15).

The assessment of dust impacts in the Onshore EIS is based on methods to predict dust generation from road construction, which may not be representative for the construction of larger non-linear compound areas such as the landfall valve installation (LVI) or the Aghoos compound or to concreting batch operations. However, we note that the issue of dust control may be adequately resolved through visual monitoring and associated mitigation (wetting of surfaces etc.) and recommend that provision for such dust control measures be
included as part of conditions attached to any consent (see Appendix B Consent Condition 16).

5.2.5 Noise and Vibration

Terrestrial Works

It is unclear what equipment was included in the noise and vibration assessment presented in the Onshore EIS and these uncertainties in the noise and vibration modelling were therefore further addressed in the Additional Information package. The Additional Information provides a number of improvements to the noise and vibration assessment:

- The Additional Information confirms the key noisy construction equipment/activities and updates the Onshore EIS noise assessment to include revised equipment and practices, the most important aspects of which are to:
  
  o Reduce noisy activity and hence noise impacts at night, with night-time impacts on residences in the Glengad location now being reduced (e.g. at noise receptor location N2 impacts are reduced from ‘Major’ to ‘No change’).
  
  o Implement further noise mitigations at the Aghoos compound during construction.

- An outline noise monitoring plan for construction is also proposed in the Additional Information package. We consider that the array of monitoring locations, to the extent that they are defined, to be appropriate. Nonetheless, further detailing of this outline noise monitoring programme should be agreed with DCENR prior to construction (see Appendix B Consent Condition 17).

- The Additional Information also briefly presents predicted vibration levels from rock-breaking activities (these were not addressed in the Onshore EIS). The basis for the modelling is not clear (e.g. whether the presented data relate to rock-breaking activities at either the Glengad or Aghoos compounds). Nonetheless, the predicted values presented are sufficiently low to indicate that vibration levels at the nearest residences to either of the compounds will be both below perceptible levels and also lower than the vibration levels resultant from some other construction activities at the compounds (e.g. vibropiling).

- The Additional Information also outlines proposed vibration monitoring during the construction period. We consider that the array of monitoring locations, to the extent that they are defined, to be appropriate. The Additional Information also proposes a vibration threshold limit as part of its monitoring programme. This is set at 12.5 mm/s, which is appropriate for protection against superficial damage to properties. However, we consider that a lower limit (a ‘warning’ level’ of 0.5mm/s ppv) to protect against nuisance complaints should also be applied, together with a slightly higher ‘action level’ (2.5mm/s ppv), above which mitigation measures are implemented in order ensure that the threshold limits (the absolute upper limit of 12.5mm/s ppv) are not exceeded. We recommend that such vibration threshold criteria be the subject of a condition to any consent and our recommended approach is defined in Appendix B Consent Condition 18.
**Tunnelling Works**

A detailed noise and vibration assessment is presented in the Onshore EIS, Appendix H, and we consider this to be appropriate in assessing noise impacts on cetaceans, pinnipeds and fish. We understand that modelling is based on psamite and silt (matrix of silt and fine sand which would reduce cobble noise impacts) horizons. This is consistent with available site investigation (SI) data.

Overall we conclude that the assessment provides an adequate demonstration that noise impacts from tunnelling-induced underwater noise are not likely to result in significant impact on marine fauna.

**5.2.6 Landscape and Visual**

A bespoke landscape classification system is used in the Onshore EIS to describe the character of the Project affected area, but suitable cross-reference is also made to the Landscape Protection Policy Areas and Character Units defined for the region in the County Mayo Development Plan and associated “Landscape Appraisal of County Mayo” report. There are differences in the detail of the assessment methodology presented in the Onshore EIS with the Development Impact Potential Index approach identified in the “Landscape Appraisal of County Mayo” report. However, we find that the assessment of the sensitivity of the landscape and the assessment of landscape and visual impacts are appropriate and adequately reflect the landscape sensitivities described in the “Landscape Appraisal of County Mayo” report.

During the construction period the tunnelling compound at Aghoos will impact on the views from a Scenic Route as designated under the Co. Mayo Development Plan. Because of the visual sensitivity of this location, the visual impact of the compound during construction is assessed in the Onshore EIS as Substantial Negative but “short term” in duration. The Onshore EIS does not define what is meant by ‘short term’ for the different elements of construction in relation to its impact classification. However, we understand from the EIS authors that, in line with EPA Guidelines, short-term is defined as 1 to 7 years. While we agree that the impacts are ‘short-term’ under the EPA definitions, the ‘Substantial Negative’ impact will nonetheless be present for approximately two years. Some mitigation measures for visual impacts are ‘recommended’ in the Onshore EIS and, while these are reasonable, we recommend that implementation of these measures should be enforced via a condition to any consent (see Appendix B Consent Condition 19). Even with the implementation of effective mitigation measures the short-term impacts are likely to remain Substantial.

Lighting impacts at the Aghoos compound have been assessed in the Onshore EIS and it is predicted that a level of 0.3lux will be achieved at approximately 25m from the compound. This demonstrates a minimal impact, although this is presumably based on the application of good light management. In order to ensure that this is achieved, we recommend that monitoring is undertaken to ensure that the lighting design as implemented meets these levels (see Appendix B Consent Condition 20).

**5.2.7 Waste Management and Material Assets**

There appear to be discrepancies in the volumes of some bulk wastes as presented in the Onshore EIS, in particular between Appendix R and Chapter 11/Appendix S4. For example, it is stated in Chapter 11 that 68,000m³ of waste arisings will be generated from the tunnelling process, but in Appendix R tunnel waste arisings “out” are stated as 37,585m³.
Similarly, total peat disposal volumes are described in Chapter 11 as 75,000m$^3$, but peat “out” volumes in Appendix R are stated as 53,151m$^3$.

Further clarifying details were provided in the EIS Addendum (Review Item 6). The EIS Addendum text is not entirely clear, although we understand that:

- The data presented in Appendix R of the Onshore EIS were used in the traffic assessment.
- Data for cuttings volumes in Appendix R of the Onshore EIS are defined as the amount estimated to require offsite disposal and are based on the assumption that some cuttings will be reused on site.
- Data presented in Appendix R of the Onshore EIS for peat disposal are the ‘best estimate’ volume, whereas the 75,000m$^3$ volume mentioned in Appendix S of the Onshore EIS is a cautious maximum estimate (to ensure sufficient capacity at Srahmore).

The level of detail presented in the Onshore EIS and the EIS Addendum does not enable the assumed volumes of HCV for the peak traffic case to be checked in detail. However, on the basis of the information provided, the overall HCV figures appear reasonable. Given that traffic volumes may be greater than currently assumed in the TIA, for example in the event that less drill cuttings are found to be suitable for re-use on the project than currently estimated, we recommend that SEPIL demonstrates to DCENR that it has liaised with the relevant authority (i.e. Mayo County Council) in the development of appropriate monitoring mechanisms consistent with that described in Item 17 of Section 7 of the EIS Addendum (see Appendix B Consent Condition 21).

### 5.2.8 Ecology

#### Presentation of Results

A number of figures intended to be included in Appendix J (1) (Flora and Fauna Terrestrial Environment) of the Onshore EIS were inadvertently omitted from the documentation submitted as part of the May 2010 Application (Review Item 1). This omission significantly affected the ability of the reader to adequately understand either the baseline characterization or the impact assessment judgements provided in the Onshore EIS. The omitted figures were subsequently submitted to DCENR and made available by SEPIL on its website. The omitted figures were also later included as part of the Additional Information (Review Item 5) submitted to DCENR in November 2010. The following review is based on an updated version of Appendix J that included the originally omitted figures.

#### Status of Natura 2000 Sites

There is some inconsistency in the described status of the Natura 2000 sites in the vicinity of the pipeline route, both within the main Onshore EIS document, the Non-Technical Summary and the Onshore EIS’s associated appendices. The Glenamoy Bog Complex is variously described within the Onshore EIS as either a designated Special Area of Conservation (SAC) and as a candidate SAC (cSAC). Similarly, Blacksod Bay/Broadhaven is described as both a designated Special Protection Area (SPA) and a proposed SPA (pSPA). ENVIRON understands that the Glenamoy Bog Complex is a candidate SAC and that Sruwaddacon Bay has previously been designated as an SPA (part of the Blacksod Bay /
Broadhaven SPA), but as it is currently being re-designated to accommodate boundary changes and a reconsideration of qualifying species, this is the reason for reference to it as a pSPA.

Appendix P of the Onshore EIS provides a Natura Impact Statement (NIS), which is effectively the Stage 1 (screening) of an Appropriate Assessment (AA) of the proposed pipeline. We consider the NIS to be thorough and it includes the details which we would expect to find in such a report including details of the proposed scheme, the potential effects of the scheme and the significance of those effects on the designated sites. Generally, ENVIRON accepts the findings of the NIS that the proposed pipeline is not likely to significantly affect the integrity of either of the Natura 2000 sites. However, we did identify one concern in the adequacy of the assessment of impacts on the Natura 2000 sites, which relates to the potential need for an emergency intervention pit within Sruwaddacon Bay in the event that the tunnel boring machine (TBM) becomes stuck during the tunnelling process. However, this issue was adequately addressed in the Additional Information as described below:

Article 6, Part 3 of the Habitats Directive states that “any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site’s conservation objectives. In the light of the conclusions of the assessment of the implications for the site, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned.”

It is stated in the Onshore EIS that the likelihood that an intervention pit will be required during construction is low, and evidence to substantiate this conclusion is presented in both the Onshore EIS and the Additional Information package (e.g. Review Item 8). (See also the Entec Report for further commentary.) We nonetheless consider it to be necessary for the Onshore EIS to include an assessment of the potential impacts on the pSPA and cSAC designated areas in Sruwaddacon Bay in the event that an intervention pit is required. However, we do not consider that such impacts were adequately assessed in the Onshore EIS and in particular:

- **Hydrology/Scour.** While the potential impacts on scouring were assessed in the Onshore EIS for 4 potential locations in the upper and lower sections of Sruwaddacon Bay, we noted that these locations did not correspond to locations along the planned tunnel route (i.e. they are not in locations where an intervention pit could actually be required). It is concluded in the Onshore EIS that the residual hydrological impacts are ‘imperceptible to slight’. However, we find that the rationale to support this conclusion is unclear, particularly as it is earlier stated in the Onshore EIS that “a significant alteration in the hydrography of the area caused by excess scour may have a significant impact on the flow patterns within the estuary over a longer term”.

- **Ecology.** The assessment of the intervention pit in the Onshore EIS did not adequately assess certain impact types and in particular: impacts of raised turbidity/suspended sediment levels on marine fauna, sedimentation impacts on benthos, and noise impacts from dredging/piling on birds (including qualifying species/habitats under the pSPA).
However, further detail and assessment of the potential impacts in the unlikely event that an intervention pit is required have been presented in the Additional Information, and in particular in the EIS Addendum (Review Item 6), Review Item 10 and Review Item 11. These Additional Information items address both ecological and hydrological impacts and in ENVIRON’s opinion form an adequate assessment for the installation of an intervention pit as part of an Appropriate Assessment process. Our review commentary on the assessment of ecological and hydrological impacts in the Additional Information package is provided below.

- **Ecology**
  The Additional Information package provides greater information on the design and potential noise disturbance impacts on avifauna of an Intervention Pit. In particular, the assessment presented in these documents:

  - Considers the worst case location scenarios for potential impacts on the four Bird Concentration areas that lie within 400m of the proposed route (bird areas 4, 5, 6 & 7 as shown on Figure 3.4 of Appendix J1 to the Onshore EIS). The assessment includes figures showing the spatial extent of potential noise impacts in relation to the bird areas, and information on the species present at each location and statements on how the predicted noise impacts might affect those species.

  - Provides a suitable discussion of the research upon which many of the conclusions of the assessment are based, and in particular information on the species-specific responses to certain disturbance stimuli. This supports the conclusions that significant noise disturbance to birds will not occur and ensures that such conclusions are robust and based on scientific evidence.

  - Provides further information on survey work undertaken while jack-up barges were in situ in Sruwaddacon Bay during site investigation works in the summer of 2010. This provides good evidence of the low impact on birds in the bay from the operation of structures of some similarity to the intervention pit. This information has been presented in a scientific way and provides confidence in the statements that a pit would not negatively impact bird species.

- **Hydrology/Scour**
  The Additional Information package provides a reasonable assessment of the hydrological and scour affects that would occur if an intervention pit were to be located within the permanent channel in Sruwaddacon Bay. The locations used in the assessment lie on the proposed tunnel route and have been chosen to reflect the worst case scenarios in terms of the potential scale of hydrological impacts and we concur that this is appropriate.

  Impacts on flow regimes have been assessed via a 2-D flow model based on hydrological data specific to Sruwaddacon Bay. Scour impacts have then been subsequently assessed using empirical models. These models predict scour depths (in the absence of mitigation) of up to 9m. However, we note that these predicted scour depths are likely to be very conservative as:

  - No allowance is made in the scour modelling for the increased sediment size/presence of cobbles at depth in the bay bed (this is confirmed by SI data
available for the bay), which would act to reduce scour effects in deeper sediment layers.

- No allowance is made in the modelling for the fact that as scouring occurs, the water depth increases in the scoured pit which in turn reduces subsequent scouring. Indeed, additional modelling presented in Review Item 11 indicates that consideration of this phenomenon may decrease predicted scour depths by around 50%. We also understand that the predicted scour areas may decrease by up to a factor of four³.

Mitigation measures identified in the Additional Information include scour protection in the form of concrete mattresses to reduce scour effects. We concur that while localised scouring may occur around these mattresses, if appropriately placed they would prevent significant scour occurring due to the presence of an intervention pit.

It is also confirmed in the Additional Information that, in the event that an intervention pit is required, detailed modelling would be undertaken based on the precise location/pit requirements in order to further:

- Optimise the design of the intervention pit, including orientation of the sheet piling to minimise scour effects.
- Optimise the design/location of the scour protection.

With the application of these mitigation measures we concur that hydrological and scour impacts of an intervention pit may be reduced such that significant impacts will not occur.

Where an intervention pit is required in or near to the permanent channel, both its physical presence and the work to install scour protection could impact aquatic fauna, and in particular salmon if they were present at that time. We therefore recommend that installation of an intervention pit in the vicinity of the permanent channel would only be permitted outside of the migration run seasons of the Atlantic salmon. We recommend that this restriction, together with confirmation of the pit design and mitigation measures described in the Onshore EIS and Additional Information, be enforced through conditions to any consent (see Appendix B Consent Condition 22).

In conclusion, we consider that the Additional Information forms an adequate assessment for the unlikely scenario of an intervention pit being required within Sruwaddacon Bay. The assessment demonstrates that an intervention pit, as described, would not have a likely significant effect on the integrity of the qualifying interests of the pSPA/cSAC within Sruwaddacon Bay, provided the proposed mitigation measures are appropriately adopted.

**Habitat and Botanical Baseline Surveys**

Habitats and vegetation have been assessed in the Onshore EIS in terms of habitats (Phase 1) and subsequently through more detailed (Phase 2) vegetation surveys. These have been carried out over the course of many years.

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³ Ian Wilson, personal communication, October 13, 2010
The Onshore EIS and supporting surveys include information on the botanical baseline by virtue of transects and quadrat surveys (Onshore EIS Section 12.3.1 and Ecological Impact Assessment (EcIA Sections 2.2, 3.2 and 4.2 and Appendix 16)). Although not explicitly stated in the Onshore EIS, we understand that permanent control quadrats have been included in the survey programme and this helps to ensure that sufficient data are available to confirm whether or not any changes are as a result of Project-related impacts.

Overall, we are satisfied that the surveys undertaken provide baseline data for the habitats identified as having the highest ecological value in the Onshore EIS.

One minor deficiency in the description of the surveys in the Onshore EIS is that survey reports for reptiles or amphibians are not presented. This means that, for example, evidence is not provided to support the statement that waterbodies in vicinity of the project are unsuitable for the smooth newt Lissotriton vulgaris is not provided. However, this omission is adequately resolved by the overview of reptile and amphibian surveys provided in the Additional Information package (Review Item 7).

The Additional Information package (Review Item 10) also provides further information regarding the potential presence of machair in the vicinity of the project facilities at Glengad. Review of this Additional Information, together with verbal evidence provided by the NPWS during the 2010 Oral Hearings, provides sufficient evidence that machair is not present at this location.

**Otters**

Otters are identified as a high priority species, as they are protected under international law (Annex II and Annex IV Habitats Directive; Appendix II Bern Convention). We are satisfied that the surveys detailed in the Onshore EIS and supporting data have accurately established where the main areas of activity are for otters.

