

Greenlink Interconnector Limited  
Greenlink Ireland | Onshore  
Construction Environmental  
Management Plan

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This report takes into account the particular instructions and requirements of our client.

It is **NOT** intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 246369-00

**Ove Arup & Partners Ireland Ltd**

**Arup**  
One Albert Quay  
Cork  
T12 X8N6  
Ireland  
[www.arup.com](http://www.arup.com)

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## Appendices

### Preliminary Environmental Control Plans

## Appendix 4.1 CEMP

### 1 Introduction

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#### 1.1 Overview

This Construction Environmental Management Plan (CEMP) has been prepared by Arup to support Greenlink Interconnector Limited's (GIL) application for consent to develop an interconnector to link the existing electricity grids in Ireland and Great Britain.

Greenlink Interconnector Limited will have a construction management team which will supervise all aspects of the construction phase of the proposed development.

Greenlink Interconnector Limited's construction management team will ensure the contractor (and any subcontractors) will comply with all of the performance requirements set out in the tender documentation including the conditions attached to statutory consent s which may be granted by An Bord Pleanála, Department of Housing Planning and Local Government, EPA and other relevant statutory consent authorities.

Greenlink Interconnector Limited's construction management team will ensure compliance with the mitigation measures set out in the EIAR.

This CEMP sets out the duties and responsibilities which will be imposed on the contractor in the construction contract. Greenlink Interconnector Limited's construction management team will be responsible for ensuring that the contractor complies with all requirements of this CEMP.

#### 1.2 Proposed Development

The proposed development (encompassing the onshore elements in Ireland only) comprises the following elements:

- **Landfall Compound** - a temporary landfall compound near Baginbun Beach, on the Hook Head peninsula in County Wexford, where the high voltage direct current (HVDC) cable will be installed under the beach and cliff at Baginbun Beach by horizontal directional drilling (HDD);
- **HVDC Cables** - two HVDC electricity cables with a nominal capacity of 500 megawatts (MW), installed underground from the landfall near Baginbun Beach to the converter station, including jointing bays at intervals along the route;
- **Converter Station** - a converter station with a permanent access road situated close to the existing Great Island substation in Wexford;
- **Tail Station**- a 220kV substation located beside the proposed converter station. The tail station connects the HVAC 220kV cable into the 220kV grid via the existing Great Island substation;

- **MV Substation** - an ESB substation
- **Contractor Compounds** - three temporary cable contractor compounds will be required (i) at the landfall site close to Baginbun Beach (ii) at the proposed converter station and (iii) one along the onshore route in the townland of Lewistown near Dollar Bay;
- **HDD Compounds** - temporary HDD contractor compounds are required. One will be located close to the cable contractor compound at Baginbun Beach and launch and reception compounds will be located at each side of the Campile River Estuary crossing;
- **High Voltage Alternating Current (HVAC) Cables** - three 220kV HVAC electricity cables installed underground connecting the proposed converter station via the tail station to the existing Great Island substation; and
- **Fibre Optic Cables** - fibre optic cables for control and communication purposes, laid underground with the HVDC and HVAC cables;
- **Community Gain Roadside Car Parking near Baginbun Beach** - in consultation with Wexford County Council, circa 54 roadside car parking spaces will be constructed; and
- **Community Gain in Ramsgrange Village** - in consultation with Wexford County Council, extension to existing footpaths, four new streetlights and a speed activated sign at Ramsgrange.

### 1.3 Purpose

The purpose of this CEMP is to provide a framework that outlines how Greenlink Interconnector Limited will manage and where practicable minimise negative environmental effects during the construction of the proposed development. Construction is considered to include all site preparation, enabling works, demolition, materials delivery, materials and waste removal, construction activities and associated engineering works.

This CEMP identifies the minimum requirements with regard to the appropriate mitigation, monitoring, inspection and reporting mechanisms that need to be implemented throughout construction. Compliance with this CEMP does not absolve GIL from compliance with all legislation and bylaws relating to their construction activities.

This CEMP has been produced as part of the application for consent to ensure compliance with legislative requirements and the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) that has been prepared for the proposed development.

### 1.4 Approach

This CEMP provides a framework to:

- Describe the programme for environmental management during construction;

- Implement those monitoring and mitigation measures identified in the EIAR and NIS;
- Outline the principles and minimum standards required during the development of the CEMP (and associated Method Statements) and throughout construction;
- Identify the relevant roles and responsibilities for developing, implementing, maintaining and monitoring environmental management; and
- Outline the procedures for communicating and reporting on environmental aspects of the proposed development throughout construction.

It is intended that this CEMP would be expanded and updated prior to the commencement of any construction activities on site. The CEMP is a dynamic document and will remain up to date for the duration of the construction period. The CEMP may need to be altered during the lifecycle of the construction period to take account of monitoring results, legislative changes, outcomes of third-party consultations etc.

Following appointment, the contractor will be required to develop more specific Method Statements that is cognisant of the proposed construction activities, equipment and plant usage and environmental monitoring plan for the proposed development. This CEMP should not be considered a detailed Construction Method Statement as it would be the responsibility of the contractor, appointed to undertake the individual works, in association with Greenlink Interconnector Limited, to implement appropriate procedures and progress this documentation prior to commencement of construction.

This CEMP outlines the range of potential types of construction methods, plant and equipment which may be used by any contractor appointed to enable their effects to be assessed for the purposes of the planning authority's environmental impact assessment and appropriate assessment prior to determining whether to grant planning permission.

## 1.5 Structure

This CEMP is structured as follows:

- **Section 1** introduces the proposed development and outlines the purpose of the CEMP;
- **Section 2** describes in detail the proposed development;
- **Section 3** sets out the framework and mechanisms through which environmental requirements would be managed;
- **Section 4** outlines the procedures to be employed during construction to manage environmental aspects;
- **Sections 5 and 6** describe in detail the measures to be implemented to minimise likely significant negative effects, as far as practicable, during the construction of the proposed development.

## 1.6 Updates to Construction Environmental Management Plan

As previously mentioned, the detailed CEMP(s) are considered 'live' documents that will be reviewed and revised regularly as construction progresses. The process for update, review, and approval of the CEMP(s) must be documented in the detailed CEMP(s) to ensure that all revisions can be easily understood, applied and updated.

The contractor is required to update the CEMP that to ensure that it:

- Is in accordance with the mitigation measures specified in the EIAR and NIS and this CEMP;
- Is in accordance with any conditions that may be prescribed as part of the consent(s) for the proposed development;
- Aligns with those design and construction details described in the EIAR and NIS and ensures there is no material change in terms of significant effects on the environment; and
- Where practicable the contractor should seek to identify opportunities for further reducing significant negative environmental effects and to implement best practice in as far as reasonably practicable, i.e. take every reasonable effort to reduce and prevent negative effects, while enhancing benefits.
- Will have regard to the guidance contained in the handbook published by Construction Industry Research and Information Association (CIRIA)<sup>1</sup>.

Further, the following plans, and any others considered relevant, will be incorporated into the CEMP:

- Heritage Strategy;
- Construction Compound Management Plan;
- Noise and Vibration Management Plan;
- Dust Management Plan; and
- Emergency Incident Response Plan.

It is expected that amendments to the CEMP may be necessary to reflect inter alia changes in the project scope, contract scheduling, contractor appointments, environmental management policies, practices or regulations, and developments on the site. These reviews and updates are necessary to ensure that environmental performance is subject to continual improvement and that best practice is implemented throughout construction.

In addition, the following preliminary environmental control plans are attached to this CEMP as Appendices:

- Frac-out Contingency Plan

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<sup>1</sup> CIRIA (2015) Environmental Good Practice on Site Guide, 4th Edition

- Pollution Prevention and Emergency Response Plan
- Procedure for Dealing with Silty Water
- Environmental Preparedness Plan.

## 2 The Proposed Development

### 2.1 Overview

Greenlink Interconnector Limited is proposing to develop Greenlink, linking the electricity grids in Ireland and Great Britain. Greenlink will consist of two converter stations, one close to the existing substation at Great Island in County Wexford (Ireland), and one close to the existing substation at Pembroke in Pembrokeshire (Wales). The converter stations will be connected by underground cables (onshore) and subsea cables (offshore).

In 2013, the European Union adopted Regulation (EU) No 347/2013 (EC, 2013) guidelines for trans-European energy infrastructure. These regulations established a process to identify Projects of Common Interest (PCI) and appoint a competent authority to coordinate and issue consents and decisions regarding major energy infrastructure projects. Greenlink was deemed a PCI and An Bord Pleanála was deemed the competent authority in Ireland.

Greenlink will be of key strategic importance providing significant additional interconnection between Ireland, Great Britain (GB) and onwards to mainland Europe. It will provide additional transmission network capacity, reinforcing the existing electricity grids in Ireland (EirGrid) and GB (National Grid), whilst contributing to each country's strategic interconnection objectives.