No active breeding holts were found within the study area at the time of the surveys. The Onshore EIS proposes a pre-construction survey immediately prior to construction, to be carried out in winter. As otters are highly mobile and may breed at any time of year, breeding holts may be established between the survey and the start of construction. We therefore recommend that conditions be applied to any consent that stipulate a maximum elapsed time between survey and start of works (see Appendix B Consent condition 23).

Mitigation measures are recommended within the Onshore EIS for otter holts. The requirement for pre-construction surveys is paramount due to the highly mobile nature of otters. The programming of this survey should be enforced through consent conditions and overseen by an independent otter specialist (see Appendix B Consent condition 23). In general, we consider the provisions for otter in the Onshore EIS to be reasonable.

**Birds**

The assessment of impacts on bird species appears to be based on a sizeable body of data spanning the past 8 years and looking at a variety of species and groups. Surveys relate both to the proposed route of the pipeline and to the wider Sruwaddacon Bay area. In this respect, we are satisfied that the ornithological baseline has been sufficiently well characterised. This review has not examined the many appendices of previous bird data, rather it has focused on the findings of the more recent surveys specific to the proposed pipeline route and the assessments made in the Onshore EIS.
Individual species of avian fauna are selected in the Onshore EIS for specific description of their status within the working area. Some bird species have been selected for specific study (Light-bellied Brent Goose and Sand Martin), the remainder being part of group surveys (waders & waterfowl and terrestrial birds). The rationale for certain species being described more fully than others within the Onshore EIS is not clear and at times the description of the population of birds could be clearer.

Predicted noise profiles from planned construction activities are illustrated in Figures 17 and 18 of Appendix J1 (see ‘Status of Natura 2000’ above for a discussion of noise impacts in the event of an intervention pit being required). Guidance on acceptable noise levels for birds is difficult to find, so a baseline level of 55dB, based on normal background noise levels is taken. On this basis, we judge that significant impacts will occur at up to about 100m from the Glengad and Aghoos site compounds. There appears to be no significant overlap of these zones of influence with key bird locations recorded during the surveys, although mitigation should still be implemented within SEPIL’s management plans/procedures to ensure that noise and other disturbance (through human movements, lighting etc.) are minimised.

Details of the key areas of usage by bird species within the pSPA provide a clear representation of how these areas relate to the proposed pipeline route. On the basis of the provided information the conclusions made in the Onshore EIS that the pipeline construction will not result in any significant impacts on birds appear to be sound.

The proposed mitigation measures (Onshore EIS Appendix J1, Section 6) should be enforced through conditions on any consent. In addition, we recommend that the following information should be sought via consent conditions (see Appendix B Consent condition 24):

- The proposed “intensive bird monitoring” should include monitoring of bird activity within Sruwaddacon Bay while tunnelling activity is occurring to see if there is a notable response which is not highly localized and temporary. Bird responses to noise events arising from the site compounds should also be monitored because, as stated in the Onshore EIS, the type of noise and how it occurs may be as significant as the level and duration of noise events.

- Any vegetation capable of supporting nesting birds to be removed during the bird breeding season should be checked by a qualified ecologist prior to work occurring and work in that area only allowed if no nests are found.

**River Crossings**

The baseline freshwater ecology conditions of the project-affected rivers/streams are generally well assessed in the Onshore EIS, although we do make the following comments:

- The baseline characterisation section would have been strengthened by a more in-depth analysis of the ecology of the freshwater habitats.

- Individual species of fish noted in Annex II of the Habitats Directive are discussed in detail. However, few other mentions of fish are made. This section would have been strengthened by a more in-depth analysis into whether the Leenamore River contains Lamprey as these are protected under Annex II.
• Although otters have been discussed in the Onshore EIS, no mention has been made of other non-fish species (e.g. water voles, newts).

On the basis of the baseline characterisation provided, the rivers crossed by the pipeline are of relatively low ecological value at the crossing sites and on this basis the proposed construction methods (dry open cut methods are identified for the smaller crossings) represent standard industry practice. Nonetheless, given the potential for the presence of salmonids at or downstream of some river crossings we suggest that (see Appendix B Consent Condition 25):

• The regulatory authority (i.e. DEHLG) and Inland Fisheries Ireland (IFI) should be consulted on the proposed method and timing of river / stream crossings before construction commences. (We note that the ‘dry open cut’ construction methods proposed in the Onshore EIS for the two smaller crossings represent standard industry practice, but the crossing construction method for the River Leenamore is not confirmed in the Onshore EIS.)

• The construction of stream / river crossings should not take place during the salmon spawning season or during high-flow periods, unless agreed otherwise with IFI.

**Monitoring, reinstatement and aftercare plan**

The Onshore EIS states that a monitoring, reinstatement and aftercare plan will be agreed with the authorities. However, the Onshore EIS does not state the timeframe for the information to be submitted and agreed with the authorities and whether or not this is to be agreed prior to the commencement of construction. In addition, a number of pre-construction surveys are required for species such as otter and the details of these also need to be provided.

We therefore recommend that a condition is applied to any consent to ensure that a monitoring, reinstatement and aftercare plan/programme is prepared for agreement by DCENR prior to construction (see Appendix B Consent Condition 26). The plan should include but not be limited to:

• survey/monitoring timetable including dates to be delivered/reported

• the current scope of surveys that were outstanding at time of Onshore EIS submission

• scope of pre-construction surveys for species such as otter, including details of the maximum time allowed between survey and construction start (see also Appendix B Consent Condition 23)

• methods of how habitats will be returned to comparable or improved status following completion of construction works and timeframes for doing so

• details of proposed habitat enhancement measures to-off-set loss of habitat at above ground locations or more permanent changes to habitat (e.g. loss of forestry, new access roads, improvements to amphibian breeding site availability, measures to off-set failed restoration if this were to occur etc)
post construction monitoring including botanical surveillance visits and information on how early remedial action will be triggered if the reinstatement appears to be defective/failing

- details on the methods and criteria that will be used to judge the success of reinstatement.

**Storage and Restoration of Peat and Soils**

During pipeline construction in ecologically sensitive areas of intact and ecologically sensitive peat of sufficient depth, it is proposed that the top vegetated layer of peat will be removed and stored in sections (turves). The turves will be stored in a single layer on bog to minimise compaction and the turves will be monitored during storage and will be watered as required. The turves will be replaced over the pipeline trench/stone road after the pipeline has been installed. We consider this to be an appropriate method to ensure restoration in these construction areas.

Where turving is not to be implemented, the Onshore EIS states (EcIA Section 6.2.1) that top soil/peat will be stored and re-used at the end of construction for reinstatement. However, storage methods to maintain the seedbank and structure of the topsoil/peat are unclear. This is particularly important where the topsoil/peat will be stored for prolonged periods (e.g. at the tunnel compounds). However, this issue has been adequately addressed in the Additional Information package (Review item 10), which includes:

- details of the duration of topsoil/peat storage periods on the pipeline RoW (duration of storage at the compounds is already included in the Onshore EIS)

- An overview of the storage methods to be implemented.

### 5.2.9 Soils, Geology, Hydrology & Hydrogeology

#### Ground Stability Assessment

The ground stability assessment for peat in Appendix M2 of the Onshore EIS is somewhat ambiguous with regards to the width of Stone Road used in the calculations to assess landslide impact. However, SEPIL have clarified the matter, and it is evident that the correct values for the width of the Stone Road were used in the calculations.

It is also stated in Appendix M2 of the Onshore EIS that “investigations have been limited in some areas due to access difficulties”. We understand from SEPIL that this statement was a typographical error and in fact was a legacy from the previous application that related to access to onshore areas that are no longer part of the proposed onshore pipeline route.

There are also some ambiguities in Section 7 of Onshore EIS Appendix M2 concerning the location of debris channels on Dooncarton Mountain, and it is noted that no photographs were provided of ‘debris channel 2’. Clarification on the location of the debris channels was provided by SEPIL, and a photograph of ‘debris channel 2’ was provided as additional information (Review Item 6).

Further minor ambiguities are present in Onshore EIS Appendix M2 regarding how peat depth varies along the proposed route of the Stone Road, and how previous assessments of differential settlement (carried out for the previous application) relate to the revised pipeline route.
route. Clarification was subsequently provided by SEPIL that satisfactorily resolved the queries.

The assessments of peat stability (Onshore EIS Appendix M2) included a number of recommendations to safeguard the stability of the pipeline trench / stone road, but the Geotechnical Risk Register (Onshore EIS Appendix M4) does not appear to explicitly consider a number of the recommendations made in the peat stability assessment. Clarification was provided by SEPIL, and we understand that the Geotechnical Risk Register is intended to be a ‘generic’ document that encompasses the broad facets of geotechnical risk, and that a detailed compilation of specific geotechnical risks will be compiled at the detailed design stage. We concur with this position and (if consent is granted) recommend that the geotechnical risk register should form part of SEPIL’s management plans/procedures and be enforced using a consent condition (see Appendix B, Consent Condition 33).

**Flooding (tidal)**

It is stated in Section 15.2.2.1 of the Onshore EIS that a potential cause of flooding might be due to a prolonged extreme rainfall event coinciding with a high tidal event in Sruwaddacon Bay. However, there is no further assessment of this scenario in the text of the Onshore EIS.

The potential for a ‘tidal’ flood event is briefly discussed in Sections 3.1 and 4.2 of the Hydrological Impact Assessment (Onshore EIS Appendix M5 of the EIS). It is stated that the LVI and compounds at Glengad and Aghoos are ‘not at risk from tidal flooding’. This conclusion appears to be based on:

- An assumed 2m tidal surge coinciding with a high tide of 3.8m above chart datum (2.662mOD) at Broadhaven Bay
- Ground levels of 6.5mOD, 10mOD and 6mOD at the LVI, Glengad and Aghoos compounds respectively.

The high tide at Broadhaven Bay used in the Onshore EIS assessment appears to be based on observed tidal heights over a two week period in 2007. There is no consideration of the heights of high tide during the actual operational life of the LVI or the compounds (i.e. there is no reference to predicted future tidal heights).

We also note that in Section 9.3.2.4 of the 2001 Offshore EIS (Review Item 2) the Highest Astronomical Tide (HAT) at Broadhaven Bay is stated to be 4.2m (presumably above chart datum, but no reference is provided). This is higher than the 3.8m tide used in the Onshore EIS risk assessment, but no reason is given of why the 4.2m value has not been considered.

The County Mayo Development plan stipulates that the minimum flood design standards for new developments along the coast and estuaries should accommodate the 200 year tide level. This requirement has not been addressed in the Onshore EIS.

There is no topographical survey provided for the LVI or the compounds. However, ground levels along the route of the pipeline shown on the Onshore Pipeline Alignment Plan in the Onshore EIS suggests that existing ground levels at the northern boundary of the Aghoos
compound (the boundary closest to the shoreline, in the area of the proposed settling pond) are in the region of 4.3m to 4.8mOD. This is appreciably lower than the ‘6mOD’ stated in the Hydrological Impact Assessment in the EIS.

There also appears to be inconsistencies in the factor used to convert Chart Datum to the corresponding value referenced to Ordnance Datum.

In light of the above, we consider that there were some shortcomings in the Onshore EIS assessment with respect to the selection of an appropriate tidal height and the elevation of ground that could be susceptible to flooding. Therefore, the information provided in the Onshore EIS and appended Hydrological Impact Assessment does not give adequate assurance that parts of the development (particularly the Aghoos compound) would not be at risk from flooding in the event of extreme rainfall coinciding with a high tidal event in Sruwaddacon Bay.

In response to the above issues, additional information was provided within Appendix F of the Addendum to the EIS (Review Item 6). This comprised an assessment of the risk of tidal and fluvial (stream) flooding at the LVI and the Aghoos and Glengad compounds. The risk from groundwater flooding was also considered at the LVI, and the requirements of the County Mayo Development Plan were evaluated with respect to flooding.

The assessment of risk from tidal flooding presented in the Addendum used computer modelling (that incorporated the effects of storm surge) to predict the height of tidal events with a 1:200 and 1:1,000 year return period. The maximum tidal levels (for a 1:1,000 rear event) were predicted to be approximately 3m below ground level at the LVI and Glengad compounds, and 2m below ground level at the Aghoos compound.

The above values appear to have been based on the ‘most likely’, rather than the ‘worst case’ extreme tidal event. However, this is considered appropriate as the results were based on a conservative (1:1,000 year) return period.

The assessments of risk from tidal flooding in the Onshore EIS and Addendum do not consider any effects of climate change upon tidal levels. These effects are unlikely to be significant during the relatively short lifespan of the compounds at Glengad and Aghoos, but an increase in tidal level due to climate change could possibly occur within the operational life of the LVI. Draft guidance issued by the Office of Public Works (the national authority with regard to Flood Risk Assessment) recommends that two scenarios are considered when assessing the effects of climate change on future risks from flooding; a ‘mid-range’ future scenario, and a ‘high-end’ future scenario. The tidal level allowances for these scenarios are + 500mm for a ‘mid range’ scenario, and + 1,000mm for a ‘high range’ scenario (for a 100 year time horizon). The extreme 1:1,000 year tidal level predicted at the LVI is 3m below ground level. An extra allowance of 1,000mm for a ‘high range’ effect from climate change would equate to an extreme tide 2m below ground level. Therefore, assuming that the ground levels at the LVI stated in the Addendum are correct (see below), it is unlikely that the effect of climate change on tidal levels would be significant with respect to flood risk at the LVI.

The assessment of predicted extreme tidal levels presented in the Addendum is considered generally acceptable. However, the risk of tidal flooding is also dependent on the ground
level at the facilities. The lowest ground levels at the LVI and Glengad / Aghoos compounds are stated in the Addendum, but there is no reference to how these levels have been determined. In particular, the ground level at the Aghoos compound is stated in the Addendum to be 5.43mOD Malin. This appears to conflict with levels shown on the pipeline alignment sheets provided in the Onshore EIS, where ground levels of approximately 4.8 to 4.9mOD are shown in the northern part of the compound (between chainages 88.72 and 88.73). Also, it was not clear whether the values for ground level stated in the Addendum refer to existing or anticipated ‘as built’ levels.

Additional information on ground levels (Review item 10) confirmed that the ground levels used in the Flood Risk Assessment were based on data from topographic surveys, whereas ground levels along the route of the pipeline shown on the Alignment Plans were derived using a less accurate (photogrammetric) survey method. This explained the apparent discrepancies between the levels used in the Addendum Flood Risk Assessment and those shown on the alignment plans, and provided assurance that the ground levels used in the assessment are accurate.

It was also confirmed (Review Item 10) that the minimum ground levels used in the Flood Risk Assessment for the LVI and Glengad compound (6.3maOD and 6.9maOD respectively) are the proposed minimum ‘as built’ levels.

It was also stated (in Review Item 10) that the minimum level used in the assessment for the Aghoos compound (5.4maOD) was the existing level determined by survey, and it is also the proposed ‘as built’ level. However, this is contradicted later in the document by a statement that “The proposed level will be slightly above (100 to 150mm) the existing ground level...” This contradiction is not significant in terms of the assessment, as raising the ground level would further reduce risk from flooding.

Therefore, the risks from tidal flooding have been satisfactorily addressed. Nonetheless, it is still recommended that appropriate conditions are included in any consent with respect to the minimum ground levels permitted at the compounds and stringing / peat storage areas to mitigate tidal flood risk (see Appendix B Consent Condition 8).

**Flooding (fluvial)**

The assessment of risk from fluvial flooding given in the Addendum (Review Item 6) used a basic (although in this instance appropriate) quantitative method to estimate whether water channels in proximity to the LVI and Glengad compounds would overtop during extreme storm events (of 1:100 and 1:1,000 year return periods). The Leenamore River, close to the Aghoos compound, was not considered as there is an appreciable difference in elevation between the edge of the river and the compound.

It was found that the channel in the proximity of the LVI should be able to accommodate the flow from a storm event with a 1:1,000 year return period. The risk of fluvial flooding at the LVI is therefore negligible.

A channel adjacent to the western edge of the Glengad compound was calculated to be able to contain flow from a 1:100 year storm event, but could overtop during a storm of a 1:300 year return period. Although the risk of fluvial flooding of the Glengad compound from this channel is still relatively remote, it is noted in the flood risk assessment that flood risk could be further reduced by raising the channel banks by “200mm” within the site compound. It is
agreed that raising the banks of the channel within the compound (in conjunction with perimeter drains to intercept overland flow upstream of the compound) would be a prudent measure. We recommend that SEPIL demonstrates to DCENR that it has liaised with the relevant authority (i.e. Mayo County Council) to agree suitable drainage controls (see Appendix B Consent Condition 7).

**Flooding (groundwater)**

Flooding as a result of high groundwater level at the LVI has been assessed in the Addendum, with reference to groundwater levels recorded during site investigations in the area. The assessment concludes that there is a low risk from groundwater flooding at the LVI. We concur with this conclusion, and note that a water drainage system is proposed for the LVI that will further reduce any risk from groundwater flooding.

However, although the risk of groundwater flooding has been assessed for the LVI, there is no equivalent assessment in the Addendum for the temporary compounds at Glengad or Aghoos. Additional information was provided on the matter (Review Item 10), which justified a low risk of groundwater flooding at the Glengad compound (i.e. the depth of the perimeter drains would be sufficient to intercept and collect groundwater if the water table were to rise).

It was also stated (in Review Item 10) that the risk of groundwater flooding at the Aghoos compound was “considered to be low”. Adequate details of groundwater control were described for the construction of the tunnel starting pit, but details were lacking on the anticipated groundwater levels across the rest of the compound (in the sands / gravels below the peat). However, the groundwater information contained in Appendix M6 of the Onshore EIS, together with the additional information on ground levels (see above), provides adequate assurance that there is a low risk of groundwater flooding at the Aghoos compound.

**Stone Road**

It is considered that there are a number of shortcomings in the Onshore EIS related to the 'stone road' method of pipeline installation and the use of stone infill for 'ground improvement' at the Aghoos compound. Commentary on the 'stone road' elements of the Onshore EIS and the assessment of further information from SEPIL in response to these issues is given below. To enhance clarity, the findings of this part of our review are presented in two parts: (i) a review of the information presented in the Onshore EIS, and (ii) an appraisal of the additional information.

**Review of information provided in the Onshore EIS**

A key potential impact on peatlands relates to the installation of the pipeline and the construction of the tunnelling compound at Aghoos. The proposed approach for pipeline installation in peatland areas and construction of the Aghoos compound is the use of a 'stone road' method. This technique has the potential to disturb the hydrological flows of the peatlands, for example through interrupting lateral flows, generating longitudinal preferential flow routes, or, if underlying impermeable layers are disturbed, potentially creating vertical flow routes.

Potential impacts on peatland hydrology in recovering blanket bog are assessed in the Onshore EIS as ‘Significant’ but reducing to ‘Imperceptible’ with the application of mitigation measures. While the mitigation measures presented in the Onshore EIS (e.g. use of 'plugs'
to prevent the stone acting as a longitudinal preferential flow route) are broadly appropriate, we consider that insufficient evidence is provided in the Onshore EIS to support the residual impact evaluation, particularly with respect to the potential for vertical water leakage through the base of the trench. Significant water leakage through the base of the trench could potentially result in desiccation of the surrounding peat, with associated adverse ecohydrological impacts.

The issue of vertical water leakage from the base of the trench was addressed in detail at the time of the previous application for consent to construct a pipeline in February 2009. Additional studies were requested by the DCENR to assess a means of mitigating vertical water leakage in any areas of thin peat that might be underlain by relatively high permeability soils. These studies culminated in a report providing assurance that vertical water leakage could be mitigated by sealing the pipeline trench with a layer of low permeability re-worked peat in areas where the pipeline trench encountered high permeability soil. The report also provided Construction Control Measures to ensure that this was achieved. The findings of this report (Final Report on Reworked Peat & Mineral Soil Permeability Research. AGEC, Ref: 942-233, October 2009) do not appear to have been properly considered in the current assessment provided in the Onshore EIS.

There is considerable ambiguity in the Onshore EIS regarding the placement of re-worked peat at the base of the pipeline trench in areas of shallow peat. It is stated in Section 5 of the EIS that a 0.5m thick layer of peat will be left in situ at the base of the stone road in areas where the peat is of sufficient thickness to do this. Retaining this layer is designed to impede vertical water leakage from the base of the trench in any instances where the underlying mineral soil is of a high permeability. However, there is no mention in the text of the Onshore EIS of what measures will be undertaken to reduce vertical leakage in those sections of the pipeline where peat is too thin to allow the retention of 0.5m of peat at the base of the trench.

The apparent lack of any intention to prevent vertical water leakage in areas of shallow peat disturbed by the works is also illustrated in the Peatland Hydrology Characterisation report (Onshore EIS Appendix M6). In this report it is described how in areas of shallow peat the pipe trench will be excavated through the full thickness of peat into the underlying mineral soil, with no layer of peat to impede any vertical water leakage.

It is only in Section 2.3.2 (8) of Onshore EIS Appendix M2 that the placement of a layer of re-worked peat is briefly mentioned. It is stated that in areas of shallow peat the pipe trench will be excavated through the peat and into the mineral soil beneath it, and that a layer of re-worked low permeability peat will be placed in the trench to prevent the vertical leakage of water. However, there is no detailed description of how this will be achieved or any reference to quality control procedures that will be employed.

The potential impact from vertical water leakage is assessed in Appendix M6 of the Onshore EIS, where it is stated that the effects of any vertical leakage through the “unmitigated” stone road will be ‘minor’. However, this conclusion seems to be based on observations of water levels in the peat around the existing stone road in the area of the terminal. The peat along the route of the existing stone road was relatively thick, and so presumably a layer of peat was left in-situ at its base. However, there is a 190m section of the proposed stone road to the east of Aghoos (accounting for approximately 28% of the total route in peat) where the peat is thin and there is little information to deduce whether the underlying soil is of a low
enough permeability to impede leakage. Therefore, no in-situ peat would remain at the base of the trench in this section, and the potential for adverse impacts from vertical water leakage might be greater than those observed in the section of existing stone road near the terminal. There are also appreciable areas of the Aghoos tunnelling compound / stringing area covered by shallow peat. The compound is also proposed to be constructed using the 'stone road' methodology, and so the above issues also apply to these areas.

**Appraisal of Additional Information**

SEPIL confirmed (Review Item 10) that a 0.5m layer of in-situ peat will be left at the base of the pipeline trench in areas where the peat is of a sufficient thickness to allow this. In areas of shallow peat, where the pipeline trench would be excavated into the underling mineral soil, a layer of low permeability re-worked peat will be constructed at the base of the stone road, where appropriate, along the length of the pipeline route that traverses peatland. The description of the measures to be adopted generally concur with the details given in the report by AGEC dated October 2009 (Final Report on Reworked Peat & Mineral Soil Permeability Research – Ref: 942-233), which presented design parameters and construction techniques for the stone road to minimise the potential for vertical water leakage. This is considered adequate, but if consent were to be granted these measures should be formalised for approval by DCENR before construction commences (see Appendix B Consent Condition 2(iv)).

With respect to the 'stone road' method of ground improvement at the Aghoos compound, it was confirmed (Review Item 10) that a 0.5m thick layer of in-situ peat will be left at the base of the excavations, except in instances where deeper excavation is required for foundations etc. In these instances, a 1m layer of re-worked peat will be placed as part of reinstatement. This is also considered adequate, although it should also be enforced through consent conditions if consent were to be granted (see Appendix B Consent Condition 6).

Additional information (Review Item 10) was also provided on the proposed ‘stone road’ method of ground improvement at the Aghoos stringing area (adjacent to the compound). It was stated in the additional information that:

"The grassland field within the stringing area is a non-peat area.....It is proposed that no measures are required to retain water in the grassland as this may cause water-logging."

It is clearly shown on Figure 8 (cross sections 3, 4 and 5) and on Figure 9 of Onshore EIS Appendix M2 that peat (albeit relatively thin) is present beneath the stringing area. However, although peat is present, the ‘grassland’ is of comparatively low ecological value and it will be much less sensitive than ‘peatlands’ to the effects of any vertical groundwater drainage. Therefore, the proposal that no measures are required to inhibit vertical water movements in the grassland is accepted.

Further information (Review Item 13) was received for the design of the pipeline trench in the forested area which extends from approximate chainage 89.540 (approximately 270m southeast of the Leenamore estuary) to the Bellanaboy terminal site. No mitigation measures for vertical water leakage in the pipe trench were proposed for this section, other than the retention of a 0.5m layer of in-situ peat at the base of the trench where the peat depth was sufficient to allow this. It was contended that as the peat within the forested area is very well drained, no significant additional impact is likely to result from leakage through
the pipe trench where it is excavated through the full thickness of peat. This is considered reasonable.

From the additional information on pipeline trench construction summarised above, it is apparent that the placement of a low permeability layer of re-worked peat in the base of the trench will only occur along a 190m section of the route between the edge of the ‘grassland’ (approximate chainage 89.350) to the edge of the forested area (approximate chainage 89.540). This 190m section of the route is the only part that traverses peatlands of an appreciable ecological value. If consent were to be granted, the boundaries of this section should be clearly delineated in a consent condition (see Appendix B Consent Condition 2(iv)).

Details of a pipeline trench ‘trial section’ were also outlined in additional information (Review Item 13). The ‘trial section’ would involve the construction of a short section of trench before commencement of the main works, to refine the proposed methods of construction. The trial section would include the placement of a basal layer of re-worked peat, which would be tested to ensure that it achieved a low enough permeability to inhibit vertical water leakage.

The proposed methodology for construction and testing of the trial section is based on that in the ‘Final Report on Reworked Peat & Mineral Soil Permeability Research’ (referenced above). There are some relatively minor issues in the proposed methodology that require clarification, and the exact location of the trial section needs to be confirmed, but on the whole the proposals for the trial section are acceptable for the purposes of this review. The methodology for the trial section should be formalised (and the minor points of clarification resolved) within a Method Statement as part of the detailed design (see Appendix B Consent Condition 2(ii)).

**Surface water drainage systems at tunnelling compounds**

Proposals for surface water drainage are described in Onshore EIS Appendices M6 and M7, and the basic components and techniques for surface water management are adequately considered. The level of detail provided in the assessments is sufficient to demonstrate that adequate measures can be put in place to achieve acceptable levels of surface water control.

We note that although reference is given to the terms of reference for the design assumptions (for example, for the 20 year return period storm event used in the assessment), there is no indication in the Onshore EIS that these parameters have been discussed and agreed with the relevant Authorities. However, during the review process, SEPIL have confirmed that the Mayo County Council were consulted, and that the Council have put forward proposed consent conditions with respect to surface water drainage.

Although the assessments are sufficient for the purposes of the Onshore EIS, a detailed design / surface water management plan should be prepared before construction commences. It is recommended that SEPIL demonstrates to DCENR that it has liaised with the relevant authority (i.e. Mayo County Council) to agree such a plan before construction commences (see Appendix B Consent Condition 5).

**5.2.10 Archaeology and Cultural Heritage**

The assessment of archaeological and cultural heritage involved desk-based research and six field surveys, which were carried out between August 2007 and February 2010 along the
terrestrial route of the pipeline. In addition, inter-tidal surveys were conducted in September 2007 and April 2010, and an underwater survey was carried out in October 2007.

Desk-based research identified five features of archaeological potential. Subsequent field surveys and a test excavation established that three of these are most likely to be natural in origin, and of no actual archaeological significance. One of the remaining two features that are of archaeological interest (near the access road to the LVI) is protected and will not be impacted.

The second feature of archaeological significance (a commemorative mass site and enclosure) is located approximately 50m from the working area of the Aghoos compound. This will not be directly impacted by the development, but will suffer indirect impact in terms of the site's 'setting' for the duration of the construction works. We note that no mitigating measures are proposed with respect to this indirect disturbance. It is reasonable to assume that the periods when this indirect disturbance will be most evident is when Mass is practiced at the site (on Easter Sunday). Mitigation by means of suspending non-essential works at the compound while Mass is taking place should be considered (see Appendix B Consent Condition 4).

It is proposed in Section 16.3.1.5 of the Onshore EIS that archaeological monitoring be carried out during the earthmoving works to ensure the identification and recording of any finds. It is also proposed (in Onshore EIS Section 16.6.4.2) that archaeological monitoring is undertaken during all seabed and inter-tidal disturbances during construction, and that tunnel arisings are monitored. The use of construction surveys/monitoring and associated 'Chance Finds' procedures for archaeology is not unusual for projects of this nature, although we suggest that such inspection and resolution should wherever possible be carried out in advance of construction (as well as during construction) to avoid the potential for construction reworking and to ensure appropriate mitigation measures (including if necessary micro-realignment to avoid archaeological features) are feasible.

Given the inherent uncertainty in the potential presence of archaeological sites, we do not consider the Onshore EIS assertion that there will be no residual impacts on archaeology or cultural heritage to be justified.

It is reported (in Onshore EIS Section 16.3.1.5) that the EIS Authors have discussed archaeological mitigation with the National Monuments Section of the DEHLG. However, we note that the approach of construction surveys necessitates the development of an agreed Chance Finds procedure that includes: clear guidelines for the role of the inspecting archaeologist, survey methods and procedures if finds are made (for example when works should be suspended in the event of a find). We recommend that SEPIL demonstrates to DCENR that it has liaised with the relevant authority (i.e. DEHLG) to agree such protocols prior to construction commencing (see Appendix B Consent Condition 3). We also note that this approach, if properly designed and implemented, represents a residual risk to the construction schedule and may even necessitate the need for micro-realignment of the pipeline route.
6 Offshore EIS Review

6.1 Background

The 2001 Offshore Pipeline EIS and an associated 2009 Offshore Supplementary Update Report have previously reviewed on behalf of DCENR (Corrib Pipeline. Review of February 2009 EIS. AEA/ED05950/R/2, April 2010, the ‘AEA Report’). ENVIRON has reviewed both the 2001 EIS and the AEA Report and generally concurs with the findings of the AEA Report. A brief summary of the findings of this earlier review are provided in Section 6.2 below. As part of the current Corrib submission, the developer has submitted a 2010 Offshore Supplementary Update Report and this has also been reviewed by ENVIRON (see Section 6.2).

Construction of the offshore facilities commenced in 2005 under the 2002 Authorisation. The 2010 Supplementary Update Report identifies key changes to the offshore project since the 2001 EIS was produced, provides an update on field/monitoring data obtained since 2001, and provides assessment of the remaining offshore construction activities. The main outstanding construction activities described in the 2010 Offshore Supplementary Update Report are:

- Rock placement along certain sections of the pipeline to avoid free spans and to prevent scour. The need for rock placement was not considered in the 2001 Offshore EIS. We understand that initial rock placement works were conducted in 2009 and that the additional rock placement works identified in the 2010 Offshore Supplementary Report were undertaken in spring 2010, prior to ENVIRON’s review assignment.

- Installation of an umbilical services line adjacent to the laid pipeline, which is scheduled to take place in 2011. This includes some trenching activities and shore-based pull-in activities.

- Pre-commissioning activities, including hydrotesting with associated discharge of hydrotest water and need for shore-based compressors and nitrogen generators adjacent to the LVI. We understand that the offshore pipeline was filled with hydrotest water in 2009, but that discharge of the hydrotest waters is yet to occur.

A key change to the proposed operation of the offshore pipeline since the 2001 EIS was developed is that treated produced water will no longer be discharged through the outfall pipe, but rather through cores in the umbical to the Corrib field manifold and hence will be discharged in approximately 350m water depth (see also Section 3.2). This reduces the potential environmental effects associated with this discharge and is an appropriate solution.

6.2 Review Findings (2001 Offshore EIS, 2009 Supplementary Update Report)

The 2001 Offshore Pipeline EIS and an associated 2009 Supplementary Update Report have been previously reviewed on behalf of DCENR (the AEA Report). ENVIRON has reviewed both the 2001 Offshore EIS and the AEA Report and generally concurs with the findings the AEA Report. Overall, we conclude that the Offshore 2001 EIS and associated 2009 Supplementary Update Report (in combination) provide a reasonable assessment of the impacts associated with offshore construction activities that were identified to be required
at that time. However, we identify a number of generally minor deficiencies and uncertainties, and these are briefly summarised below.