Greenlink will deliver increased security of supply, facilitate fuel diversity and greater competition, and will ultimately provide significant benefits to consumers in Ireland and GB. It is recognised that there are significant benefits to be accrued both in Ireland and GB from the provision of additional interconnection of the two national electricity grids.

### 2.2 HVAC Grid Connection and Tail Station

The Irish HVAC grid connection will be made from the Great Island 220KV substation in County Wexford, Ireland, to the proposed Great Island converter station. These sites are adjacent to each other and the connection will be made by a very short underground cable. The connection will be subject to agreement with landowners.

The HVAC cables will connect to a new small substation adjacent to the proposed converter station. This substation is referred to as a 'tail station' and will be fully enclosed. The site footprint of the substation will be 34.75m x 31.7m.



## 2.3 Converter Station

The converter station footprint site will be 1.85 hectares. The footprint will accommodate a nominal 500MW station for the conversion between HVAC and HVDC electrical currents. Within that footprint, two alternative converter station configurations are currently being considered by Greenlink Interconnector Limited.

Although the final configuration of the converter station has not yet been determined, the ‘worst-case’ environmental effects of the converter station alternatives have been taken into consideration during the preparation of this CEMP.

Within the large field that accommodates the converter station site, a comprehensive landscaping scheme will be implemented, incorporating significant earthworks, berming, planting of approximately 15,000 native mixed-woodland trees and zones of grassland meadow.

## 2.4 HVDC Onshore Cables

The cable route between the converter station and the landfall site is approximately 23km long. The entire route will be underground, generally approximately 1m below ground level and where possible follow the existing roads. However, for engineering reasons there are areas along the route where it is necessary to divert the underground cables off road and traverse agricultural lands.

For approximately the first 2.7 kilometres at Great Island / Campile, the cables will be laid under agricultural lands. This section of the route also includes a trenchless crossing of the Campile River Estuary, downstream of Dunbrody Bridge. The cables will be a minimum of 10 metres below the riverbed at this location. In agricultural land, a 30m working strip of land will be fenced-off for construction.

Most of the route between Dunbrody Bridge and the landfall location at Baginbun Beach is under existing roads. Installation of ducts on roads require approximately 100-300m of road to be fenced off (depending on road conditions), the road excavated, the ducts installed, and the trench backfilled with duct surround material.

## 2.5 Landfall Site

Following technical and environmental analysis Baginbun Beach was selected as the preferred landfall site. The cable route at Baginbun Beach will be formed by horizontal direction drill (HDD).

## 2.6 Stream and River Crossings

Northeast of the proposed converter station the cable corridor crosses a watercourse, Kilmannock Stream/ Newtown River. The preferred method of crossing this watercourse is by mini-horizontal directional drill (mini-HDD).

In the unlikely event that mini-HDD is not used, the cable trenching at this stream crossing will not differ from the standard approach however, the trench will be deeper to provide a one metre separation between the cable protective measures and the bed of the watercourse will be maintained to account for any future erosion. The watercourse will be temporarily dammed immediately upstream and downstream of the cable installation. Over-pumping will be employed to ensure continuous flow in the watercourse and will be completed within a day. Pollution prevention measures, as outlined later in this CEMP, will be installed to avoid any downstream siltation impacts.

Once reinstatement of the cable trench is complete, the temporary dams will be removed, and over-pumping ceased.

It is proposed to use HDD to cross under the Campile River Estuary, at a depth of more than 10m below the riverbed. This methodology will avoid any direct effects on the river.

## 2.7 Construction Compounds

### 2.7.1 Cable Contractor Compound

Three temporary cable contractors' compounds/lay down areas will be required. There will be one at each end of the route (i.e. the Great Island converter station site and at the landfall site close to Baginbun Beach), and one will be located in the townland of Lewistown near Dollar bay, along the onshore route.

### 2.7.2 HDD Contractor Compound

There will be a temporary compound for the HDD contractor close to the cable contractor compound near Baginbun Beach. Two similar temporary HDD compounds will be established at Campile, one at either end of the Campile River Estuary crossing.

### 2.7.3 Construction Compound

The temporary contractor's construction compound will be established at the converter station site at Great Island. It will provide facilities and lay down areas for the construction of the converter station and tail station.

## 3 Environmental Management Framework

### 3.1 Overview

The contract(s) awarded for the proposed development will include a requirement for the contractor to comply with relevant documentation including the EIAR, planning (and other statutory consent) conditions received and this CEMP.

As part of the environmental management framework contractors will need to comply with all relevant environmental legislation and take account of published standards, accepted industry practice, national guidelines and codes of practice appropriate to the proposed development. Due regard should be given to the guidance and advice given by ISO14001 standard<sup>2</sup> and Construction Industry Research and Information Association (CIRIA) guidance<sup>3,4,5</sup>.

The appointed contractor will be required to develop and implement an Environmental Management System (EMS) that follows the principles of ISO14001. Further, the appointed contractor's EMS should include an environmental policy, operational, monitoring and auditing procedures to ensure compliance with all environmental requirements and to monitor compliance with environmental legislation and the environmental management provisions outlined in the relevant documentation.

### 3.2 Responsibilities

#### 3.2.1 Employer

Greenlink Interconnector Limited will be the employer responsible for ensuring that competent parties are appointed to undertake construction and that sufficient resources are made available to facilitate the appropriate management of risks to the environment.

#### 3.2.2 Employers Representative

Greenlink Interconnector Limited and/or the Employers Representative (ER) appointed by Greenlink Interconnector Limited will be responsible for monitoring compliance with the CEMP. The ER may be required to appoint temporary or permanent specialists with appropriate skills and experience as required to implement on site procedures and monitor construction on behalf of the employer, i.e. competent experts in biodiversity and architecture, archaeology and heritage, noise, vibration, dust, waste, land, soils, contamination and/or water.

<sup>2</sup> ISO (2015) ISO 14001:2015 Environmental management systems -- Requirements with guidance for use

<sup>3</sup> CIRIA (2015) Environmental Good Practice on Site C692 (fourth edition) (C762)

<sup>4</sup> CIRIA (2015) Coastal and marine environmental site guide (second edition) (C744)

<sup>5</sup> CIRIA (2002) Brownfield development sites: ground-related risks for buildings (X263)

### 3.2.3 The Contractor

The contractor(s) appointed will be responsible for the organisation, direction and execution of environmental related activities during the detailed design and construction of the proposed development. The contractor is required to undertake all activities in accordance with the relevant environmental requirements including the consent documentation and other regulatory and contractual requirements.

### 3.2.4 Site Manager

A Site Manager will be appointed by the contractor to oversee the day-to-day management of working areas within the site and ensure that effective, safe, planned construction activities are delivered on an ongoing basis to the highest standards. The Site Manager will be a suitably qualified, competent and experienced professional that will oversee site logistics, communicate regularly with construction staff, accommodate project-specific inductions for staff on site and ensure that all work is compliant with the relevant design standards and health and safety legislation.

### 3.2.5 Environmental Manager

An Environmental Manager will be appointed by the contractor to ensure that the CEMP is effectively implemented. The Environmental Manager will be a suitably qualified, competent and experienced professional that would perform the necessary tasks, review environmental procedures and consult with the members of the construction team and stakeholders as required. The Environmental Manager would be responsible for:

- Preparing, maintaining and implementing the CEMP;
- Establishing, implementing, and maintaining the EMS in line with ISO 14001;
- Conducting regular environmental inspections and audits as specified in the contract and checking adherence to the CEMP;
- Ensuring that construction occurs in accordance with the relevant environmental requirements and that such compliance is adequately recorded and documented;
- Completing a site inspection and compiling an environmental compliance as agreed and specified in the CEMP;
- Attending site and stakeholder meetings as required;
- Keeping up-to-date with relevant environmental best practice and legislative changes;
- Liaising with the relevant staff to prepare Method Statements and relevant plans for all activities where there is a risk of environmental damage;
- Having a detailed level of knowledge on all aspects of environmental information associated with the proposed development;
- Ensuring all personnel have undertaken adequate environmental inductions, awareness briefings and training (including subcontractors);

- Dealing with environmental complaints; and
- Managing and responding to environmental incidents and ensuring that all incidents are recorded and reported in an appropriate manner.

### 3.2.6 Liaison Manager

A liaison manager will be appointed and will be responsible for managing such tasks as the following:

- Briefing neighbours on progress and issues as necessary;
- Liaison with Wexford County Council and emergency services as appropriate;
- Liaison with local Gardaí, particularly in relation to traffic movements and permits where necessary; and

Contact details for the liaison manager will be posted on all construction site notice boards, on the project website, and on any other information or correspondence, which may be distributed from time to time.