- The area of influence of the offshore pipeline project was not fully defined in the 2001 Offshore EIS.
- The 2001 Offshore EIS does not include a dedicated section of scoping and no systematic approach to scoping potential impacts is evident. Notwithstanding this, we do not identify any major potential impacts that have not been addressed in the 2001 Offshore EIS.
- The 2001 Offshore EIS only provides a brief summary of the issues raised by both statutory consultees and local communities and we find that a systematic demonstration of how every issue has been addressed is not presented.
- The assessment of the significance of impacts, including assessment of residual impacts and impact uncertainty, is not consistent throughout the Offshore EIS.
- Accommodation of offshore construction workers is not addressed.
- No mention is made of how the location of the pipeline will be made known to other sea users. In this regard we recommend that the pipeline is marked on nautical charts in agreement with the Department of Transport (see Appendix B Consent condition 31).
- It is stated in the 2001 Offshore EIS that the offshore pipeline will not affect fishing activities once laid (although there will be a small exclusion zone of approximately 3km² around the wellhead). However, temporary restrictions are applied during offshore construction activities. The 2001 Offshore EIS and the 2009 Supplementary Update Report contain few details of the possible interruption to fishing activities and any associated mitigation measures. However, it is noted in the 2009 Onshore EIS that in August 2008 the Erris Inshore Fishermen’s Association and the Corrib Gas Partners reached an agreement on a compensation framework for disturbance resulting from the 2008 offshore pipelay. We understand from DCENR that the Erris Inshore Fishermen’s Association represent the key users of the potentially affected fishery areas, and in particular Broadhaven Bay, and on this basis we consider liaison with this group to be an appropriate mechanism to manage impacts on fishing activities. We recommend that continued liaison with relevant fishery groups should be undertaken by SEPIL as necessary in relation to future offshore construction and maintenance works in agreement with DCENR (see Appendix B Consent Condition 32).
- The 2009 Supplementary Update Report contains additional mitigation measures for the offshore element, including minimizing the duration of offshore trenching, implementation of a code of practice for dredging works, and the presence of a marine advisor on board dredging vessels to ensure no disruption to marine mammals. The anticipated underwater noise from dredging is predicted to be higher than assessed in the 2001 Offshore EIS, but the impact is still deemed to be ‘negligible’, with little in the way of assessment to justify this conclusion. However we consider that impacts from these activities on marine mammals may be adequately by the application of appropriate mitigation and monitoring controls within the associated EMP. While ENVIRON has not reviewed the EMPs for previously completed construction activities, we understand an
appropriate process was followed whereby such EMPs were reviewed and agreed by DCENR and, further, that independent ecological oversight of the offshore construction activities to ensure compliance with the EMPs was undertaken on behalf of DCENR. (For discussion of ongoing/future offshore construction activities see Section 6.3.)

With regard to offshore construction elements completed prior to ENVIRON’s review process, we generally find the 2001 Offshore EIS (as updated by the 2009 Offshore Supplementary Report) to be adequate. While a number of relatively minor deficiencies and uncertainties have been identified, we consider that these relate to either minor technical deficiencies that do not materially affect the adequacy of the EIS, or else aspects that could reasonably be resolved through the application of appropriate mitigation and monitoring programmes within the EMPs associated with the completed phases of offshore construction as described above.

6.3 Review Findings (2010 Offshore Supplementary Update Report)

6.3.1 Rock Placement

Primary mitigation controls during rock placement activities in 2010 are described in the 2010 Offshore Supplementary Update Report (Review Item 3) and the 2010 Marine Works EMP (Review Item 15). These include the following mitigation controls:

- Schedule timing constraints to avoid, *inter alia*, sensitive water bird seasons (principally over-wintering periods for Brent Geese).
- The use of a fall pipe guided by visual surveillance from a Remote Operated Vehicle (ROV) to ensure accurate placement of rock.
- Use of graded and washed gravels to help minimise generation of waterborne sediments during rock laying.
- Presence of Marine Mammal Observers (MMOs) onboard rock placement vessels. The roles of the MMOs are defined in the Vessel Code of Conduct (an appendix to both Review Item 3 and Review Item 15), and include the performance of a 30 minute watch prior to commencement of rock placement to ensure that the area is clear of marine mammals. We consider this to be an appropriate process of control to ensure that significant impacts on marine mammals will not occur.

- It is stated in the 2010 EMP (Review Item 15) that SEPIL would consult with DEHLG/NPWS after an initial survey has determined how much of the pipe line within and adjacent to Broadhaven Bay cSAC requires protection and the area of seabed to be covered by rock armour i.e. length, width and height. This was to allow an assessment to be made on the impacts on the cSAC, prior to rock placement. This is an appropriate approach and we note, for example, that such inspection could also assist in the identification of the extent of impacts (e.g. smothering effects) during the 2009 rock placement, and in the assessment of impacts in 2010 and also cumulative impacts. However, ENVIRON has not reviewed the results of the consultation process undertaken between SEPIL and the DEHLG/NPWS.
We consider that the above mitigation controls are appropriate, although make the following recommendation:

- The chemical compatibility of the gravel material pertinent to the location of the pipeline should be confirmed (we understand from DCENR that this has already been confirmed but this recommendation is noted here for completeness). See Appendix B Consent Condition 27.

A range of monitoring measures was to be undertaken in relation to rock placement works, including:

- A survey of the pipeline prior to rock placement in order to identify the extent of rock placement required (see above).
- Visual monitoring of the fall pipe via ROV during rock placement (see above).
- Monitoring of rock quantities.
- Long term monitoring of marine mammals within Broadhaven Bay cSAC via:
  - Cliff-based marine mammal visual observation
  - Static acoustic monitoring systems.

We consider the above monitoring programmes to be appropriate, although we make the following observations:

- We recommend post-construction surveys be undertaken to identify the extent of smothering and, in the longer term, recovery of the seabed benthos and colonisation of the pipeline (see Appendix B Consent Condition 27).
- Turbidity monitoring during rock placement would have been helpful, although the need for this would depend on the result of the survey works undertaken after the 2009 rock placement works (see above).

### 6.3.2 Installation of Umbilical Lines

Impacts from installation of the umbilical lines are assessed in the 2010 Offshore Update Report as minor/negligible. Overall we concur with this assessment and consider the proposed mitigation measures, which include construction scheduling restrictions and the use of MMOs, to be appropriate. Nonetheless we make the following observations (see Appendix B Consent Condition 28):

- We note some uncertainty in the review materials regarding the precise construction method (i.e. trenching/ploughing) but consider that this can be appropriately agreed with DCENR (in liaison with DEHLG) via final method statements. Associated monitoring requirements (e.g. turbidity monitoring to assess the lateral effects of raised sediments during the trenching/ploughing process) should also be agreed.
- We also recommend that shore-based noise monitoring should be undertaken at points representing the nearest residences during pull-in of the umbilical line to
ensure that day and night-time noise standards are met (with shutdown procedures in place in the event that thresholds are exceeded).

6.3.3 Hydrotesting
We understand that the offshore pipeline was filled with hydrotect waters in 2009. Dewatering of the pipeline and commissioning has yet to take place. The discharged water will be released at the offshore manifold in relatively deep water (approximately 350m water depth) and we note that the avoidance of discharge to shallow waters is in line with good practice. The pipeline hydrotect water includes the following additives:

- Sicor 2007 Hydrotect Cocktail
- Roemex RX-9022 Fluorescent Dye.

Prior to flooding of the pipeline, the chemical additives were assessed on behalf of DCENR by the Marine Institute who concluded that both the above substances are ranked as having low hazard quotients. Following this review, approval was granted with a number of consent conditions attached. On the advice of the Marine Institute, DCENR also recommended that:

- “Relevant stakeholders e.g. fishermen be advised of the proposed discharges in advance of the discharge to allow for full dispersion before recommencement of any fishing activities in the area.”
- “Computer simulation / modelling may be necessary to accurately judge when concentration will reach background levels.”

We concur with these recommendations and consider that they should be included as conditions on any consent. We further recommend that the predictive modelling includes consideration of (see Appendix B Consent condition 29):

- The extent of effects of reduced dissolved oxygen around the discharge location.
- Evaluate the ranges at which ecological effects (e.g. LC-50 levels) are predicted to be exceeded (in this regard we note that since the review by the Marine Institute eco-toxicity testing has been undertaken on SICOR 2007).

We also recommend that the need for monitoring during discharge of hydrotect waters be agreed with DCENR in the light of the predictive modelling (see Appendix B Consent condition 29).

6.3.4 Marine Mammals
Since 2002 SEPI has undertaken a range of baseline monitoring studies of marine mammals in the Broadhaven Bay cSAC, including:

- Cliff-based marine mammal visual observation
- Vessel-based visual observation
- Static acoustic monitoring systems.
Summary reports from the monitoring exercises in 2005, 2008 and 2009 are provided as appendices to the 2010 Offshore Supplementary Update Report. This survey effort has significantly improved data on the usage of the Broadhaven cSAC by marine mammals and provides an overview of the existing usage of the Bay by marine mammals. In total 11 species of marine mammal have been identified within the Bay and the main behaviours identified are foraging and travelling. The 2009 monitoring report also identifies:

- an overall decrease in sighting rates in the 2005, 2008 and 2009 field seasons as compared to the first field season 2001/2002.

- the absence of observations of use of the haul-out site at Rossport Bay by harbour seals since 2001/2002 and a general preference shown by marine mammals for the western bay area in the 2009 field season, a pattern which was not observed previously.

While these affects have occurred during a period of construction activity, the 2009 monitoring report notes that a causal-affect is uncertain. Nonetheless, this does stress the importance of continued monitoring effort during the outstanding construction activities. Notwithstanding this, we note that the nature and duration of the outstanding offshore works is such that significant impacts on marine mammals are not anticipated provided that the proposed mitigation measures (see Sections 6.3.1 and 6.3.2) are implemented.

We note that baseline monitoring data for marine mammals along the offshore pipeline route beyond the Broadhaven Bay cSAC is less extensive. Nonetheless, and as stated above, we consider that the outstanding construction activities are not likely to lead to significant impacts on marine mammals if appropriate mitigation measures are employed. In this regard we note that in some instances it is unclear from the review material if all the proposed mitigation and measures are applied only within the Broadhaven cSAC or in the wider offshore pipeline route. We recommend that all relevant proposed mitigation measures relating to the protection of marine mammals are applied to the whole route where rock placement and trenching of the umbilical line is to be undertaken, and in particular the use of MMOs and associated mitigation controls for the protection of marine mammals (see Appendix B Consent Condition 30).
7 Examination of the Pipeline Design Documentation

7.1 Background

The purpose of this section is to provide a high level design review of the Corrib Onshore Pipeline Environmental Impact Statement (Onshore EIS) with respect to the pipeline asset technical reports contained within the documents. A previous high-level design review was undertaken on behalf of DCENR at the time of the 2009 Submission, the findings of which were presented in the AEA Report (Review Item 23). We have reviewed the AEA Report and concur with the findings presented therein. However, we note that a number significant changes have been made to the pipeline design and supporting assessment as part of the 2010 Submission, especially in relation to the onshore pipeline. Particular attention has been paid to these elements in the review presented in this section.

We also understand that a separate and more detailed review of the technical and safety aspects of the pipeline has been undertaken by Entec on behalf of DCENR. In consideration of this Application, DCENR should take due account of any findings and recommendations made in the Entec Report.

The Corrib Gas Development will operate as a subsea production facility tied back to an onshore processing terminal and will include:

- The offshore wells
- Subsea facilities and offshore pipeline to a landfall in Mayo – Maximum Allowable Operating pressure 150 Barg and Design pressure 345 Barg
- Onshore pipeline – see below
- A gas terminal at Beal an Atha Bui (Bellanaboy), Co. Mayo

The proposed onshore pipeline has the following characteristics:

- Approximately 8.3 km in length
- A diameter of 508 mm (20 inches)
- A wall thickness of 27.1 mm (>1 inch)
- Design pressure 144 Barg
- Maximum allowable operating pressure 100 Barg
- Nominal operating pressure 85 Barg – 90 Barg at the landfall valve installation (LVI)
- Design life 20 years

Approximately 4.9 km of the pipeline between Gleann an Ghad (Glengad) and na hEachu (Aghoos) will be constructed in a tunnel. Approximately 4.6 km of this length will be laid underneath Sruwaddacon Bay (see also Section 3.2). The tunnel will be constructed as follows:
• Minimum depth of cover 5.5 metres
• 4.2 metres in diameter
• Lined with pre cast concrete segments
• Contain services umbilical and outfall pipeline
• Backfilled with cement grout

The remaining 3.4km of pipeline, umbilical and outfall pipeline will be laid at a minimum depth of cover of 1.2 metres.

This Corrib pipeline high level technical review has comprised chiefly a review of Appendix Q of the Onshore EIS, associated drawings and references to the main body of the Onshore EIS where appropriate.

Appendix Q of the Onshore EIS has been prepared to demonstrate that the onshore pipeline meets Irish and International requirements relating to public safety and also meets the additional requirements set out in correspondence by ABP. Appendix Q of the Onshore EIS also provides information relating to upstream facilities where they are relevant to landfall valve installation LV1 at Glengad. Geotechnical information contained in Onshore EIS Appendix M has been used for the pipeline design, risk and integrity analysis contained in Appendix Q.

Onshore EIS Appendix Q is structured to contain the following sections:
• Integrated design description
• Code requirements
• Technical details
• Pipeline integrity management
• Safety management

7.2 Approach
This high level review of the onshore pipeline system addresses:
• Relevant legal compliance
• Relevant code compliance
• Pipeline asset lifecycle comprising:
  o Design basis
  o Routing
The review has been carried out having in mind potential environmental impacts.

7.3 Previous Safety Reviews
A number of regulatory reviews of the pipeline system have been carried out as follows:

- Public safety review by Mr Andrew Johnston – March 2002
- QRA review by AEA Technology – 2005
- The Advantica independent safety review – May 2006
- Technical Advisory Group reports – 2006

In addition, a mediation process was conducted by Mr Peter Cassells that also addressed safety aspects associated with the pipeline system.

From an examination of the documents presented for the review we conclude that a rigorous process has been followed to ensure regulatory compliance for the pipeline. We note that the present design proposal is as a result of the Advantica review to limit the onshore pipeline to a maximum pressure of 144 Barg and modifications to the route proposed by Mr Peter Cassells plus other unreported modifications.

7.4 Codes and standards
The applicable codes listed in Onshore EIS Appendix Q for the Corrib Pipeline are:

- IS EN 1461:2004 (Petroleum and Natural Gas Industries - Pipeline Transportation Systems)
• IS 328:2003 (Code of Practice for Gas Transmission Pipelines and Pipeline Installations (Edition 3.1))

• BS PD 8010-1:2004 (Code of Practice for Pipelines, Part 1: Steel Pipelines on Land)

It is reported in Onshore EIS Appendix Q that the application of the above Standards complies fully with the Report of the Technical Advisory Group to the Minister for Communications, Energy and Natural Resources which recommended that:

• IS EN 1461:2004 – should be the primary design code and;

• IS 328:2003 and BS PD 8010-1:2004 should be applied where they exceed IS EN 1461:2004

The Advisory group also made certain additional recommendations regarding the detailed application of these codes.

We conclude that these codes are the relevant European and British codes and standards applicable to pipeline and that a rigorous process has been followed to ensure that an appropriate standards regime has been put in place.

7.5 Design overview

The Onshore pipeline design review has been presented in Appendix Q4.1 of the Onshore EIS. The document covers:

• General design parameters

• Pipeline route

• On shore gas pipeline design

• Outfall design

• Umbilical design

• Fibre optic cable design

• Signal cable design

In addition to the design review presented in Appendix Q4.1 a stone settlement analysis has been provided in Appendix Q4.1A. The report uses the geotechnical information provided in appendix M. The report provides the results of a Finite Element Analysis (FEA) modelled for the pipeline and umbilical when constructed in the stone road. The results show that the settlement values would have to be increased by a factor of 10 to cause the onshore pipeline to reach its Specified Minimum Yield Strength (SMYS) during operation.

We have reviewed the content elements of these documents and find that the design issues addressed are consistent with the requirements of the codes listed above. We make no further comment with regard to a detailed assessment of the technical design.
7.6 Safety Management

Onshore EIS Appendix Q 6 deals with safety management including:

- Introduction to safety management – Q6.1
- Public safety – application of design codes – Q6.2
- Qualitative risk assessment – Q6.3
- Quantitative risk assessment (QRA) – Q6.4
- Response to queries Q6.5
- Emergency response planning and provision Q6.6

Also included are independent reports as follows:

- Det Norske Veritas QRA report which concludes that the predicted levels of risk associated with the proposed pipeline and LVI pose an extremely low risk to the occupants of dwellings along the route of the pipeline.

- Pipeline Integrity Engineers Ltd report on failure frequency predictions due to third party interference for Corrib Pipeline indicates that the rupture frequency for the Corrib pipeline is approximately 200 times lower than that of an equivalent pipeline of standard wall thickness, typical of those in the UK pipeline population.

We conclude therefore that the process for providing safety management for the pipeline has been addressed.

7.7 Pipeline routing

Eight routing options were considered for the pipeline before the final route was agreed; these are summarised in Chapter 1 Section 3.4 of Volume 1 of the Onshore EIS.

Onshore EIS Appendix Q5(i) deals with response to ABP regarding the query raised in Section 3b of letter dated 2nd November 2009. This was to address the concerns raised by ABP with regard to the consequences of pipeline failure to ensure that persons standing besides the dwellings will not receive a dangerous dose of thermal radiation in the case of full bore rupture at maximum pressure; without taking into account the probability of failure. It is concluded in the Onshore EIS Appendix Q5(i) that persons standing besides the dwellings will not receive a dangerous dose of thermal radiation in the case of full bore rupture; this analysis is consequence based and takes no account of the probability of full bore rupture.

Onshore EIS Appendix Q5(ii) deals with response to ABP regarding the query raised in their letter to SEPIL dated 2nd November 2009. The request was for hazard distances, building burning distances and escape distances to be mapped in contours for the entire pipeline, and that the applicant should indicate the outer hazard line contour, which should show the distances from the pipeline at which a person would be safe. A set of drawings showing the requested contours is provided in Appendix Q5(ii).
We conclude therefore that, in addition to the comprehensive routing study contained in the pipeline design, responses to the issues raised by ABP have further addressed safety concerns relating to the pipeline routing.

7.8 Construction

The construction of the pipeline comprises a total pipeline length of 8.3 km. Approximately 4.9 km of the pipeline will be constructed in a tunnel of which 4.6 km will be laid underneath Sruwaddacon Bay. 3.4 km of pipeline will therefore be constructed by conventional means and from a high level perspective should not present any concerns.

The tunnelling option has been chosen to address the pipeline hazard distances and a range of alternatives have been considered for the tunnelling technique. These are summarised in Chapter 1 Section 3.5 of Volume 1 of the Onshore EIS.

Section 3.5.1.2 of Volume 1 discusses the grouting of the tunnel, the principal considerations being:

- Safety of the gas pipeline and associated services
- Compliance with relevant codes and standards
- Potential for using the tunnel for other services in future
- Potential requirement for maintaining the services in the tunnel

It is stated that full grouting has been selected for the following reasons:-

- The pipeline will be fully protected within the grouted tunnel
- A fully grouted tunnel is preferable from a maintenance point of view
- A fully grouted tunnel will maintain the long term integrity of the tunnel structure

A full review of the Construction options is contained in Table 3.2 of the Onshore EIS.

Under environmental considerations in Table 3.2 of the Onshore EIS it is stated that “an intervention pit would only be required in exceptional circumstances. The possibility of there being a requirement for an intervention pit with segment lining is remote.” A proposal for excavating an intervention pit is detailed in Section 5.5.1.3 of the Onshore EIS. However this relates to during construction activities and not after the tunnel has been grouted and the pipeline commissioned. It is mentioned that grouting will not affect the pipeline coating.

Construction activities on land are fully described in Section 5.4 of the Onshore EIS.

Onshore EIS Appendix Q5 deals with Pipeline Integrity Management including quality management, design process, manufacturing process, construction process and pre-commissioning process including the hydrostatic test report

Appendix R and Appendix X of the Onshore EIS detail information on tunnelling construction activities as follows:
• Summary of materials and quantities
• Typical method statement direct pipe technique
• Review of risks associated with micro tunnelling
• Management plan for materials arising on site.

A full description of the construction methodologies together with the rationale for selection of the tunnelling option has been detailed in the Onshore EIS. From our high level review of the reports it is not clear how the pipeline coating will be protected against damage during the grouting operations. Any subsequent access required to the pipeline after grouting will require re-establishment of a major construction site in Sruwaddacon Bay. We have not seen proposals for achieving such access in the documents presented.

7.9 **Surveillance, inspection and maintenance**

A threat to continued integrity of the pipeline is associated with corrosion. Onshore EIS Appendix Q4.7 deals with Materials and Corrosion Management Premises. The Appendix addresses the following topics:

• Corrosion and other materials threats
• Corrosion mitigation
• Corrosion inhibition
• Pipeline corrosion monitoring requirements
• Design re-assessment

The above topics cover the activities associated with corrosion management. In addition to corrosion the greatest threat to the pipeline is from third party interference damage. We assume that the approach to surveillance will be covered in the pipeline maintenance procedures which we have not seen for this review. We recommend that such procedures should be reviewed by DCENR when available.

7.10 **Emergency plan**

Onshore EIS Appendix Q6.6 of the EIS details the Emergency response and planning provisions detailing:-

• Interface with the public
• Overview of pipeline emergency response scenarios
• Management of emergency response for the Corrib development
• Pipeline emergency response provisions
• Emergency response organisation and structure
• Emergency response roles
7.11 Repairs

It is noted that in the emergency plan the Pipeline Damage Procedures are said to be contained in Appendix Q5 of the Onshore EIS. From an examination of the information provided we have not found detailed information which describes pipeline repair methods in the unlikely event that these are required.

Onshore EIS Appendix Q4.10 provides a puncturing and denting evaluation.

Should damage occur to the onshore open cut section of pipeline it is assumed that the damage would be repaired by conventional means. For the tunneled section, most of which lies beneath Sruwaddacon Bay, a conventional repair strategy could not be adopted. In the event that pipeline repairs are required during the operation of the pipeline, the approach to such repairs would need to be agreed with the relevant authorities to ensure that all technical, environmental and social standards are met.

7.12 Pipeline process flow

In reviewing the pipeline process flow conditions the following scenarios have been considered:

- Over pressure (LVI)
- Interrupted supply – depleted pipeline pressure (LVI)
- Failure due to the effects of the fluid being conveyed

7.12.1 Over pressure protection

A land fall valve has been installed to provide choke flow to achieve an onshore pipeline maximum operating pressure of 100 Barg. The upstream offshore pipeline has a maximum operating pressure of 150 Barg.

The documents applicable to the design of the LVI, contained in Appendix Q of the Onshore EIS, are:

- Land fall valve installation justification and overview – Q4.3
- Appraisal of alternative configurations for the LVI safety shut down system - Q4.4
- Aspects of process engineering design of the Corrib production system – Q.4.5
- Reliability of overpressure protection systems for offshore and onshore pipelines-Q4.6

The system comprises an in parallel high integrity safety shut down system comprising:
• Duplicate 16 inch inline shut down axial flow valves installed in a bypass which fail closed
• 20 inch line valve which is always closed
• Triplicate pressure measurement instruments
• Logic solver
• Restart bypass to regulate the flow and mitigate the Joules Thompson effect
• Methanol injection to prevent formation of hydrates during restart

It is concluded that the fault condition of over pressurisation has been considered in the design brief contained within the documents of Appendix Q.

7.12.2 Interrupted supply – depleted pipeline pressure (LVI)
Following a disruption in flow established by the closure of the two inline flow valves, subsequent system start up relies upon the operation of a 4 inch bypass manual restart valve. The start-up procedures and supply interruption procedures at the terminal with respect to maintaining a positive pipeline pressure are not discussed in Appendix Q of the Onshore EIS.

While the failure to supply scenario is not fully described in the documents presented for review it is anticipated that these will be contained in operational procedures. In the unlikely event that the onshore pipeline pressure fell to atmospheric pressure then the associated re-commissioning procedures are likely to have environmental impacts, for example purged gas, air emissions from compressors and nitrogen generators (such impacts would be similar in nature to the impacts associated with pre-commissioning of the offshore and onshore pipelines – see also Section 5.2.4).

7.12.3 Gas composition
Table 4.1 of Appendix Q4.7 of the Onshore EIS deals with Materials and Corrosion Management Premises and identifies the following failure modes associated with the fluid being transported:

• Low temperature cracking
• Excessive internal corrosion

The main causes are identified as:

• CO₂ and organic acid corrosion
• H₂S Corrosion – levels are relativity low –the limit for carbon steels operating at 144 Barg is 24ppm

The mitigating actions are:

• Flow regulation and materials selection
• Continuous injection of corrosion inhibitor and Intelligent pigging

Onshore EIS Appendix Q4.9 provides an assessment of wet gas operation, internal corrosion and erosion.

It is concluded therefore that the failure modes associated with gas composition have been considered in the design

### 7.13 Conclusions

The conclusions of the high level technical review are summarised as follows:

• For the legal review we conclude that a rigorous process appears to have been followed to ensure Legal Compliance for the pipeline from a technical design perspective.

• We note that the present design proposal is as a result of the Advantica review to limit the onshore pipeline to a maximum pressure of 144 Barg and modifications to the route proposed by Mr Peter Cassells plus other unreported modifications

• We note that in addition to the comprehensive routing study contained in the pipeline design, responses to the issues raised by ABP have further addressed safety concerns relating to the pipeline routing

• We conclude that the codes specified in the design are those relevant European and Irish codes and standards applicable to Onshore pipelines and that a rigorous process appears to have been followed to ensure that an appropriate standards regime has been put in place

• We have reviewed the content elements of the design document and find that the design issues addressed are consistent with the requirements of the codes listed in Section 5. We make no further comment with regard to a detailed assessment of the technical design

• We conclude that a process for providing safety management for the pipeline has been addressed

• A full description of the construction methodologies together with the rationale for selection of the tunnelling option has been detailed in the Onshore EIS. From our high level review of the reports it is not clear how the pipeline coating will be protected against damage during the grouting operations. We have not seen proposals for achieving such access, after the pipeline tunnel has been grouted, in the documents presented.

• Corrosion management has been addressed. In addition to corrosion the greatest threat to the pipeline is from third party interference damage. We assume that the approach to surveillance will be covered in the pipeline maintenance procedures which we have not seen for this review. We recommend that such procedures should be reviewed by DCENR when available.

• We conclude that an emergency plan for the pipeline has been developed.
- Should damage occur to the onshore open cut section of pipeline it is assumed that the damage would be repaired by conventional means. For the tunnelled section, most of which lies beneath Sruwaddacon Bay, a conventional repair strategy could not be adopted. In the event that pipeline repairs are required during the operation of the pipeline, the approach to such repairs would need to be agreed with the relevant authorities to ensure that all technical, environmental and social standards are met.

- It is concluded that the fault condition of over pressurisation has been considered in the design brief contained within the documents of Appendix Q of the Onshore EIS.

- While the failure to supply scenario is not fully described in the documents presented for review it is anticipated that this will be addressed in operational procedures. In the unlikely event that the onshore pipeline pressure fell to atmospheric pressure then the associated re-commissioning procedures are likely to have environmental impacts (such impacts would be similar in nature to the impacts associated with pre-commissioning of the offshore and onshore pipelines – see also Section 5.2.4).

- It is concluded that the failure modes associated with gas composition have been considered in the design.
8 Assessment of Submissions

A number of submissions were lodged with the DCENR during the following consultation periods associated with the Section 40 Application:

1. The EIS Application consultation period from 30/5/2010 to 30/7/2010

A variety of issues were raised within the lodged submissions, and a brief summary of the issues raised in each submission is provided in Appendix A.

A review of the public submissions indicates that many of the points of concern raised relate to aspects that are outside of the scope of this review and we make no comment on these issues in this report. Such issues are indicated on an issue-by-issue basis in Appendix A and include aspects related to the following general topics:

- Technical and safety aspects associated with the pipeline and its construction, including pipeline integrity, safety risk assessment, tunnelling methods and landslide risks. We understand that review of these technical and safety issues has been undertaken on behalf of DCENR in the Entec Report.

- Performance of geotechnical borehole investigation works undertaken Sruwaddacon Bay in 2010.

- Issues related to the actual implementation of construction activities undertaken to date under the 2002 pipeline Authorisation and other consents.

- Wider sustainability and energy policy in Ireland and world-wide.

- Legal implementation of EU Directives into Irish law.

- The approach adopted by the relevant consenting authorities to licensing of the different phases of the Corrib project to date.

In addition to the above issues, the submissions also raise many concerns pertaining to the adequacy of the EIS documentation, and which fall within the scope of the current review. From our review of the submissions we find that all issues are either:

- adequately addressed between the EIS documentation and the Additional Information, or

- may be appropriately addressed through the application of consent conditions (as described in Appendix B).

In Appendix A we provide cross-references to the relevant sections in this report that deal with the general topics pertaining to each raised issue and also, where appropriate, relevant consent conditions proposed in Appendix B.
9 Summary, Conclusions and Recommendations

ENVIRON has reviewed the EIS documentation associated with SEPIL’s application to DCENR under Section 40 of the Gas Act 1976 (as amended) for the construction of the onshore and offshore Corrib gas pipeline. The full list of materials reviewed by ENVIRON is provided in Section 4.2 and is summarised below:

- EIS documentation submitted to DCENR in May 2010, including:
  a. The Corrib Offshore EIS, 2001
  b. The 2010 Offshore Supplementary Update Report
  c. The Corrib Onshore pipeline EIS, May 2010

- A range of Additional Information submitted to DCENR in November 2010 in response to queries from DCENR following their review of the May 2010 EIS submission.

- A range of ad-hoc associated information provided by DCENR.

An overview of our findings is as follows:

Screening Assessment

On the basis of comparison with relevant EU and Irish legislation (e.g. the Gas Act, 1976 as amended, and the Petroleum and Other Mineral Development Act, 1960, as amended), we conclude that an EIS is required for the Corrib gas pipeline development.

Review of the adequacy of the Onshore EIS documentation

1. Our review of the Onshore EIS revealed a number of deficiencies against good practice requirements. However, the Additional Information presented as part of the November 2010 submission adequately resolved the identified issues to the extent that we consider the Onshore EIS and Additional Information in combination to:

   - Adequately meet the material requirements for an EIS.
   - Adequately demonstrate that the development could be completed without unacceptable adverse environmental and social impacts.
   - Provide an adequate assessment of the potential impacts of the development on the Natura 2000 sites through which the proposed onshore pipeline is routed as part of an Appropriate Assessment process and further provide an adequate demonstration that the development is not likely to significantly affect the integrity of these Natura 2000 sites.

2. The above conclusions are based on the assumption that all mitigation and monitoring controls identified in the Onshore EIS and Additional Information are appropriately managed and implemented through an appropriate environmental management system and associated plans/procedures that are to be agreed with DCENR (see Appendix B Consent condition 1).
3. While our reviews identified a number of residual issues and uncertainties within the Onshore EIS and Additional Information documentation, we consider that these may be adequately managed and resolved through the application of a range of consent conditions to be attached to any consent for the development granted by the Minister. These proposed consent conditions are summarised in Appendix B.

Review of the adequacy of the Offshore EIS documentation

1. With regard to offshore construction elements completed prior to ENVIRON’s review process, we generally find the 2001 Offshore EIS (as updated by the 2009 Offshore Supplementary Report) to be adequate. While a number of relatively minor deficiencies and uncertainties have been identified, we consider that these relate to either minor technical deficiencies that do not materially affect the adequacy of the EIS, or else aspects that could reasonably be resolved through the application of appropriate mitigation and monitoring programmes within the EMPs associated with the completed phases of offshore construction. While ENVIRON has not reviewed the EMPs for previously completed construction activities, we understand that an appropriate process was followed whereby such EMPs were reviewed and agreed by DCENR and, further, that independent ecological oversight of the offshore construction activities to ensure compliance with the EMPs was undertaken on behalf of DCENR.

2. In relation to the remaining outstanding offshore construction activities, we find that the assessment presented in the 2010 Offshore Supplementary Update Report and the 2010 Offshore EMP provide a reasonable basis to demonstrate that the remaining construction activities could be completed without unacceptable adverse environmental and social impacts. This conclusion is made on the assumption that the proposed mitigation and monitoring controls are appropriately managed and implemented through management plans/procedures that are/will be agreed with DCENR (see Appendix B Consent Condition 1).

3. While our reviews identified a number of residual issues and uncertainties within the 2010 Offshore Supplementary Update Report regarding future construction activities, we consider that these may be adequately managed and resolved through the application of a range of consent conditions to be attached to any consent for the development granted by the Minister. These proposed consent conditions are summarised in Appendix B.

High level examination of the Pipeline design elements

1. ENVIRON has undertaken a high-level examination of the pipeline design elements presented in the Onshore EIS documentation. The main conclusions of this review are as follows:

   - A rigorous process appears to have been followed to ensure compliance with relevant regulatory standards for the pipeline from a technical perspective.

   - The codes specified in the design are those relevant European and Irish codes and standards applicable to onshore pipelines and that a rigorous process appears to have been followed to ensure that an appropriate standards regime has been put in place.
A process for providing safety management for the pipeline has been addressed.

The fault condition of over pressurisation has been considered in the design brief contained within the Onshore EIS documentation.

Failure modes associated with gas composition have been considered in the design.

2. In addition to the above conclusions we also make the following recommendations:

- In consideration of this Application, DCENR should take due account of any findings and recommendations made by the independent pipeline safety and design consultant (Entec) that has undertaken a separate and detailed review of the technical and safety aspects of the development on behalf of DCENR (see the Entec Report).

- An appropriate approach to surveillance of the pipeline to mitigate risks associated with third party interference/damage during operation needs to be developed by SEPIL and agreed with relevant authorities.

- In the event that pipeline repairs are required during the construction (e.g. during grouting) or operation of the pipeline, the approach to such repairs would need to be agreed with the relevant authorities to ensure that all technical, environmental and social standards are met. This is particularly important in relation to pipeline damage within the grouted tunnel under Sruwaddacon Bay.