### 3.2.7 Environmental Specialists engaged by the Contractor

To fulfil its obligations under the CEMP and to support its Environmental Manager, the contractor will be responsible for engaging suitably qualified and experienced professionals including where necessary the following (i.e. depending on the scope of the contract) competent experts:

- Project archaeologist;
- Project ecologist;
- Noise and vibration specialist;
- Air quality and dust specialist;
- Land, soils and contamination specialist(s); and
- Water specialist.

## 3.3 Communication Procedures

### 3.3.1 Community and Stakeholder Engagement

The contractor will take all reasonable steps to engage with stakeholders in the local community, focusing on those who may be affected by the construction works including residents, businesses, community resources and specific vulnerable groups.

Communication with the local community, Wexford County Council and other relevant stakeholders shall be undertaken at an appropriate level and frequency throughout construction.

Greenlink Interconnector Limited will establish a Communications Management Plan that will specify obligations in relation to community and stakeholder engagement that the contractor must adhere to. Where communications are related to environmental issues the Environmental Manager will be informed and engaged with, as appropriate.

### 3.3.1.1 Community Liaison

Greenlink Interconnector Limited recognises the importance of effective community liaison in order to reduce nuisance to residents, to ensure public safety and welfare and to help ensure the smooth running of construction activities. Important issues in ensuring good relations are:

- Providing information for the public during the construction phase, (particularly nearby sensitive receptors);
- Providing the correct points of contact and being responsive; and
- Ensuring good housekeeping in all aspects of the operations.

A ‘good neighbour’ policy will be implemented, as far as possible. Key aspects of this policy include:

- Early implementation of the policy i.e. from the commencement of construction;
- Reduction of nuisance factors;
- Maintaining access to neighbouring premises;
- Clear and concise information; and
- Undertaking timely liaison with stakeholders.

The Contractor will be required to prepare a Community Liaison Plan, which will include details of how the local community, road users and affected residents will be notified in advance of the scheduling of major works, any temporary traffic diversions and the progress of the construction works.

This plan will typically include details of the following:

- Contractor’s community relations policy;
- Personnel nominated to manage public relations;
- A methodology for processing observations, queries and complaints from the general public, relevant authorities, the media and emergency services; and
- The strategy for project- wide liaison with all relevant parties.

### 3.3.2 Regular Consultation and Public Communications

The Communications Management Plan will also specify obligations in relation to regular consultation and public communications activities required during the construction of the proposed development. The contractor will facilitate regular consultation in accordance with the specifications and cooperate with this plan. Where communications are related to environmental issues the Environmental Manager would be informed and engaged with, as appropriate.

Details of the available communication channels/points of contact for members of the public to contact the project team during construction will be established in advance of the commencement of construction and displayed around working areas.

### 3.3.3 Advance Notice of Works

The contractor will ensure that local residents, businesses, occupiers, general users of the area and stakeholders are informed in advance of construction activities that may affect them. Relevant obligations and procedures in relation to advance notice of works will be identified in the detailed CEMP(s) and in the Communications Management Plan.

All notifications will detail the nature, estimated duration and working hours. All notifications will include a project-specific contact number to which any enquires can be directed. The contractor will be responsible for preparing and issuing the notifications subject to the relevant approval and consents.

Greenlink Interconnector Limited and the contractor in consultation with Wexford County Council and statutory stakeholders will decide whether to arrange any further targeted consultation with the public or relevant stakeholders in advance of specific construction activities on a local basis.

### 3.3.4 Emergency Contacts

An emergency contact list will be established and made available to all construction staff employed. The contact list shall be displayed prominently on site as well as at suitable locations where construction activity is being carried out around working areas. The contact list will include key environmental representatives that may need to be contacted in the event of an incident.

### 3.3.5 Enquiries and Complaints

The contractor will establish a process for handling all enquires including complaints. All enquires will be recorded and a log will be maintained to include details of the response and action taken. This will be available upon request for inspection to Wexford County Council. All enquiries, whether a query or a complaint, will be dealt with in a timely manner.

The Environmental Manager will be immediately informed of any environmental-related issues that have been raised. Where appropriate, the Environmental Manager would be responsible for informing Wexford County Council, relevant stakeholders and statutory bodies.

Any works that are carried out in response to an enquiry/complaint within/adjacent the shared boundary with SSE, will be carried out in consultation with SSE.

## 4 Environmental Management Procedures

### 4.1 Training, Awareness and Competence

The contractor (and their subcontractors) will be selected with due consideration of relevant qualifications and experience. The contractor will be required to employ construction staff with appropriate skills, qualifications and experience appropriate to the needs of the works to be carried out during construction.

A site induction will be provided to all construction staff before they commence work on site. Where appropriate, the contractor will identify specific training needs for the construction workforce and will ensure that appropriate training requirements are fulfilled.

The contractor will establish an Environmental Training and Awareness Programme and ensure that all personnel receive adequate training prior to the commencement of construction activities. A baseline level of environmental awareness will be established through the site induction programme. Key environmental considerations and objectives will be incorporated into this induction. Specifically, site inductions will cover the following as a minimum:

- Introduction to the Environmental Manager;
- Description of the CEMP(s) and consequences of non-compliance;
- The requirements of due diligence and duty of care;
- Overview of conditions of consents, permits and licences;
- Requirements associated with community engagement and stakeholder consultation;
- Identification of environmental constraints and notable features within the site; and
- Procedures associated with incident notification and reporting including procedures for dealing with damage to the environment.

Nobody will work on site without first receiving environmental induction. Signed records of environmental training will be established, maintained and made available to the Employers Representative.

Site briefings and talks would be carried out on a regular basis to ensure that construction staff have an adequate level of knowledge on environmental topics and community relations and can effectively follow environmental control procedures throughout construction.

### 4.2 Meetings

Greenlink Interconnector Limited and/or the Employer's Representative will arrange regular meetings to discuss environmental matters and ensure effective coordination to be attended by:

- Greenlink Interconnector Limited;



- The Employer's Representative;
- Contractor (including Site Manager);
- Environmental Manager; and
- Environmental Specialists - engaged by either Greenlink Interconnector Limited and/or the contractor.

The Environmental Manager will be responsible for arranging and holding monthly meetings and site walk overs with the Employer's Representative. The Environmental Manager would develop and distribute minutes of the monthly meetings and distribute them accordingly.

### 4.3 Monitoring, Inspections and Audits

For the duration of the contract(s), the environmental performance of the contractor will be monitored through site inspections and audits. The programme for monitoring, inspections and audits shall be specified in the contract and it is likely to be a combination of internal inspections and independent external audits that may be either random or routine.

Records of all inspections carried out should be recorded on standard forms and all actions should be closed out in a reasonable time. The detailed CEMP(s) would include further details of inspection procedures.

#### 4.3.1 Monitoring

Mitigation and monitoring will be carried out in accordance with the requirements of the EIAR and NIS so that construction activities are undertaken in a manner that does not give rise to significant negative effects. Suitable monitoring programmes will need to be developed, implemented, documented, and assessed (with potential follow up) in accordance with the specification outlined in the detailed CEMP(s).

The results of all environmental monitoring activities would be reviewed by the Environmental Manager on an ongoing basis to enable trends or exceedance of criteria to be identified and corrective actions to be implemented as necessary. The contractor will be required to inform the Employer's Representative of any continuous exceedances of criteria.

#### 4.3.2 Inspections

Routine inspections of construction activities will be carried out by the Environmental Manager daily to ensure all necessary environmental measures relevant to the construction activities are being effectively implemented by construction staff, ensuring legal and contractual conformity.

More detailed inspections would be undertaken by the Environmental Manager on a weekly basis.

The weekly inspections would be appropriately documented by the Environmental Manager and copies of these records and any action required to be undertaken should be made available to the Employers Representative.

Each month one of the weekly inspections will include a review of environmental documentation and records. The monthly inspection will be recorded on a standard form and reported to the Employers Representative within five days of the inspection taking place. This standard form will address the following as a minimum:

- Summary of compliance/non-compliance with the CEMP(s);
- Results and interpretation of the monitoring programme;
- Key issues noted in inspections and/or audits;
- Summary record of non-conformities, incidents and corrective actions;
- Summary of environmental complaints and queries received in relation to environmental matters; and
- Summary record of environmental training undertaken by staff.

### 4.3.3 Audits

Greenlink Interconnector Limited will arrange for independent environmental audits to be carried out by a third-party during construction. External audits provide the opportunity for an independent auditor to advise on compliance with applicable environmental regulatory requirements, the efficacy of the environmental management approaches used, and recommendations for reducing identified environmental risks (if considered appropriate).

Further, regulatory and statutory bodies may undertake site visits to monitor compliance with legislative and regulatory requirements. These site visits may occur randomly throughout the construction period. The contractor will facilitate these visits and the Environmental Manager will be available to provide information as required and deal with any issues that may arise during, or as a result of, these visits.

Planned and documented audits aimed at evaluating the conformance of the EMS would also be carried out by the Environmental Manager. As part of the detailed CEMP(s), the Environmental Manager will establish a schedule for internal audits and this inspection calendar will be made available to the Employer's Representative. These environmental audits will be scheduled at least once every three months.

The contractor will be required to prepare standard forms for reporting and audit items shall include but not be limited to the following activities:

- Review of environmental documentation to establish if relevant requirements are being achieved and if continual improvement is occurring;
- Site inspection and interviews with onsite personnel; and
- Reporting with recommendations.

For any environmental nonconformities found, the auditor will prepare a Corrective Actions Report to describe and record the findings of the non-conformance. The verification of previous Corrective Actions Reports will be also recorded.

Upon completion of an audit, the auditor will review all Corrective Actions Reports and prepares an Audit Report to summarise:

- Corrective action requests raised;
- Previous corrective action requests closed; and
- Observations made during the audit.

The Environmental Manager will be entitled to participate in all audits. Notwithstanding this, the Employers Representative shall produce and provide the contractor with a copy of each audit report within five working days of the audit. Each audit report will detail the findings from the auditor, specify non-conformances identified and outline the proposed corrective action.

## 4.4 Incident Response

### 4.4.1 Corrective Actions

#### 4.4.1.1 Overview

Corrective actions are measures to be implemented to rectify any non-conformances (i.e. exceedance of criteria or targets) identified during monitoring, inspections and/or audits.

In the first instance, an investigation should be undertaken by the Environmental Manager to identify the cause of any non-conformances. Appropriate remedial measures shall be identified and implemented as soon as practicable to prevent further exceedances. If necessary, the appropriate statutory authority and stakeholders will be notified.

Where new or amended measures are proposed, the relevant CEMP(s) will be updated accordingly by the Environmental Manager and the Employer's Representative should be informed at the earliest opportunity.

#### 4.4.1.2 Corrective Action Reports

A Corrective Actions Report is prepared on foot of any non-conformances identified during environmental monitoring, inspections and/or audits on site. The Corrective Actions Report will describe in detail the cause and effect of a non-conformance on site and describe the recommended corrective action that is required to remedy it.

An appropriate timeline for closing out the corrective actions will be identified by the contractor in their detailed CEMP as well as arrangements for the Environmental Manager verifying the Corrective Actions Report and informing appropriate authorities and stakeholders in a timely manner.

## 4.4.2 Emergency Incidents

### 4.4.2.1 Overview

Emergency incidents are those occurrences that give rise to significant negative environmental effects including but not limited to the following:

- Any malfunction of any mitigation measure and/or environmental protection system;
- Any emission that does not comply with the requirements of the contract and relevant licences;
- Any circumstance with the potential for environmental pollution; or
- Any emergency that may give rise to environmental effects (e.g. significant spillages or fire outbreak).

As discussed in **Section 3.3.4** an emergency contact list will be established and made available to all construction staff employed. The contact list shall be displayed prominently on site as well as at suitable locations where construction activity is being carried out around working areas. The contact list will include key environmental representatives that may need to be contacted in the event of an incident.

### 4.4.2.2 Spill Control Measures

Every effort will be made to prevent pollution incidents associated with spills during the construction of the proposed development. The risk of oil/fuel spillages will exist on the site and any such incidents will require an emergency response procedure. Given the scale and extent of the proposed development all contractors will carry spill kit materials in their cabins and mobile plant and machinery will be accompanied by a spill kit.

The following steps provide the procedure to be followed in the event of an oil/fuel spill occurring on site:

- Identify and stop the source of the spill and alert people working in the vicinity;
- Notify the Environmental Manager immediately giving information on the location, type and extent of the spill so that they can take appropriate action;
- If applicable, eliminate any sources of ignition in the immediate vicinity of the incident;
- Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill;
- If possible, cover or bund off any vulnerable areas where appropriate such as drains, watercourses and/or sensitive habitats;
- If possible, clean up as much as possible using the spill control materials;

- Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited;
- The Environmental Manager shall inspect the site as soon as practicable and ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring; and
- The Environmental Manager will notify the appropriate stakeholders such as Wexford County Council, National Parks and Wildlife Service, Department of Communications, Climate Action and Environment and Department of Housing, Planning and Local Government and/or the EPA.

Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident must be reported, recorded and investigated in accordance with the procedures described in **Section 4.4**.

#### 4.4.2.3 Emergency Incident Response Plan

A set of standardised emergency response procedures will govern the management of emergency incidents. Detailed emergency incident response procedures will be incorporated in the CEMP and in addition to an Emergency Incident Response Plan.

The Emergency Incident Response Plan will contain emergency phone numbers and the method of notifying local authorities, statutory authorities and stakeholders. Contact numbers for key personnel will also be included therein. Contractors will be required to adhere to and implement these procedures and ensure that all staff and personnel on site are familiar with the emergency arrangements.

In the case of work required in an emergency, or which if not completed would be unsafe or harmful to workers, the public or local environment, Wexford County Council will be informed as soon as reasonably practicable of the reasons and likely duration. Examples may include where the ground needs stabilising if unexpected ground conditions are encountered, concrete pouring taking longer than anticipated due to delayed deliveries or equipment failure.

In the event of an emergency incident occurring, the contractor will be required to investigate and provide a report including the following, as a minimum:

- A description of the incident, including location, the type and quantity of contaminant and the likely receptor(s);
- Contributory causes;
- Negative effects;
- Measures implemented to mitigate adverse effects; and
- Any recommendations to reduce the risk of similar incidents occurring.

The relevant statutory authorities, stakeholders and relevant parties such as the Health and Safety Authority, the Fire Authority, the Ambulance Service, the EPA, utilities companies and Wexford County Council will be consulted when preparing and developing response measures. Further, if any sensitive receptor

is impacted, the appropriate environmental specialists will be informed and consulted with accordingly.

Any response measures will be incorporated into an updated Emergency Incident Response Plan that should be disseminated accordingly to construction staff, Greenlink Interconnector Limited and the Employer's Representative.

#### 4.4.2.4 Emergency Access

Emergency access routes will be maintained throughout construction and identify site access points for each working area.

This should be developed in partnership with the emergency services and documented as part of the detailed CEMP(s) and Emergency Incident Response Plan.

#### 4.4.3 Extreme Weather Events

The effects of extreme weather events and related conditions during construction will be considered. Short to medium range weather forecasting service from Met Eireann or other approved meteorological data and weather forecast provider will be used to inform short to medium term programme management, environmental control and mitigation measures.

All measures deemed necessary and appropriate to manage extreme weather events will be taken, including training of personnel and prevention and monitoring arrangements for staff. As appropriate, method statements will also consider extreme weather events where risks have been identified, e.g. construction works adjacent to the Irish Sea.

#### 4.4.4 Unexpected Discoveries

Appropriate procedures will be put in place, to be employed in the event of encountering unexpected archaeological or cultural heritage assets or subsurface contamination during intrusive ground works.

Appropriate procedures will be developed as part of the CEMP and the Environmental Manager will ensure that specialists (e.g. archaeologist) are facilitated to ensure management in accordance with industry best practice and effective compliance with the relevant legislation. All unexpected discoveries will be reported to the appropriate authorities and documented in an appropriate manner.

### 4.5 Reporting

#### 4.5.1 Environmental Compliance Report

The contractor will be required to submit a monthly report to the Employer's Representative for review and approval. The report shall address the following as a minimum:

- Summary of compliance with the CEMP(s) including identification of any non-conformances;
- Interpretation of the results of ongoing monitoring;
- Detailed description of any issues and/or non-conformances identified during inspections and/or audits;
- Record of incidents and corrective actions (including Corrective Actions Reports as appropriate);
- Synopsis of environmental complaints received / queries raised by stakeholders; and
- Records of environmental training undertaken (as appropriate).

### 4.5.2 Incident Investigation Reports

The contractor will inform the Employer's Representative of all emergency incidents immediately and prepare an initial report within 24 hours setting out the details of the incident and cause(s) if known. The contractor will be required to complete the Environmental Incident Report and any further documentation requested by the Employer's Representative in relation to the incident within 7 days of the incident occurring. The Contractor will respond to all comments made by the ER on any incident.

The Environmental Incident Report will contain details of the incident including the location, known and suspected causes and weather conditions. It will define the scale and effects (short, medium, long term, temporary/permanent) as well as required corrective actions and mitigation/remediation/compensation measures (as appropriate).

## 4.6 Environmental Records

Records of all environmental documentation will be maintained including monitoring, test results, method statements and plans. All records will be kept up to date and be made available for audits, inspections and periodical reporting. The Contractor will maintain the following environmental records (as a minimum) that will be made available for inspection to the Employer's Representative and the relevant authorities, if required:

- Management Plans;
- Records of environmental incidents;
- Monthly environmental reports;
- Records of environmental training;
- Register of environmental complaints;
- Corrective Action Reports;
- Environmental inspection and audit reports;
- All monitoring data;
- Waste and chemical inventories; and

- Health and Safety records.