**Consent Conditions**

Where we have proposed consent conditions (see above and Appendix B), these in some instances place requirements on DCENR (e.g. to review and approve plans, to oversee construction activities, or liaise with other stakeholders). In such cases we strongly recommend that before such consent conditions are issued DCENR puts into place appropriate oversight and review arrangements to be undertaken by suitably qualified personnel, including review of relevant plans/assessments and periodic inspections of construction activities and facilities, in order to confirm that all relevant mitigation controls and consent conditions are being adequately met by the project developer and its construction contractors.
Annex A: Summary of Submissions
### Summary of Submissions

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<thead>
<tr>
<th>No.</th>
<th>Submission From</th>
<th>Main Issues</th>
<th>ENVIRON Commentary</th>
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<tbody>
<tr>
<td>1</td>
<td>Barrett, Kathleen</td>
<td>Issues raised include:</td>
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<td></td>
<td></td>
<td>• Traffic impacts (including size of road and duration of impacts)</td>
<td>See Section 5.2.3</td>
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<td>• Vibration impacts (landsides)</td>
<td>Refer to the Entec Report (Review Item 22 – see Section 4.2)</td>
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<td>• Vibration impacts (property damage)</td>
<td>See Section 5.2.5</td>
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<td>• Impacts of intervention pit</td>
<td>See Section 5.2.8</td>
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<td>• Health &amp; safety (pipeline risks)</td>
<td>Refer to the Entec Report</td>
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<td>• Community consent</td>
<td>See Section 5.2.2</td>
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<td>• Shell’s reputation in community relations</td>
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<td>• Allegation about a former security guard</td>
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</tr>
<tr>
<td>3a</td>
<td>DEHLG</td>
<td>• Provides conclusions of DEHLG assessment of the ecological aspects of the EIS</td>
<td>Refer to Section 5.2.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Identifies mitigation requirements</td>
<td>Refer to Section 5.2.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Methodology &amp; timing in event of an intervention pit being required to be agreed with DEHLG (in regard to migrating fish &amp; Natura 2000 sites)</td>
<td>See Section 5.2.8 and proposed Consent Condition 22</td>
</tr>
<tr>
<td>3b</td>
<td>DEHLG (NPWS)</td>
<td>• Provides conclusions of DEHLG assessment of the ecological aspects of the offshore assessment</td>
<td>Refer to Section 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Suggested requirements made with respect to marine mammal monitoring and details of the code of conduct</td>
<td>Refer to Section 6</td>
</tr>
<tr>
<td>4</td>
<td>DEHLG</td>
<td>Archaeological aspects, including:</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Archaeological monitoring recommended to be carried out by qualified archaeologist at all ground disturbance works. Procedure for work to stop in the event of archaeological material being found required</td>
<td>See Section 5.2.10 and proposed Consent Condition 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mitigations to be implemented in liaison with the DEHLG</td>
<td>See Section 5.2.10 and proposed Consent Condition 3</td>
</tr>
<tr>
<td>5</td>
<td>Erris Inshore Association</td>
<td>Concerns over fisheries baseline characterisation.</td>
<td>See Section 6.2</td>
</tr>
<tr>
<td>6</td>
<td>Health Service Executive</td>
<td>• Need to protect water supplies from contamination</td>
<td>No issues identified with the adequacy of the EIS in this regard.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Compliance to standards for air quality, noise and light</td>
<td>See Sections 5.2.4, 5.2.5, 5.2.6</td>
</tr>
<tr>
<td>7</td>
<td>Irish Whale &amp; Dolphin Group</td>
<td>Issues raised include concern over lack of cetacean baseline, especially beyond the Broadhaven Bay SAC</td>
<td>See Section 6.3.4 and proposed Consent Condition 30</td>
</tr>
<tr>
<td>8</td>
<td>Macklin, Wilfred</td>
<td>Issues raised include:</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• General concerns with oil development</td>
<td>Outside of review scope</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Concern about changes in community, potential increase in crimes, etc.</td>
<td>See Section 5.2.2</td>
</tr>
<tr>
<td>9</td>
<td>Meenaghan, Mary</td>
<td>Similar issues to Barrett (1) above</td>
<td>See (1) above</td>
</tr>
<tr>
<td>10</td>
<td>Meenaghan, Patrick</td>
<td>Similar issues to Barrett (1) above</td>
<td>See (1) above</td>
</tr>
<tr>
<td>No.</td>
<td>Submission From</td>
<td>Main Issues</td>
<td>ENVIRON Commentary</td>
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</tbody>
</table>
| 11  | Monaghan, John | Issues raised include:  
• Unknown ground conditions for suitability for tunnelling  
• Claimed 'experimental' nature of LVI  
• Sustainability and energy need concerns | -  
Refer to the Entec Report  
Refer to the Entec Report  
Outside of review scope |
| 12  | Rossport Solidarity Group | Issues raised include:  
• Duration and impact of construction traffic disturbance  
• Dooncarton landslide risks (due to construction related vibration)  
• Lack of detail on Intervention Pit  
• Lack of community consent  
• Safety concerns regarding the LVI  
• Economic and sustainability issues | -  
See Section 5.2.3  
Refer to the Entec Report  
See Section 5.2.8 and proposed Consent Condition 22  
See Section 5.2.2  
Refer to the Entec Report  
Outside of review scope |
| 13  | Conway, Terence & others | Issues raised include:  
• Safety risks associated with pipeline proximity to dwelling and landslide areas  
• Damage to ecologically sensitive/designated areas  
• Adequacy of consultation  
• Impacts on drinking water supplies | -  
Refer to the Entec Report  
See Section 5.2.8  
See Sections 5.1.4 and 5.2.2  
See (6) above |
| 14  | Lynch, Paul | Objection on the grounds of health, safety & environmental protection (no specifics identified) | No specific issues identified in submission |
| 15  | King, Anthony et al | Duplicate of Rossport Solidarity Group submission (12) above | See (12) above |
| 16  | Walsh, Mary et al | Duplicate of Rossport Solidarity Group submission (12) above | See (12) above |
| 17  | Peter Sweetman & Associates | Issues raised include:  
• Planning approvals for pipeline elements already constructed  
• Planning approvals for SI works in Sruwaddacon Bay | -  
Outside of review scope  
Outside of review scope |
| 18  | Taylor, Diane (various submissions) | Issues raised include:  
• Landslide risks  
• Pipeline safety risks  
• Need for renewable energy sources  
• Impacts and objections to previous development (not associated with the Corrib project) in the area  
• Objections in relation to various environmental aspects of the EIS including:  
  o Archaeological baseline and impacts  
  o Visual impacts  
  o Assessment of impacts on Natura 2000 sites | Refer to the Entec Report  
Refer to the Entec Report  
Outside of review scope  
-  
See Section 5.2.10  
See Section 5.2.6  
See Section 5.2.8  
Outside of review scope |
| 19  | Harrington, Maura | Issued raised include:  
• Oversight and enforcement of mitigation measures  
• General oil & gas industry concerns, including Gulf of Mexico spill | Outside of review scope (but see also Section 4.3)  
Outside of review scope |

Submissions in Relation to Additional Information Disclosure November 2010

<table>
<thead>
<tr>
<th>No.</th>
<th>Submission From</th>
<th>Main Issues</th>
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<tbody>
<tr>
<td>20</td>
<td>An Taisce</td>
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## Main Issues

<table>
<thead>
<tr>
<th>No.</th>
<th>Submission From</th>
<th>ENVIRO Commentary</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Legal aspects of existing consents and concerns over ‘project splitting’</strong></td>
</tr>
<tr>
<td>8</td>
<td>Muller, Monica &amp; Sweetman, Peter</td>
<td>Outside of review scope</td>
</tr>
<tr>
<td></td>
<td></td>
<td>**Restricted nature of alternatives analysis (due to existing construction of</td>
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<tr>
<td></td>
<td></td>
<td>offshore pipeline)**</td>
</tr>
<tr>
<td>19</td>
<td>Muller, Monica &amp; Sweetman, Peter</td>
<td>See Section 5.1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Lack of site specific conservation objectives for Natura 2000 sites</strong></td>
</tr>
<tr>
<td></td>
<td>Muller, Monica &amp; Sweetman, Peter</td>
<td>The assessment made in the EIS was undertaken within the context of available</td>
</tr>
<tr>
<td></td>
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<td>conservation objectives.</td>
</tr>
<tr>
<td>20</td>
<td>Muller, Monica &amp; Sweetman, Peter</td>
<td><strong>Outstanding ruling of the ECJ in relation to the interpretation of ‘site integrity’</strong></td>
</tr>
<tr>
<td></td>
<td>Muller, Monica &amp; Sweetman, Peter</td>
<td>See Section 5.2.8 for review of the assessment of impacts on Natura 2000 sites</td>
</tr>
<tr>
<td>21</td>
<td>Muller, Monica &amp; Sweetman, Peter</td>
<td><strong>Planning approvals for pipeline elements already constructed</strong></td>
</tr>
<tr>
<td></td>
<td>Muller, Monica &amp; Sweetman, Peter</td>
<td>Outside of review scope</td>
</tr>
<tr>
<td></td>
<td>Muller, Monica &amp; Sweetman, Peter</td>
<td><strong>Baseline characterisation and impacts on birds including light impacts</strong></td>
</tr>
<tr>
<td></td>
<td>Muller, Monica &amp; Sweetman, Peter</td>
<td>See Sections 5.2.6 and 5.2.8</td>
</tr>
<tr>
<td></td>
<td>Muller, Monica &amp; Sweetman, Peter</td>
<td><strong>Baseline characterisation and impacts on otters</strong></td>
</tr>
<tr>
<td></td>
<td>Muller, Monica &amp; Sweetman, Peter</td>
<td>See Section 5.2.8</td>
</tr>
<tr>
<td></td>
<td>Muller, Monica &amp; Sweetman, Peter</td>
<td><strong>Claimed presence of machair at Glenglad</strong></td>
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<td>22</td>
<td>King, James</td>
<td>See Section 5.2.8</td>
</tr>
<tr>
<td></td>
<td>King, James</td>
<td><strong>Legality of SI works in Sruwaddacon Bay</strong></td>
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<tr>
<td></td>
<td>King, James</td>
<td>Outside of review scope</td>
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<tr>
<td></td>
<td>King, James</td>
<td>Compliance with the Seveso Directive</td>
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<td></td>
<td>King, James</td>
<td>Refer to the Entec Report</td>
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<tr>
<td></td>
<td>King, James</td>
<td><strong>Use of consent conditions in light of ECJ ruling and Circular PD 2/07</strong></td>
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<td>23</td>
<td>King, Cornelius &amp; Sheeren, Gerry</td>
<td>See Section 4.3</td>
</tr>
<tr>
<td></td>
<td>King, Cornelius &amp; Sheeren, Gerry</td>
<td><strong>Legality of SI works in Sruwaddacon Bay</strong></td>
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<td>King, Cornelius &amp; Sheeren, Gerry</td>
<td>Outside of review scope</td>
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<td>King, Cornelius &amp; Sheeren, Gerry</td>
<td>Refer to the Entec Report</td>
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<tr>
<td></td>
<td>King, Cornelius &amp; Sheeren, Gerry</td>
<td><strong>Issues regarding historical/ongoing security presence</strong></td>
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<td>King, Cornelius &amp; Sheeren, Gerry</td>
<td>Assessment of implementation compliance during previous construction works are</td>
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<tr>
<td></td>
<td>King, Cornelius &amp; Sheeren, Gerry</td>
<td>outside of the review scope.</td>
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<tr>
<td></td>
<td>King, Cornelius &amp; Sheeren, Gerry</td>
<td><strong>‘Independent review of the best development concept for the project’</strong></td>
</tr>
<tr>
<td></td>
<td>King, Cornelius &amp; Sheeren, Gerry</td>
<td>Outside of review scope</td>
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<tr>
<td>24</td>
<td>Taylor, Mary</td>
<td>General environmental issues raised including:</td>
</tr>
<tr>
<td></td>
<td>Taylor, Mary</td>
<td><strong>Impacts on birds</strong></td>
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<tr>
<td></td>
<td>Taylor, Mary</td>
<td>See Section 5.2.8</td>
</tr>
<tr>
<td></td>
<td>Taylor, Mary</td>
<td><strong>Machair</strong></td>
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<tr>
<td></td>
<td>Taylor, Mary</td>
<td>See Section 5.2.8</td>
</tr>
<tr>
<td></td>
<td>Taylor, Mary</td>
<td><strong>Archaeology</strong></td>
</tr>
<tr>
<td></td>
<td>Taylor, Mary</td>
<td>See Section 5.2.10</td>
</tr>
<tr>
<td></td>
<td>Taylor, Mary</td>
<td><strong>Landslide risks</strong></td>
</tr>
<tr>
<td></td>
<td>Taylor, Mary</td>
<td>Refer to the Entec Report</td>
</tr>
</tbody>
</table>
## Review of the 2010 Corrib Gas Pipeline EIS Submission