## 5 General Requirements

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### 5.1 Overview

### 5.2 Good Housekeeping

A “good housekeeping” policy will be employed at all times. This will include, but not necessarily be limited to, the following requirements:

- General maintenance of working areas and cleanliness of welfare facilities and storage areas;
- Provision of site layout map showing key areas such as first aid posts, material storage, spill kits, material and waste storage, welfare facilities etc;
- Maintain all plant, material and equipment required to complete the construction work in good order, clean, and tidy;
- Keep construction compounds, access routes and designated parking areas free and clear of excess dirt, rubbish piles, scrap wood, etc. at all times;
- Details of site managers, contact numbers (including out of hours) and public information signs (including warning signs) will be provided at the boundaries of the working areas;
- Provision of adequate welfare facilities for site personnel;
- Installation of appropriate security, lighting, fencing and hoarding at each working area;
- Effective prevention of oil, grease or other objectionable matter being discharged from any working area;
- Provision of appropriate waste management at each working area and regular collections to be arranged;
- Excavated material generated during construction will be reused on site as far as practicable and surplus materials/soil, should it be deemed a by-product, shall be recovered or if considered to be waste material, disposed of to a suitably authorised waste facility site;
- Effective prevention of infestation from pests or vermin including arrangements for regular disposal of food and material attractive to pests will be implemented. If infestation occurs appropriate action will be taken to eliminate and prevent further occurrence;
- Maintenance of self-contained wheel washing facilities at each of the construction compounds and other contaminant measures as required;
- No discharge of site runoff or water without agreement of the relevant authorities and an appropriate discharge licence, if relevant;
- Open fires will be prohibited at all times;

- The use of less intrusive noise alarms which meet the safety requirements, such as broadband reversing warnings, or proximity sensors to reduce the requirement for traditional reversing alarms;
- Maintenance of public rights of way, diversions and entry/exit areas around working areas for pedestrians and cyclists where practicable and to achieve inclusive access; and
- Material handling and/or stockpiling of materials, where permitted, will be appropriately located to minimise exposure to wind. Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods.

### 5.3 Working Hours

The timing of construction activities, core working hours and the rate of progress of construction works are a balance between efficiency of construction and minimising nuisance and significant effects.

The core construction working hours for the proposed development will be:

- 7am - 7pm: Monday to Friday; and
- 8am - 2pm: Saturday.

The hours above correspond to the current construction programme.

Underground activities (i.e. HDD tunnelling works to lay cables) will occur 24-hours a day, 7-days a week for the duration of the tunnelling activity.

All rock breaking/fracturing activities will be undertaken during daytime hours. The removal of waste material off site by road and regular deliveries to site would be generally confined to daytime hours but outside of peak traffic hours (i.e. 10am to 4pm).

It may be necessary in exceptional circumstances to undertake certain activities outside of the core construction working hours. Any construction outside of the core construction working hours will be agreed in advance with Wexford County Council and scheduling of such works will have regard to nearby sensitive receptors.

### 5.4 Security

Adequate security will be provided to prevent unauthorised entry to or exit from any working areas. The following measures may be used to prevent unauthorised access:

- Install CCTV and alarm systems where required;
- CCTV and security systems will be sited and directed so that they do not intrude into occupied residential properties;
- Provide adequate security guards and patrols;
- When there is no site activity, close and lock site gates and set appropriate site security provisions in motion;

- Consult with neighbouring properties and local crime prevention officers including Wexford County Council and An Garda Síochána on site security matters as required; and
- Prevent access to restricted areas and neighbouring properties by securing equipment on site such as scaffolding and ladders.

## 5.5 Hoarding and Fencing

A site boundary in the form of hoarding or fencing will be established around each of the working areas before any significant construction activity commences in that working area. The hoarding/fencing will be 2.4m high to provide a secure boundary to what can be a dangerous environment for those that have not received the proper training and are unfamiliar with construction operations.

Site hoarding also performs an important function in relation to minimising nuisance and effects including:

- Noise emissions (by providing a buffer);
- Visual impact (by screening the working areas, plant and equipment); and
- Dust minimisation (by providing a buffer).

The erection of hoarding would be of a similar nature to what is carried out on most construction sites. Mounting posts would be erected by using a mini-digger and the posts would be set in concrete. The size and nature of the posts and hoarding would depend on the requirements for any acoustic mitigation. Where practicable, hoarding and fencing would be retained and re-configured and re-used between working areas as the construction activities progress.

The following measures will be applied in relation to hoarding and fencing:

- Maintenance of adequate fencing and hoardings to an acceptable condition to prevent unwanted access to working areas and provide noise attenuation, screening, and site security where required;
- Appropriate sight lines/visibility splays will be maintained around working areas to ensure safety of both vehicles and pedestrians is preserved;
- Use of different types of fencing and hoarding (e.g. mesh fence or solid hoarding including hoardings used for noise control);
- Temporary fences may be used in certain areas, such as for short term occupation of working areas;
- Display information boards with out of hours contact details, telephone helpline number (for comments/complaints) and information on the works;
- Erect notices on site boundaries to warn of hazards on site such as deep excavations, construction access, etc.;
- Ensure suitable measures for tree protection are implemented as required;
- Keep hoarding and fencing free of graffiti or posters;

- Retain existing walls, fences, hedges and earth banks as far as reasonably practicable; and
- Appropriate positioning of the fencing or hoarding to minimise the noise transmitted to nearby receptors or from plant, equipment and vehicles entering or leaving the working area.

## 5.6 Services and Lighting

### 5.6.1 Services and Utilities

Site services will be installed as part of the enabling works in parallel with the rearrangement and diversion of existing utilities. Working areas will be powered by mains supplies or diesel generators where an electrical supply is not available.

### 5.6.2 Lighting

Site lighting would typically be provided by tower mounted 1000W metal halide floodlights. The floodlights would be cowled and angled downwards to minimise spillage to surrounding properties. The following measures will be applied in relation to site lighting:

- Lighting will be provided with the minimum luminosity sufficient for safety and security purposes. Where practicable, precautions will be taken to avoid shadows cast by the site hoarding on surrounding footpaths, roads and amenity areas;
- Motion sensor lighting and low energy consumption fittings will be installed to reduce usage and energy consumption; and
- Lighting will be positioned and directed as not to unnecessarily intrude on adjacent buildings and land uses, ecological receptors and structures used by protected species, nor to cause distraction or confusion to passing motorists, river users or navigation lights for air or water traffic.

## 5.7 Welfare Facilities

Welfare facilities will be provided, as appropriate, for construction staff and site personnel such as locker rooms, toilets, showers etc. The main cable contractor compounds, located at the proposed converter station site, Lewistown and the landfall site, will be used as the primary location for worker welfare facilities. Where required, mobile welfare facilities will be located along the road where duct installation is being carried out.

## 5.8 Reinstatement of Working Areas on Completion

All working areas and access routes will be reinstated as work proceeds during construction. All plant, equipment, materials, temporary infrastructure and

vehicles will be removed at the earliest opportunity and the surface of the ground restored as near as practicable to its original condition.

## 5.9 Health and Safety

All Health & Safety, Fire Safety and security requirements will be provided for in co-ordination with Wexford County Council and Greenlink Interconnector Limited. The Construction Traffic Management Plan will protect the public in the vicinity of the working areas during the construction phase of the works and will include all suitable temporary signage, barriers and hoarding as necessary.

All construction staff and operatives will be inducted into the security, health and safety and logistic requirements on site prior to commencing work.

All Contractors will be required to progress their works with reasonable skill, care and diligence and to proactively manage the works in a manner most likely to ensure the safety, health and welfare of those carrying out construction works, all other persons in the vicinity of the working areas and interacting stakeholders.

All aspects of works and project facilities will comply with legislation, good industry practice and all necessary consents.

The requirements of the Safety, Health and Welfare at Work Act 2005 (Government of Ireland, 2005), the Safety, Health and Welfare at Work (Construction) Regulations, 2013 (Government of Ireland, 2013), as amended, (the “Regulations”) and other relevant Irish and EU safety legislation will be complied with at all times.

As required by the Regulations, a Health and Safety Plan will be formulated which will address health and safety issues from the design stages through to completion of the construction and maintenance phases. This plan will be reviewed and updated as required, as the development progresses.

In accordance with the Regulations, a ‘Project Supervisor Design Process’ has been appointed and a ‘Project Supervisor Construction Stage’ will be appointed as appropriate.

The Project Supervisor Construction Stage will assemble the Safety File as the project progresses.

## 5.10 Deliveries to Site

Deliveries of materials will be planned and programmed to ensure that the materials are delivered only as they are required at the working areas. Works requiring multiple vehicle deliveries, such as concrete pours, will be planned so as to ensure there will no queuing on the public roadways around the working areas. Deliveries will be limited to outside of peak hours.