### No. Submission From Main Issues ENVIRON Commentary

<table>
<thead>
<tr>
<th>No.</th>
<th>Submission From</th>
<th>Main Issues</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• Claimed lack of access to Environmental Monitoring Group reports and concerns regarding independent oversight</td>
<td>Outside of review scope</td>
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<tr>
<td></td>
<td></td>
<td>• Claimed harassment of dolphins</td>
<td>Outside of review scope</td>
</tr>
<tr>
<td>25</td>
<td>Corduff, Ethel &amp; Thomas</td>
<td>Issues raised include:</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>• Perceived contradiction in pipeline route under Sruwaddacon bay with screening out of a route through the bay in previous EIS</td>
<td>See Section 5.1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Concerns over household insurance cost/availability</td>
<td>See Section 5.2.2</td>
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<td></td>
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<td>• Impacts on oyster farm</td>
<td>See Section 5.2.2</td>
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<td></td>
<td></td>
<td>• Noise impacts on humans</td>
<td>See Section 5.2.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Landslide risks</td>
<td>Refer to the Entec Report</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Impacts on fauna (bids and otters)</td>
<td>See Section 5.2.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Impacts of an intervention pit</td>
<td>See Section 5.2.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Beach access</td>
<td>No issues identified with the adequacy of the EIS in this regard.</td>
</tr>
<tr>
<td>26</td>
<td>Conway, Terence</td>
<td>Issues raised include:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 'Independent review of the best development concept for the project'</td>
<td>Outside of review scope</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Concerns over ‘project splitting’</td>
<td>Outside of review scope</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Appropriateness of tunnelling methods</td>
<td>Refer to the Entec Report</td>
</tr>
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<td></td>
<td></td>
<td>• Concerns that tunnel will be used for additional pipelines</td>
<td>Outside of review scope</td>
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<tr>
<td></td>
<td></td>
<td>• Aquatic noise impacts on fauna</td>
<td>See Sections 5.2.5 and 5.2.8</td>
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<tr>
<td></td>
<td></td>
<td>• Impacts of an intervention pit</td>
<td>See Section 5.2.8</td>
</tr>
<tr>
<td>27</td>
<td>Byrne, Justin</td>
<td>Issues raised include:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adequacy of bird surveys</td>
<td>See Section 5.2.8</td>
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<tr>
<td></td>
<td></td>
<td>• Light impacts on wildlife</td>
<td>See Sections 5.2.6 and 5.2.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Restricted nature of alternatives analysis (due to existing construction of offshore pipeline)</td>
<td>See Section 5.1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Validity of the Appropriate Assessment</td>
<td>See Section 5.2.8</td>
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<td></td>
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<td>• Machair presence at Glengad</td>
<td>See Section 5.2.8</td>
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<td></td>
<td></td>
<td>• Impacts on priority habitats</td>
<td>See Section 5.2.8</td>
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</tbody>
</table>
Annex B: Proposed Consent Conditions
<table>
<thead>
<tr>
<th>Item</th>
<th>Subject</th>
<th>Comment</th>
<th>Outline of recommended consent condition</th>
<th>Purpose of recommended consent condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General impact mitigation and monitoring</td>
<td>All mitigation and monitoring controls identified in the EIS documentation need to be appropriately managed and implemented through environmental management plans/procedures that are to be agreed with DCENR.</td>
<td>The developer must ensure that mitigation and monitoring controls identified in the Offshore EIS, the 2010 Offshore Supplementary Update Report, the Onshore EIS and Additional Information pursuant to the Applicant are appropriately managed and implemented through appropriate management plans/procedures that are to be agreed with DCENR.</td>
<td>To ensure that the general impact mitigation and monitoring controls on which the EIS documentation is based are adequately implemented.</td>
</tr>
</tbody>
</table>
| 2    | Stone road                                  | The ‘stone road’ method of pipeline construction described in the Onshore EIS has some shortcomings. The most significant of these relate to the potential of vertical leakage of water through the base of the trench if the trench were to penetrate the full thickness of peat and encounter a high permeability soil. This could potentially result in water loss from the peat, with associated ecohydrological impacts. SEPIL commissioned considerable research and investigations to address the issue at the time of the previous application in February 2009. The findings of this research are still relevant for the revised pipeline route in the May 2010 application. The findings were presented in a report by AGEC dated October 2009 (Final Report on Reworked Peat & Mineral Soil Permeability Research – Ref: 942-233). This report includes design parameters and construction techniques for the stone road to minimise the potential for vertical water leakage. It is considered that these measures would adequately reduce the potential for vertical water leakage through the base of the trench, and address the shortcomings in the May 2010 Onshore EIS. The construction techniques described in the above report should form the basis of a method statement. The method statement should provide details of the measures to be undertaken to adequately reduce the risk of ecohydrological impact on peatland areas due to water leakage through the base of the pipeline trench. The October 2009 report also included details for the construction of a trench ‘trial section’, to allow refinement | Stone Road Trial Section  
i) Prior to commencement of onshore pipeline construction, a Method Statement must be prepared, to the satisfaction of DCENR, which details the methods to be employed for the construction, testing and quality assurance of a stone road trial section (hereafter referred to as the “Trial Section”). The details must also include the permeability criteria for the re-worked peat layer which is to be placed at the base of the trench to mitigate vertical water leakage. These details shall be based on the relevant measures described in the AGEC report of October 2010 titled ‘Trial Trench Section: Assessment of Hydraulic Impedance Measures Within Pipe Trench (Rev A)’.  
ii) The location of the Trial Section must be clearly indicated in the Method Statement.  
iii) An interpretative report of the results of the Trial Section shall be supplied to DCENR. The interpretative report shall include recommendations for any modification to the methodology necessary to ensure compliance with the acceptable limits given in the Method Statement. If the findings are to the satisfaction of the DCENR, the trench works can progress.  
Construction of Stone Road  
iv) Construction of the stone road and storage of excavated peat along the section of the pipeline between chainages 89.355 to 89.545 will follow the methods described in Sections 7.1 and 7.4 of the Report dated October 2009 titled ‘Final Report on Reworked Peat & Mineral Soil Permeability Research – Ref: 942-233’ | To ensure satisfactory construction of the pipeline trench using the stone road method.  
To refine construction techniques so as to ensure compliance with specifications  
To ensure compliance with specifications and minimise potential for vertical water leakage in peatland areas of ecological value  
To ensure that the works have been carried out in accordance with the specifications and standards. |
<table>
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<tr>
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<tbody>
<tr>
<td></td>
<td>Outline of recommended consent condition</td>
<td>Purpose of recommended consent condition</td>
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<tr>
<td></td>
<td>of the construction techniques that would be applied to the full-scale trench. These details have been amended for the May 2010 application, and are described in the document titled 'Trial Trench Section: Assessment of Hydraulic Impedance Measures Within Pipe Trench (Rev A)' (October 2010).</td>
<td>(hereafter referred to as the &quot;October 2009 Report&quot;), or as modified with the agreement of DCENR following assessment of the Trial Section Interpretative report. The reworked peat in the pipeline trench must meet the acceptable limits given in Table 7.1 of the October 2009 Report. The results of testing will be provided to DCENR within one week of production.</td>
</tr>
<tr>
<td>v)</td>
<td>A suitably experienced and qualified geotechnical engineer or geologist familiar with construction in peat will be appointed by SEPIL to supervise the construction of the stone road (and the Trial Section). This supervising engineer will, at a minimum, carry out the roles and tasks described in Sections 7.5 and 7.6 of the October 2009 Report.</td>
<td>To verify that the works have been carried out in accordance with the specifications and standards.</td>
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<tr>
<td>vi)</td>
<td>No later than 90 days following completion of the pipeline trench, a report will be prepared to DCENR’s satisfaction that provides details of the as built design of the trench (including the depth of trench, thickness of re-worked peat, location of vertical plugs, lengths of pipeline that are below the invert level of the peat etc), a photographic record of relevant elements of construction, the results of testing and any other details necessary to assess compliance with the design parameters.</td>
<td>To monitor the long term hydrogeological performance of the works.</td>
</tr>
<tr>
<td>vii)</td>
<td>Confirmatory groundwater monitoring shall be carried out according to the method and schedule described in Section 7.7 of the October 2009 Report.</td>
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<td>Comment</td>
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</table>
| 3    | Archaeology & cultural heritage | It is proposed in the Onshore EIS that archaeological monitoring is carried out: during the earthmoving works to ensure the identification and recording of any finds; during all seabed and inter-tidal disturbances during construction, and; that tunnel arisings are monitored. The use of construction surveys for archaeology is not unusual for projects of this nature, although we suggest that such inspection and resolution should wherever possible be carried out in advance of construction (as well as during construction) to avoid the potential for construction reworking and to ensure appropriate mitigation measures (including if necessary micro-realignment to avoid archaeological features) are feasible. The approach of construction surveys necessitates the development of clear guidelines for the role of the inspecting archaeologist, survey methods and procedures if finds are made. Archaeological surveys shall be undertaken by specialist archaeologists in advance of construction (where practicable) and during construction. A formal Chance Finds procedure will be developed prior to construction that includes clear guidelines for survey methods and procedures if finds are made. SEPIL must demonstrate to DCENR that it has liaised with the relevant authority (i.e. DEHLG) to agree such protocols. The protocols shall include the following provisions:  
  - Should archaeological material be found during the course of monitoring, the archaeologist may have work on the site stopped, pending a decision as to how best to deal with the archaeology.  
  - SEPIL shall be prepared to be advised by DEHLG with regard to any necessary mitigating action (e.g. preservation in situ, and/or excavation).  
  - SEPIL shall facilitate the archaeologist in recording any material found. SEPIL shall provide a report describing the results of the archaeological monitoring to DCENR and DELHG. To minimise impact on archaeological features |
<p>| 4    | Archaeology &amp; cultural heritage | Mass is practiced on Easter Sunday at a commemorative site approximately 50m from the proposed Aghoos compound. Noise from the Aghoos compound has the potential to disrupt these open air services. All non-essential activities (including vehicle movements) that have the potential to cause nuisance will be suspended at the Aghoos compound on Easter Sundays during periods when Mass is taking place at the nearby commemorative site. Justification for those activities considered ‘essential’ will be submitted to DCENR for approval no later than four weeks before every Easter Sunday during the construction period. To minimise impact on cultural activities. |
| 5    | Surface water management at tunnelling compounds | Adequate assessments of surface water management at the proposed tunnelling compounds are presented in the Onshore EIS. However, a detailed design / surface water management plan will be required before construction commences. Surface Water Management Plans for the construction and operational phases of the tunnelling compounds will be prepared before construction commences. SEPIL must demonstrate to DCENR that it has liaised with the relevant authority (i.e. Mayo County Council) to agree such a plan. To ensure adequate management of surface water. |</p>
<table>
<thead>
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<td>6</td>
<td>Ground improvement at Aghoos compound</td>
<td>In the Onshore EIS it is proposed that the ‘Stone road’ method of ground improvement is to be used at the Aghoos compound. It has been confirmed that a 0.5m thick layer of in-situ peat will be left at the base of the excavations, except in instances where deeper excavation is required for foundations etc. In these instances, a 1m layer of re-worked peat will be placed as part of reinstatement.</td>
<td>A 0.5m thickness of in-situ peat will be left beneath the stone fill within the area of the Aghoos tunnelling compound, except in instances where deeper excavation is required for foundations etc. In these instances, a 1m layer of low permeability re-worked peat will be placed as part of reinstatement.</td>
<td>To inhibit vertical water leakage within the area of the Aghoos compound.</td>
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<td>7</td>
<td>Protection from fluvial flooding at the Glengad compound</td>
<td>It is recommended in the Onshore EIS that the banks of a channel adjacent to the western edge of the Glengad compound should be raised by “200mm” within the site compound to reduce the risk from fluvial flooding. It is agreed that raising the banks of the channel within the compound would be a prudent measure.</td>
<td>SEPIL must demonstrate to DCENR that it has liaised with the relevant authority (i.e. Mayo County Council) to agree suitable drainage controls including measures to prevent overtopping of the watercourse adjacent to the western side of the compound at Glengad.</td>
<td>To adequately reduce the risk of fluvial flooding at the Glengad compound.</td>
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<td>8</td>
<td>Protection from tidal flooding at the LVI and compounds at Glengad and Aghoos.</td>
<td>Restrictions should be imposed with respect to the minimum ‘as built’ ground levels permitted within the sites of the LVI and the Glengad and Aghoos compounds so as to alleviate risk from tidal flooding.</td>
<td>SEPIL must demonstrate to DCENR that it has submitted details of the proposed final ground levels for the operation of the LVI site and the compounds at Glengad and Aghoos to the relevant authority (i.e. Mayo County Council) for approval prior to commencement of construction.</td>
<td>To ensure no significant risk of tidal flooding at the LVI and compounds at Glengad and Aghoos.</td>
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<td>9</td>
<td>Tunnel arisings</td>
<td>It is noted in several parts of the Onshore EIS that selected aggregate from tunnelling arisings will be used in the construction of the stone road. The physical selection criteria are broadly outlined in the Onshore EIS, but there is no mention of chemical selection criteria (e.g. that the aggregate will not contain calcareous material etc).</td>
<td>Details will be provided to DCENR of the chemical selection criteria that will be applied when selecting aggregates for the construction of the Stone Road. The chemical selection criteria should consider the potential ecological impacts of chemical leaching from the aggregates, and the potential for the physical integrity of the aggregate to be compromised by chemical processes (e.g. dissolution of carbonates).</td>
<td>To ensure the chemical compatibility of the stone road aggregates.</td>
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<td>10</td>
<td>Bentonite control systems</td>
<td>It is estimated in the Additional Information that the maximum credible 'break-out' release of bentonite is 7m³. This is based on the size of the working chamber and an automatic by-pass of this chamber if the chamber pressure drops.</td>
<td>The practicality of the TBM systems being able to ensure that any break-out release can indeed be contained to around 7m³ needs to be confirmed based on the detailed design of the TBM. The bentonite monitoring procedures identified in the Onshore EIS shall be fully implemented and any releases shall be notified to DCENR and DEHLG.</td>
<td>To ensure maximum credible bentonite release volumes are controlled to levels assumed in the Additional Information.</td>
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| 11   | Oyster farm                      | We understand from submissions made by the owner of the licence (T10/081) at the ABP Oral Hearings that the licence is still valid and that seed has been ordered for use in 2011. Subsequently, potential impacts of the project on the oyster farm were further assessed in Review Item 10. Following review of Review Item 10, we concur that under normal construction activities the oyster farm will not be subject to significant adverse impact. | • In the event of a bentonite break-out in the vicinity of the oyster farm (license T10/081) monitoring of any potential damage is required should the license be active at that time.  
• In the event that an intervention pit is required, SEPIL should confirm whether the oyster license is active and if so then an impact assessment should be undertaken. | To ensure potential impacts to the oyster farm are adequately mitigated in the event of a bentonite break-out. |
<p>| 12   | Workers Code of Conduct          | Public concerns have been raised in relation to the historical use of security companies in the offshore segment of the pipeline. The Onshore EIS does not address these aspects and is factually silent on the fact that the Project uses specialised security companies. We consider that worker Codes of Conduct, outlining behavioural rules and norms, should be applied to all workers, including security companies.                                                                 | A suitable workers code of conduct (CoC) must be developed and that enforcement of the CoC is to be ensured through contractual arrangements between SEPIL and its contractors. We recommend that such a Code of Conduct should be consistent with international benchmark standards (e.g. see International Finance Corporation Performance Standard 4 and associated Guidance Note). | To ensure appropriate behaviour of workers towards the local community.                           |
| 13   | Grievance Mechanism              | It is stated it the Onshore EIS that complaints are managed through Community Liaison Officers (CLOs). However, no detail is provided on formal mechanisms related to the management of grievances related to the Project, beyond the presence of CLOs. We recommend that conditions should be applied to any consent that require the adoption of such a mechanism by SEPIL and that the mechanism must be easily accessible to the public. | SEPIL must implement an agreed public grievance mechanism which must be easily accessible to the public.                                                                                                                                                    | To ensure appropriate management of grievances raised by the public in respect of the project. |</p>
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<td>14</td>
<td>Monitoring of Impacts on public transport</td>
<td>While we consider that the additional information provided in the Onshore EIS Addendum adequately supports the conclusion that no significant impacts on public transport are likely to occur, we nonetheless recommend that the potential impact on bus journey times be included in the monitoring process.</td>
<td>The monitoring programme should include monitoring of the impact (if any) of project related traffic on bus journey times along the project affected roads. SEPIL must demonstrate to DCENR that it has liaised with the relevant authority (i.e. Mayo County Council) to agree an appropriate TMP that includes monitoring of potential impacts on bus journey times and presentation of the monitoring results to relevant groups as agreed with Mayo County Council.</td>
<td>To ensure that impacts on public transport are monitored and mitigated.</td>
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<tr>
<td>15</td>
<td>Air quality and noise impacts during hydrotesting and pre-commissioning of the onshore gas pipeline.</td>
<td>During hydrotesting and pre-commissioning of the onshore pipeline air emissions are likely to result from, for example, nitrogen generators and pumps etc. The assessment of air quality impacts during hydrotesting in the EIS Addendum (Review Item 5) are based on the assumption that nitrogen generators etc. will be located at Bellanaboy Terminal. The assessment predicts that air quality standards will not be breached beyond the boundary of the terminal. We recommend that a consent condition is applied to ensure that the compressors/nitrogen generators required for hydrotesting of the onshore pipeline will be located at the Bellanaboy terminal only.</td>
<td>Compressors/nitrogen generators required for hydrotesting of the onshore pipeline will be located at the Bellanaboy terminal only. If other locations are requested by the developer then an air quality and noise assessment must be undertaken for approval by DCENR.</td>
<td>To ensure air quality and noise impacts during hydrotesting and pre-commissioning of the onshore pipeline are maintained to acceptable levels.</td>
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| 16   | Dust impacts                                                              | The assessment of dust impacts in the Onshore EIS is based on methods to predict dust generation from road construction, which may not be representative for the construction of larger non-linear compound areas such as the LVI or the Aghoos compound or to concreting batch operations. However, we note that the issue of dust control may be adequately resolved through visual monitoring and associated mitigation (wetting of surfaces etc.) and recommend that SEPIL’s management plans/procedures must include provision for such dust control measures. | SEPIL's management plans/procedures must include provision for the following dust control measures:  
• visual monitoring  
• associated mitigations including wetting of surfaces, construction vehicle wheel washing etc. | To ensure dust nuisance impacts are adequately controlled. |
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<td>17</td>
<td>Noise Impacts</td>
<td>Noise impacts are adequately assessed in EIS, including identification of noisy construction equipment. We note that blasting is not planned as part of the construction process and this significantly helps to reduce noise impacts. An outline noise monitoring plan for construction is proposed in the Additional Information package. We consider that the array of monitoring locations, to the extent that they are defined, to be appropriate. Nonetheless, further detailing of this outline noise monitoring programme should be agreed with DCENR prior to construction.</td>
<td>No blasting will occur for rock breaking as part of the construction activities at the tunnelling compounds. A detailed noise monitoring programme for the construction phase will be agreed with DCENR and incorporated within SEPIL’s management plans/procedures.</td>
<td>To ensure adequate noise monitoring is undertaken during construction activities</td>
</tr>
<tr>
<td>18</td>
<td>Vibration monitoring</td>
<td>The Additional Information outlines proposed vibration monitoring during the construction period. We consider that the array of monitoring locations, to the extent that they are defined, to be appropriate. The Additional Information also proposes a vibration threshold limit as part of its monitoring programme. This is set at 12.5 mm/s, which is appropriate for protection against superficial damage to properties. However, we consider that a lower limit (a ‘warning’ level of 0.5mm/s ppv) to protect against nuisance complaints should also be applied, together with a slightly higher ‘action level’ (2.5mm/s ppv), above which mitigation measures are implemented in order ensure that the threshold limits (the absolute upper limit of 12.5mm/s ppv) are not exceeded.</td>
<td>A detailed vibration monitoring programme for the construction phase will be agreed with DCENR and incorporated within SEPIL’s management plans/procedures. The vibration monitoring response strategy will include the following action threshold criteria: 1. A continuous vibration of 0.5 mm/s ppv at the proposed monitoring points representing dwellings nearest to the route will be regarded as a ‘Warning Level’. 2. Levels above 2.5 mm/s ppv will be regarded as an ‘Action Level’, and will result in the immediate application of mitigation measures 3. An absolute upper limit to avoid any significant damage will be the 12.5 mm/s ppv.</td>
<td>To ensure adequate vibration monitoring and to ensure that appropriate actions are taken to avoid both vibration nuisance and property damage from vibration occurring.</td>
</tr>
<tr>
<td>19</td>
<td>Visual Impacts</td>
<td>Some mitigation measures for visual impacts are ‘recommended’ in the Onshore EIS and, while these are reasonable, we recommend that implementation of these measures should be enforced. This is particularly important given the significant, if short-term, level of visual impact predicted in the Onshore EIS during the construction phase.</td>
<td>The visual impact mitigation measures ‘recommended’ in the Onshore EIS must be adopted and included in SEPIL’s management plans/procedures.</td>
<td>To ensure adequate mitigation against visual impacts</td>
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<td>20</td>
<td>Lighting impacts</td>
<td>Lighting impacts at the Aghoos compound have been assessed in the Onshore EIS and it is predicted that a level of 0.3 lux will be achieved at approximately 25m from the compound. This demonstrates a minimal impact, although this is presumably based on the application of good light management. In order to ensure that this is achieved, we recommend that monitoring is undertaken to ensure that the lighting design as implemented meets these levels.</td>
<td>SEPIL’s management plans/procedures must include monitoring of light levels around the Aghoos compound at night. If predicted light levels outside of the compound are exceeded then corrective action will be taken to modify the compound lighting system. Any portable lighting systems used on other work sites shall be positioned so as to minimise glare and light spillage to surrounding areas.</td>
<td>To ensure light impacts around the Aghoos compound are maintained to predicted levels.</td>
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<td>21</td>
<td>Traffic Monitoring</td>
<td>Given that traffic volumes may be greater than currently assumed in the TIA, for example in the event that less drill cuttings are found to be suitable for re-use on the project than currently estimated, we recommend that SEPIL monitors the construction traffic volumes during construction. The monitoring results should be reported to the regulators and stakeholders via the monitoring mechanisms described in Item 17 of Section 7 of the EIA Addendum.</td>
<td>SEPIL must demonstrate to DCENR that it has liaised with the relevant authority (i.e. Mayo County Council) in the development of appropriate monitoring mechanisms consistent with that described in Item 17 of Section 7 of the EIS Addendum.</td>
<td>To ensure project-related traffic levels remain within predicted levels.</td>
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| 22   | Intervention pit | Where an intervention pit is required in or near to the permanent channel, both its physical presence and the work to install scour protection could impact aquatic fauna, and in particular salmon if they were present at that time. We therefore recommend that installation of an intervention pit in the vicinity of the permanent channel would only be permitted outside of the migration run seasons of the Atlantic salmon. | In the event that an intervention pit is required:  
- Construction of the pit would not be allowed within the migration run seasons of the Atlantic salmon (this is to be determined in consultation with Inland Fisheries Ireland).  
- Detailed modelling would be undertaken based on the precise location/pit requirements in order to agree with DCENR (in liaison with the DEHLG and Inland Fisheries Ireland):  
  - Optimisation of the design of the intervention pit, including orientation of the sheet piling to minimise scour effects.  
  - Optimisation of the design/location of the scour protection. | To ensure appropriate control of impacts in the event that an intervention pit is required. |
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| 23   | Protection of otters     | Mitigation measures are recommended within the Onshore EIS for otter holts. The requirement for pre-construction surveys is paramount due to the highly mobile nature of otters. The programming of this survey should be enforced through consent conditions and overseen by an independent otter specialist. As breeding holts may be established between the survey and the start of construction we recommend that conditions be applied to any consent that stipulate a maximum elapsed time between survey and start of works. In general, we consider the provisions for otter in the Onshore EIS to be reasonable. | Pre-construction otter surveys must be undertaken to earthworks around the onshore pipeline route. The detailed survey plans must be agreed with DCENR (in liaison with DEHLG) and must include:  
  - Agreed minimum time lapse between the pre-construction survey and the commencement of construction activities.  
  - Oversight by an independent and suitably qualified ecologist.  
  - Agreed protocols to be followed in the event that active holts are identified. | To ensure adequate protection of otters |
| 24   | Protection of birds      | The proposed mitigation measures (Onshore EIS Appendix J1, Section 6) should be enforced through conditions on any consent, together with additional requirements for bird monitoring during construction and pre-construction surveys in areas where vegetation may support nesting birds. | The proposed mitigation measures identified in the Onshore EIS (Appendix J1, Section 6) for the protection birds must be implemented. In addition the developer will ensure that:  
  - The “intensive bird monitoring” proposed in the Onshore EIS will include monitoring of bird activity within Sruwaddacon Bay while tunnelling activity is occurring to see if there is a notable response which is not highly localized and temporary. Bird responses to noise events arising from the site compounds will also be monitored.  
  - Any vegetation capable of supporting nesting birds to be removed during the bird breeding season will be checked by a qualified ecologist prior to work occurring and work in that area only allowed if no nests are found. Protocols for these surveys will be agreed with DCENR (in liaison with DEHLG). | To ensure that appropriate mitigation and monitoring controls are in place to protect birds during the construction phase. |
| 25   | River/stream crossings   | Given the potential for the presence of salmonids at or downstream of some river crossings we suggest that additional mitigation controls are required in relation to the proposed crossing methods and timings. |  
  - DEHLG and Inland Fisheries Ireland (IFI) should be consulted on the proposed method and timing of river / stream crossings before construction commences.  
  - The construction of stream / river crossings should not take place during the salmon spawning season or during high-flow periods, unless agreed otherwise with IFI.  
  - The duration of the construction activities at each river crossing will be minimised to the extent possible. | To ensure appropriate protection of freshwater fauna during construction of river crossings. |
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<td>26</td>
<td>Reinstatement and aftercare plan.</td>
<td>The Onshore EIS states that a monitoring, reinstatement and aftercare plan will be agreed with DCENR. However, the Onshore EIS does not state the timeframe for the information to be submitted and agreed with the authorities and whether or not this is to be agreed prior to the commencement of construction. In addition, a number of pre-construction surveys are required for species such as otter and the details of these also need to be provided.</td>
<td>The developer must prepare a monitoring, reinstatement and aftercare plan/programme for agreement by DCENR. The plan/programme must include but not be limited to:</td>
<td>To ensure that appropriate reinstatement is undertaken and that long term recovery of the project affected areas is appropriately monitored and ensured.</td>
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<td>27</td>
<td>Rock placement along the offshore pipeline route</td>
<td>Primary mitigation and monitoring controls during rock placement activities in 2010 are described in the 2010 Offshore Supplementary Update Report (Review Item 3) and the 2010 Marine Works EMP (Review Item 15). However we make a number of recommendations in relation to ensuring that the impacts of rock placement are maintained to acceptable levels.</td>
<td>In relation to rock placement activities, the developer will:</td>
<td>To ensure that the impacts of rock placement are maintained to acceptable levels.</td>
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| 28   | Installation of the offshore umbilical line | Impacts from installation of the umbilical are assessed in the 2010 Offshore Update Report as minor/negligible. Overall we concur with this assessment and consider the proposed mitigation measures to be generally appropriate. However we make further recommendations in relation improved monitoring arrangements during the construction of the umbilical lines. We also note some uncertainties in the precise trenching/ploughing method to be used in the installation process. | During the installation of the umbilical lines the following monitoring activities will be developed and agreed with DCENR (in liaison with DEHLG):  
- Environmental monitoring during installation including consideration of turbidity monitoring to assess the lateral effects of raised sediments during the trenching/ploughing process.  
- Shore-based noise monitoring should be undertaken at points representing the nearest residences during pull-in of the umbilical to ensure that day and night-time noise standards are met (with shutdown procedures in place in the event that thresholds are exceeded)  
  The precise construction method (i.e. trenching/ploughing) to be utilised during the installation of the umbilical line will be agreed with DCENR (in liaison with DEHLG) and detailed in a method statement. | To ensure that the impacts during the installation of the umbilical lines are maintained to acceptable levels. |
| 29   | Discharge of the offshore pipeline hydrotest waters | Prior to flooding of the offshore pipeline, the chemical additives were assessed on behalf of DCENR by the Marine Institute who concluded that the proposed additives are ranked as having low hazard quotients. Following this review, approval was granted with a number of consent conditions attached. We concur with these recommendations and consider that they should be included as conditions on any consent. | Prior to discharge of hydrotest waters from the offshore pipeline, the developer shall ensure that:  
- Relevant stakeholders e.g. fishermen be advised of the proposed discharges in advance of the discharge to allow for full dispersion before recommencement of any fishing activities in the area.  
- Computer simulation / modelling will be undertaken to accurately judge when concentration will reach background levels. The modelling will include consideration of:  
  - The extent of effects of reduced dissolved oxygen around the discharge location  
  - Evaluate the ranges at which ecological effects (e.g. LC-50 levels) are predicted to be exceeded.  
- Monitoring during discharge of hydrotest waters will be agreed with DCENR in the light of the predictive modelling. | To ensure that the impacts during the discharge of hydrotest waters from the offshore pipeline are maintained to acceptable levels. |
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<td>Protection of marine mammals</td>
<td>We note that in some instances it is unclear from the review material if all the proposed mitigation and measures for the protection of marine mammals during the remaining outstanding offshore construction works (i.e. rock placement and installation of the umbilical line) are to be applied only within the Broadhaven cSAC or in the wider offshore pipeline route. We recommend that all relevant proposed mitigation measures are applied to the whole route where rock placement and trenching of the umbilical line is to be undertaken, and in particular the use of MMOs and associated mitigation controls for the protection of marine mammals.</td>
<td>All relevant proposed mitigation measures relating to the protection of marine mammals (in the Offshore EIS, 2010 Offshore Supplementary report and 2010 Offshore EMP) are applied to the whole route where rock placement and trenching of the umbilical line is to be undertaken, and in particular the use of MMOs and associated mitigation controls for the protection of marine mammals.</td>
<td>To ensure that the impacts on marine mammals during the remaining outstanding offshore construction works (i.e. rock placement and installation of the umbilical line) are maintained to acceptable levels.</td>
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<td>31</td>
<td>Nautical charts</td>
<td>No mention is made in the 2001 Offshore EIS of how the location of the pipeline will be made available to other sea users. In this regard we recommend that the pipeline is marked on nautical charts in agreement with relevant authorities.</td>
<td>The developer will liaise with the Department of Transport to ensure that the final pipeline route is both confirmed by as-built surveys and marked on nautical charts.</td>
<td>To ensure the built pipeline is adequately identified on nautical charts.</td>
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<td>32</td>
<td>Fisheries</td>
<td>The 2001 Offshore EIS and the 2009 Supplementary Report contain few details of the possible interruption to fishing activities and any associated necessary mitigation measures. It is noted in the 2009 Onshore EIS that in August 2008 the Erris Inshore Fishermen’s Association and the Corrib Gas Partners reached an agreement on a compensation framework for disturbance resulting from the 2008 offshore pipelay.</td>
<td>SEPIL shall continue its liaison with relevant fishery groups as necessary in relation to future offshore construction and maintenance works in agreement with DCENR. Any fishing restriction zones required should be marked on relevant nautical charts and notified to relevant fishery organisations.</td>
<td>To ensure that impacts on other marine users, including fishery organisations are adequately managed.</td>
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<td>33</td>
<td>Geotechnical Risk Register</td>
<td>The assessments of peat stability (Onshore EIS Appendix M2) included a number of recommendations to safeguard the stability of the pipeline trench / stone road, but the Geotechnical Risk Register (Onshore EIS Appendix M4) does not appear to explicitly consider a number of the recommendations made in the peat stability assessment. Clarification was provided by SEPIL, and we understand that the Geotechnical Risk Register is intended to be a ‘generic’ document that encompasses the broad facets of geotechnical risk, and that a detailed compilation of specific geotechnical risks will be compiled at the detailed design stage.</td>
<td>A geotechnical risk register should form part of SEPIL’s management plans/procedures and at the detailed design stage should include a detailed compilation of specific geotechnical risks.</td>
<td>Ensure appropriate recording of geotechnical risks.</td>
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<td>34</td>
<td>Pollution prevention</td>
<td>Pollution prevention measures will be included in the SEPIL management plans/procedures that are to be agreed with DCENR. These should include reporting procedures to DCENR in the event of any pollution incidents.</td>
<td>SEPIL will develop a full suite of necessary pollution prevention measures in the management plans/procedures that are to be agreed with DCENR under Consent Condition 1. These shall include protection measures to prevent and control contaminant releases to air ground and surface waters. SEPIL will report any pollution incidents during construction and operation to the DCENR (and other authorities e.g. DEHLG, IFI, the Health Service Executive and Mayo County Council as necessary according to the nature of the incident).</td>
<td>To ensure protection of the environment from pollution incidents.</td>
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<td>35</td>
<td>Disturbance of natural habitat</td>
<td>Disturbance of habitats and flora and fauna during the construction period should be minimised.</td>
<td>Personnel and machinery associated with the tunnelling compounds should enter and leave the compounds only through the nominated entrance/exit points and these should be situated away from the foreshore area. The amount of activity occurring outside of the tunnelling compounds during the tunnelling works must be kept to a minimum.</td>
<td>To minimise disturbance to sensitive habitats, flora and fauna.</td>
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<td>36</td>
<td>Protection of drinking water supplies</td>
<td>To ensure protection of drinking water supplies appropriate measures need to be implemented to prevent contamination of water supplies through control of the release of contaminants (see Consent Condition 34 for relevant conditions) and through the implementation of appropriate controls to protect the integrity of the water main where it is traversed by the pipeline RoW.</td>
<td>As part of the design and construction of the pipeline consideration shall be given to the protection of the integrity of the water main where it is traversed by the pipeline RoW.</td>
<td>To ensure protection of drinking water supplies.</td>
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<td>37</td>
<td>Marine mammal monitoring</td>
<td>The Broadhaven Bay Marine Mammal Monitoring Programme has been undertaken in previous years. This should continue throughout future offshore construction and commissioning.</td>
<td>The Broadhaven Bay Marine Mammal Monitoring Programme undertaken in previous years and consisting of visual survey (cliff and boat-based), acoustic monitoring and photo-identification of Bottlenose Dolphins should continue for at least one year following final completions of construction/commissioning activities. Annual reporting of this programme should be delivered to DCENR and DEHLG (NPWS).</td>
<td>Protection of marine mammals</td>
</tr>
<tr>
<td>38</td>
<td>Marine mammal protection (code of conduct)</td>
<td>A code of conduct has been developed for the protection of marine mammals. This code needs to be appropriately applied to ensure adequate protection marine mammals across the length of construction activities to ensure protection in line with Article 12 of the Habitats Directive (Council Directive 92/43/EC). The Code of Conduct notes that “Vessels undertaking acoustic surveys within and adjacent to Broadhaven Bay SAC must conform to guidelines relating to marine mammals in Section 4”. This section appears to have been omitted from Appendix 7-16.</td>
<td>1. The Code of Conduct (as outlined in Appendix 7-16 of the 2010 Offshore Supplementary Update Report) must be applied to the full extent of the works (e.g. from landfall to the well-head) irrespective of Natura 2000 designations (see also Consent Condition 30). 2. As per the Code of Conduct, 30 minutes of pre-survey is required prior to commencement of any construction works. The applicant should make clear to operators, in the environmental management plans/procedures, the differentiation between the project specific Code of Practise (Appendix 7-16) and guidelines derived by the Department of the Environment, Heritage and Local Government in relation to acoustic seafloor surveys. 3. All vessels approaching, leaving or working within or adjacent to Broadhaven Bay shall stay within the corridors shown on the accompanying Chart ‘Operating Corridors for Construction Vessels within the Region of Broadhaven Bay’ as per Appendix 7-16. 4. The guidelines relating to marine mammals for vessels undertaking acoustic surveys within and adjacent to Broadhaven Bay SAC must be agreed with DCENR (in liaison with DEHLG) and included in the code of conduct.</td>
<td>Protection of marine mammals</td>
</tr>
<tr>
<td>39</td>
<td>Pre-commissioning activities</td>
<td>Equipment at the LVI used during pre-commissioning has the potential to lead to noise impacts on humans and fauna. These impacts need to be managed to ensure that impacts are maintained to acceptable levels.</td>
<td>Prior to pre-commissioning SEPL should agree with DCENR the timing of pre-commissioning activities at the LVI and associated noise monitoring requirements to avoid impacts on sensitive ecological seasons and humans.</td>
<td>To avoid impacts on humans and sensitive ecological seasons</td>
</tr>
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