## 5.11 Cranage

The construction works will require the use of standard mobile cranes on site. The cranes will be required for the moving of building materials on site such as concrete pipes, formwork for concrete, reinforcement, precast concrete,

steelwork, façade, plant and general building materials. Again, the use of mobile cranes may be adopted to assist in the installation of the converter station, the converter station building façade and mechanical plant. Heavy machinery transport on the road network to and from the working areas will be restricted to outside of peak hours.

## 5.12 Converter Station Site

Steps will be taken to reduce the probability of an incident occurring and to also reduce the magnitude of any incident from a combination of good site environmental management procedures, including additional precautions when operating machinery close to watercourses, soil management, staff training, contingency equipment and emergency plans.

Key measures identified to reduce erosion and sedimentation include:

- Secure oil and chemical storage in over-ground bunded areas, limited to the minimum volume required to serve immediate needs with specified delivery and refuelling areas;
- Emergency spill kits retained onsite at sensitive locations and within contractor vehicles;
- Cessation of work and development of measures to contain and/or remove pollutant should an incident be identified;
- Silt traps will be employed and maintained in appropriate locations;
- Temporary interception bunds and drainage ditches will be constructed up slope of excavations to minimise surface runoff ingress and in advance of excavation activities; and
- Excavation and earthworks will be suspended during and immediately following periods of heavy rainfall to minimise sediment generation and soil damage.

## 5.13 Onshore Cable

The cables will be installed in ducts, so the only section of trench that will be open is that which is being excavated and in which ducts are being installed. Typically, 50m of trench will be fully open at any time, with up to 200m of trench backfilled to the level of the asphalt courses, that will then be reinstated at the end of each week.

Any groundwater or rainwater that collects in a trench will be pumped to locations agreed with the landowners and local authorities. Typically, this will be onto adjacent land, not directly into waterways, and through a filter medium, to avoid the build-up of silt, as some granular material will, inevitably, be pumped out with the water. The pump flowrates will match that of the water into the trench, as it must be kept generally free of water.

A single pump with a 75mm hose will usually be adequate to deal with rainwater running into a trench. A similar arrangement will apply at joint bays, where a sump will be cast into the concrete base for a pump. For the HDDs, any groundwater or rainwater that collects in an HDD drilling pit will be pumped

away as described above. Any bentonite (or similar HDD drilling head lubrication material) will be handled and removed by the drilling contractor. The volume of bentonite required will be in the order of five cubic metres per shift at the Campile Estuary crossing, and 15 cubic metres per day at the landfall.

## 6 Environmental Management

This section describes the specific environmental requirements identified as part of the specimen design and EIAR and NIS that will be adhered to.

It should be noted that the measures in this CEMP provide a summary of minimum requirements that will be developed as the project progresses. It is intended that the measures set out herein will be discussed in more detail with relevant stakeholders as required to support the identification of any additional measures to be taken account of during construction.

### 6.1 Traffic and Transportation

The following measures will be implemented in relation to traffic and transportation during construction:

- Deliveries of materials will be planned and programmed to ensure that the materials are delivered only as they are required at the working areas along the cable route and will avoid peak hours for set-up and removal of equipment;
- Works requiring multiple vehicle deliveries, such as concrete pours, will be planned so as to ensure there will no queuing on the public roadways around the working areas;
- Deliveries of materials will be limited to outside of peak hours on the existing road network and/or likely commuter movement times;
- All trucks entering and exiting the working areas which are carrying materials which could become windborne will be covered with tarpaulin;
- Trucks will not be allowed to park on public roads either outside the working areas or on any of the approach roads leading to the working areas;
- All trucks entering the working areas will be restricted to suitable speed limits and will be directed to the relevant area by the site manager, avoiding school areas at drop off and collection times;
- Trucks required to wait at the working areas will switch off engines to avoid unnecessary fuel usage and noise;
- All trucks exiting the construction compounds will be required to pass through a wheel wash. All water from the wheel wash will be collected, treated to remove silt or other contaminants, and removed from site;
- Roads immediately adjacent to the construction compounds will be visually inspected on a daily basis and power swept and washed as and when required; and
- Adequate parking will be provided at the converter station site, landfall site, and the cable contractor compound in Lewistown to avoid queuing at the site entrances and prevent disruption to neighbouring businesses and residences.



## 6.2 Air Quality and Climate

Dust emissions will occur during construction, although the prevailing weather, the extent of the works and the distance from sensitive receptors will determine the extent of the effects. The focus of the control procedures will therefore be to reduce the generation of airborne material.

‘Standard mitigation’ measures will be implemented, as per guidance presented in the TII document *Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes* (TII, 2011). These will include the following:

- Spraying of exposed earthwork activities, stockpiles and site haul roads during dry weather;
- Provision of wheel washes at construction compounds;
- Covering of stockpiles;
- Control of vehicle speeds, speed restrictions and vehicle access; and
- Sweeping of hard surface roads.

In addition, the following measures will be implemented. These measures are based on best practice as outlined in the British Research Establishment (BRE) document *Controlling particles, vapour and noise pollution from construction sites* (BRE, 2003) and the Institute of Air Quality Management (IAQM) document *Guidance on the assessment of dust from demolition and construction* (IAQM, 2016).

- Exhaust emissions from vehicles operating within the working areas, including trucks, excavators, diesel generators or other plant equipment, will be controlled through regular servicing of machinery;
- During dry periods when dust generation is likely or during windy periods, working areas and vehicles delivering material with dust forming potential will also be sprayed with water, as appropriate;
- Areas where materials will be handled and stockpiled will be designed to minimise their exposure to wind - all stockpiles shall be kept to the minimum practicable height with gentle slopes;
- There shall be no long-term stockpiling within the working areas and storage time will be minimised;
- Material drop heights from plant to plant or from plant to stockpile will be minimised;
- Dust screens will be implemented at locations where there is the potential for air quality effects during the construction phase; and
- Truck loads will be covered when carrying material likely to generate dust.

Employee awareness is also an important way that dust may be controlled on any site. Staff training and the management of operations will ensure that all dust suppression methods are implemented and continuously inspected. Further details on employee training is provided in **Section 4.1** above.

The following mitigation measures will be implemented during the construction phase of the development to minimise CO<sub>2</sub> emissions:

- A Construction Traffic Management Plan has been prepared and will be implemented in full. This will minimise congestion and encourage car sharing and the use of public transport, where practicable;
- Materials will be handled efficiently on site to minimise the waiting time for loading and unloading, thereby reducing potential emissions;
- Engines will be turned off when machinery is not in use; and
- The regular maintenance of plant and equipment will be carried out.

### 6.3 Noise and Vibration

Specific noise abatement measures will be taken, to comply with the recommendations of BS 5228-1 and 2:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites: Noise and vibration* (BSI, 2014) and the *European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001* (EC, 2001).

The following specific measures will be implemented during the construction phase to ensure noise and vibration effects are minimised:

- Site representatives shall be appointed to be responsible for matters relating to noise and vibration;
- Equipment will be switched off when not required;
- Internal haul routes will be well maintained;
- Rubber linings shall be used in chutes and dumpers etc. to reduce impact noise;
- Drop heights of materials will be minimised;
- Plant and vehicles will be started sequentially rather than all together;
- Construction plant and activities to be employed on site will be reviewed to ensure that they are the quietest available for the required purpose;
- Generators will be located away from sensitive receivers and will be enclosed;
- Where required, improved sound reduction methods e.g. enclosures shall be used;
- For all construction works likely to generate off-site vibration, the vibration limits set out in BS 5228 will be met.
- Site equipment will be located away from noise sensitive areas, as much as is feasible;
- Regular and effective maintenance by trained personnel will be carried out to reduce noise and/or vibration from plant and machinery;
- Acoustic barriers with a density of at least 7kg per square metre will be provided around construction works to minimise the effects of noise and vibration generating activities in the vicinity of sensitive locations, including HDD compounds;

- Typically, site activities shall be limited to 7am - 7pm, Monday to Friday; and 8am - 2pm, Saturday. It may also be necessary in exceptional circumstances to undertake some other types of activities outside of normal construction core working hours. Underground activities (i.e. tunnelling works to lay cables) will occur 24-hours a day, 7-days a week for the duration of the contract. Any such working hours outside the normal construction core working hours will be agreed with Wexford County Council. The planning of such works will have regard to nearby sensitive receptors;
- A Community Liaison Plan will be prepared to provide for effective community liaison to help ensure the smooth running of construction activities and to address any issues that may arise;
- Construction work within 400 metres of the Gas Networks Ireland transmission pipeline will be carried out in accordance with the Code of Practice for Working in the Vicinity of the Gas Transmission Network (included as Appendix 4.2 to the EIAR). This may include the assessment of potential peak particle velocity effects associated with rock removal activities.
- For the locations where significant temporary noise effects are predicted during cable route excavation, Greenlink Interconnector Ltd and the appointed contractor will develop and implement specific measures to mitigate impacts, potentially including temporary acoustic screening and discretionary pre-condition surveys.
- The use of vibratory roller compactors will be in 'static' mode only, for compaction activities within 50m of properties.
- To minimise the impulsive noise and vibration associated with the driving of pre-cast piles, the following measures will be taken as required, to meet the established noise and vibration thresholds: acoustic screen for hammer head and top of pile and the use of a resilient pad (dolly) between the pile and the hammer head. The precast piles will only penetrate as far as the weathered top of the bedrock, not into the intact rock. The installation of the precast piles does not have the potential to impact the bedrock aquifer.
- At the converter station site, rock will be excavated using either rock splitting or blasting, or a combination of both techniques. Rock crushing may be required to reuse the excavated material. The noise levels associated with blasting (if it is deemed necessary) will not exceed those predicted for rock-breaking, and specific mitigation measures will be implemented, as set out in **Section 8.5.1 of Chapter 8 Noise and Vibration** to ensure that adverse effects on the Gas Networks Ireland transmission pipeline are avoided.
- Piling at the converter station site could potentially increase noise/vibration levels. The precast piles will only penetrate as far as the weathered top of the bedrock, not into the intact rock. To minimise the impulsive noise and vibration associated with the driving of pre-cast piles, the following measures will be taken as required, to meet the established noise and vibration thresholds: acoustic screen for hammer head and top of pile and the use of a resilient pad (dolly) between the pile and the hammer head.

## 6.4 Biodiversity

Environmental Protection Measures (of relevance in respect of any potential ecological effects) will be implemented throughout the project, including the preparation and implementation of detailed method statements. The works will incorporate the relevant elements of the guidelines outlined below:

- *The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*. National Roads Authority, Dublin.
- *Control of water pollution from construction sites. Guidance for consultants and contractors (C532)*. CIRIA. H. Masters-Williams et al (2001)
- *Control of water pollution from linear construction projects. Technical guidance (C648)*. CIRIA. E. Murnane, A. Heap and A. Swain. (2006)

### 6.4.1 Water Quality

Mitigation measures in relation to water quality are outlined in **Section 6.8** below.

### 6.4.2 Noise

Best practice noise and vibration control measures will be employed. The best practice measures set out in BS 5228 (2009) Parts 1 and 2 will be complied with. This includes guidance on several aspects of construction site environmental measures, including, but not limited to the following:

- Specific noise abatement measures will be taken, to comply with the recommendations of BS 5228-1 and 2:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites: Noise and vibration* (BSI, 2014) and the *European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001* (EC, 2001);
- The following specific measures will be implemented during the construction phase to ensure noise and vibration effects are minimised;
- Site representatives shall be appointed to be responsible for matters relating to noise and vibration;
- Unnecessary revving of engines will be avoided and equipment will be switched off when not required;
- Internal haul routes will be well maintained;
- Rubber linings shall be used in chutes and dumpers etc. to reduce impact noise;
- Drop heights of materials will be minimised;
- Plant and vehicles will be started sequentially rather than all together;
- Construction plant and activities to be employed on site will be reviewed to ensure that they are the quietest available for the required purpose;

- Generators will be located away from sensitive receivers and will be enclosed;
- Where required, improved sound reduction methods e.g. enclosures shall be used;
- Site equipment will be located away from noise sensitive areas, as much as is feasible;
- Regular and effective maintenance by trained personnel will be carried out to reduce noise and/or vibration from plant and machinery;
- Acoustic barriers shall be provided around construction works to minimise the effects of noise and vibration generating activities in the vicinity of sensitive locations;
- Typically, site activities shall be limited to 7am - 7pm, Monday to Friday; and 7am - 2pm, Saturday; Underground activities (i.e. tunnelling works to lay cables) may occur 24-hours a day, 7-days a week for the duration of the HDD contract. The permissible noise levels are detailed in Chapter 8 Noise and Vibration from the EIAR where 'daytime' noise limits are defined as 7am to 7pm, and lower permissible noise levels are stipulated outside these hours;
- All rock breaking/fracturing activities will be undertaken during daytime hours;
- To minimise the impact of noise, the piling rigs, where practical, will be situated with the rear of the rig towards any sensitive receptor. Timber packers will be used between the pile and the hammer to reduce the noise level.

A site boundary will be established around each of the working areas before any significant construction activity commences, as described above. Site hoarding will be erected to minimise effects including:

- Noise emissions (by providing a buffer);
- Visual impact (by screening the working areas).

### 6.4.3 Lighting during construction

Potential impacts during construction and operation, from lighting, will be mitigated by the following measures:

- Floodlights will be cowled and angled downwards to minimise spillage;
- Lighting will be provided with the minimum luminosity sufficient for safety and security purposes;
- Lighting will be positioned and directed as not to unnecessarily impact on designated sites or woodland habitats.

#### 6.4.4 Invasive Species

- A survey for invasive species will be carried out prior to the commencement of works. This is to confirm the extent of infestations as identified by invasive species surveys to date, and to determine whether any new infestations have established in the intervening period. A step by step procedure for the management of invasive species is set out in the ISMP which is included as Appendix 9.6 to the EIAR. This includes undertaking up to date surveys prior to commencement of construction and based on the results, proposed methodologies, in accordance with codes of practice and guidelines, for the elimination of these species. No significant effects on Natura 2000 sites will occur. However as invasive species are present within the overall study area and given their invasive nature, repeat surveys will be carried out and mitigation implemented.
- Prior notification will be given to all contractors that parts of the site are infested with Japanese knotweed, Rhododendron and Three-Cornered Leek and that they must adhere to this protocol to avoid the spread of the plant within and more importantly, outside of the works area. This includes any site investigation works in advance of commencement of excavation works.
- The location of the invasive species will be clearly delineated with hazard tape in a manner visible to machine operators prior to the commencement of works. Appropriate signage will be put in place to deter any entrance by people or machinery into the areas within which the invasive species are growing.
- The invasive species management plan (which is a live document), will ensure that risks are minimised. This includes any site investigation works which may proceed the commencement of site works. The management plan will include all provisions for site hygiene and appropriate disposal of contaminated soil and subsoil.
- If contaminated material is to be removed off site it will require a licence from the National Parks and Wildlife Service in advance of any removal, in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477).

#### 6.4.5 Protection of habitats

- The Wildlife Amendment Act 2000 (S.46.1) provides that it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land or such growing in any hedge or ditch from the 01st of March to the 31st of August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided. Where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the potential disturbance of breeding birds outside of the proposed development site boundary.
- To prevent incidental damage by machinery or by the deposition of spoil during site works, any habitats earmarked for retention in close proximity to the proposed works will be identified and will be securely fenced or sign posted early in the construction phase. These will be clearly visible to

machine operators. Hedgerow, tree and scrub vegetation that are to be retained which are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation.

- Habitats that are damaged and disturbed will be left to regenerate naturally or will be rehabilitated and landscaped once construction is complete. Disturbed areas will be seeded or planted using appropriate native grass or species native to the areas where necessary. Within the large field that accommodates the converter station site, a comprehensive landscaping scheme will be implemented, incorporating significant earthworks, berming, planting of approximately 15,000 native mixed-woodland trees, and zones of grassland meadow.
- There will be a defined working area which will be fenced off with designated haul routes to prevent inadvertent damage to adjoining habitats.
- To prevent incidental damage by machinery or by the deposition of spoil during site works, any habitats earmarked for retention nearby will be securely fenced or sign posted early in the construction phase. These will be clearly visible to machine operators.
- Habitats that are damaged and disturbed will be left to regenerate naturally or will be rehabilitated and landscaped once construction is complete. Disturbed areas will be seeded or planted using appropriate native grass or species native to the areas where necessary.
- Mature trees, particularly over mature trees with the potential to provide bat roosts will be avoided. Any hedgerows or treelined habitat disturbed during construction will be replanted using a suitable mix of native species.
- Tree root systems can be damaged during site clearance and groundworks. No materials will be stored within the root protection area of mature trees. Materials, especially soil and stones, can prevent air and water circulating to the roots. Retention of the existing networks of woodland/ tree lines/ hedgerows will provide natural screening and help to maintain biodiversity. Where tree root systems cannot be avoided the trees will be assessed by an arboriculturalist to determine if crown reduction is required. If a small number of trees are removed, they will be replanted.

#### 6.4.6 Otter Mitigation Measures

- No signs of otter or otter holts were noted within 150m of cable route, HDD launch pits or proposed converter station, although otter was recorded utilising habitats along the Campile River Estuary and at Baginbun Beach. Otters could occur along the Newtown/Kilmannock River. A detailed pre-construction survey will confirm the absence of otter holts within 150m of the proposed development area.
- If otter holts are recorded at that time, the supervising ecologist will determine the appropriate means of minimising effects i.e. avoidance, moving works, timing of works etc. If required the ecologist will obtain a derogation licence from the NPWS, to facilitate licenced exclusion from the breeding or resting site in accordance with a plan approved by the NPWS.

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

### 6.4.7 Crossing of the Newtown/Kilmannock River Mitigation Measures

The key design mitigation measure for this watercourse crossing is the use of mini-HDD as the preferred construction methodology. Vegetation will not be significantly adversely affected as the majority of the access route to this location is on road, while off-road access is limited.

In the unlikely event that mini-HDD technology is not used, the following mitigation measures will be implemented:

- Works will comply with The IFI's Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016) and IFI will be consulted with regard to any proposed over pumping at the Newtown River crossing.
- Construction activities at the Newtown River will be undertaken during daylight hours only This will ensure that there is potential for undisturbed fish passage at night. The works will be temporary and will not create a significant long-term barrier to fish movement
- Works will take place outside the most sensitive time for these species: during the summer periods from July - September inclusive. Due to dryer conditions in the summer period this will also minimise the risk of ground damage, minimises the potential for silt generation and thus minimises the risk of inadvertent ecological impacts.
- As the stream will be crossed via an open cut methodology dams will be put in place. The height of the dams and method of construction will take into account the potential impacts from high tide events downstream. Works during high spring tides will be avoided.
- Over-pumping of the stream will take into account that pumping may be required from downstream to upstream during high tides.
- A fish salvage operation will be carried out by the supervising ecologist and fish, if present, will be relocated to suitable habitats in proximity to the proposed works. This will be carried out following receipt of a section 14



licence from Inland Fisheries Ireland and in consultation with Inland Fisheries Ireland.

- Sediment from the stream bed will be stockpiled at a minimum of 10 metres from the river and used to re-create the stream bed.
- Dams will be removed gradually, with silt curtains in place and under ecological supervision to minimise the potential for silt generation.
- Bankside impacts will be minimised, and any disturbed areas will be reseeded as soon as practicably possible after completion of works.

#### 6.4.8 Badger Mitigation Measures

As a precautionary measure, the site will be surveyed for badgers immediately prior to the commencement of site works, to confirm the absence of badgers within the zone of influence of the development. If badgers are discovered at that time, the mitigation measures outlined in the NRA publication, *Guidelines for the Treatment of Badgers Prior to the Construction of a National Road Scheme* (NRA, 2006c), are to be followed. If necessary, the following measures will be employed for all construction works where badger issues arise:

- Badger sett tunnel systems can extend up to c. 20m from sett entrances. Therefore, no heavy machinery will be used within 30m of badger setts (unless carried out under licence); lighter machinery (generally wheeled vehicles) will not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance will not take place within 10m of sett entrances. Based on the results of badger surveys to date the HDD works at the Campile River Estuary will not take place within these buffer zones.
- During the breeding season (December to June inclusive), none of the above works will be undertaken within 50m of active setts or pile driving within 150m of active setts. Based on the results of badger surveys to date the HDD works at the Campile River Estuary will not take place within these buffer zones.
- Where badger setts are likely to be affected, they will be clearly marked and buffer zones for vehicles clearly marked by fencing and signage;
- Works close to badger setts or removal of badgers from a site will only be carried out under the supervision of a qualified ecologist under license from the NPWS;
- Where affected setts do not require destruction, construction works may commence once recommended mitigation measures to address the badger issues as identified by the supervising ecologist and agreed with NPWS, have been complied with. Such mitigation may include hoarding or visual screens.

In the unlikely event that destruction of a badger sett is required this can only be carried out under licence from the NPWS. In these circumstances, which are highly unlikely to arise, badgers must have an alternative sett within their territory that can be utilised or an alternative artificial sett will be provided.

### 6.4.9 Bat Mitigation Measures

The first aim of the developer will be to entirely avoid or minimise the potential effect of the proposed development on bats and their breeding and resting places. During the site works, general mitigation measures for bats will follow the National Road Authority's '*Guidelines for the Treatment of Bats during the Construction of National Road Schemes*' NRA (2005) and '*Bat Mitigation Guidelines for Ireland: Irish Wildlife Manuals, No. 25*' (Kelleher, C. & Marnell, F. (2006)). These documents outline the requirements that will be met in the pre-construction (site clearance) stage to minimise negative effects on roosting bats, or prevent avoidable effects resulting from significant alterations to the immediate landscape. All reasonable steps will be taken to ensure works do not harm individuals by altering working methods or timing to avoid bats, if necessary. No bat roosts were recorded within the proposed development areas. The following mitigation measures will be implemented:

- Any required felling of mature trees, as identified by the supervising ecologist, will be undertaken in autumn (September-November) or spring (April-May) to avoid the destruction of maternity roosts and hibernating sites. Young bats are unable to escape injury because they cannot fly. Equally, hibernating bats may not arouse sufficiently to avoid fatal injuries;
- Felled trees will not be mulched immediately. Such trees should be left lying several hours and preferably overnight before any further sawing or mulching. This would allow any bats within the tree to emerge and avoid accidental death. A bat ecologist will be on-hand during felling operations to inspect felled trees for bats. If bats are seen or heard in a tree that has been felled, work should cease and the local NPWS Conservation Ranger should be contacted for advice;
- Bat roosting sites can change depending on a variety of factors and therefore the presence of bats should never be ruled out completely;
- Retain mature to semi-mature trees in external boundaries where possible and resist 'tidying up' dead wood and spilt limbs on tree specimens;
- Any inadvertent damage to treelines outside the proposed development area but adjacent to it and thus at risk, will be clearly marked by the supervising ecologist.
- During construction lighting will typically be provided by tower mounted 1000W metal halide floodlights that will be cowled and angled downwards to minimise spillage. The primary area of concern is the potential impact on woodland habitat at the HDD site at the Campile River Estuary HDD site. There will be no directional lighting focused towards this woodland and as noted above by cowling and focusing lights downwards light spillage will be minimised.
- Felling of trees with no potential for roosting bats (features such as tree holes, crevices, loose bark, spilt limbs and dead wood are absent) does not require a bat specialist to be present;
- If bats are recorded by the bat ecologist within any vegetation or structure on site i.e. trees, or walls to be removed or impacted on, no works will proceed without a relevant derogation licence from the NPWS.

- Upon completion external lighting will be installed at the converter station. To avoid creating any unnecessary glare external lighting will be turned off during hours of darkness with the exception being for emergency outdoor works.

#### 6.4.10 Bird Mitigation Measures

Works in close proximity to the Campile River Estuary will take place outside the peak season for wintering birds which runs from October to March inclusive. This will prevent any disturbance to wintering species utilising the sites during this period.

The Wildlife Act 1976, as amended, provides that it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land, or any such growing in any hedge or ditch from the 1st of March to the 31st of August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided. Nonetheless, it is recommended that vegetation be removed outside of the breeding season.

Retention of the native tree lines, hedgerows and woodland along the site boundaries will reduce the loss of breeding and nesting habitat for birds. NRA guidelines on the protection of trees and hedges prior to and during construction should be followed (NRA, 2006b).

Prior to the commencement of construction works a full survey for evidence of Barn owl occupation will be carried in relation to an abandoned structure to the south of the converter station site, out by a suitably qualified person to ensure no offence is committed under the Wildlife Act. No demolition of this structure is required. If evidence of Barn owl is found within the building, no construction work shall take place within 30 metres of any part of the site containing material evidence unless survey-based evidence has been provided to the Local Planning Authority that no birds are nesting at the site to which the consent applies. If a nesting site were to be removed it would be necessary to create as a minimum the same amount of suitable Barn owl foraging habitat to that which is being lost to ensure no net loss in biodiversity. This can be on or off-site. A habitat management plan should specify a topping regime of not more than once a year and not before 15th July. Annual topping on a rotational basis can help ensure there is always some optimum foraging habitat available for the barn owls.

#### 6.4.11 Biodiversity and Landscaping

A comprehensive landscaping scheme is proposed for the converter station and tail station site, leading to long-term local improvements in habitat and species diversity in the area.

### 6.5 Archaeology, Architectural and Cultural Heritage

The following mitigation measures will be implemented -

- All ground disturbance within the four complexes of archaeological monuments, all greenfield areas, including off-road locations of works and any ground disturbance associated with the excavation of launch and reception pits, the development of a converter station and tail station at Great Island including a converter station construction compound, the cable contractor compounds at Great Island, Lewistown and the landfall site and the HDD compounds at the Campile River Estuary and landfall site will be monitored by a suitably qualified archaeologist. Topsoil strip will be re-inspected after some days to locate any Stone Age (Mesolithic and Neolithic) lithic material that may not be apparent in freshly turned soil. The archaeologist will secure an excavation licence for monitoring in the event of an archaeological discovery. The licence is issued by The Heritage Service, Department of Culture, Heritage and The Gaeltacht and approved by the National Museum of Ireland.
- The monitoring archaeologist will have the power to halt the development if buried archaeological features or finds are uncovered. If archaeological remains are uncovered, these sites become an archaeological site and are protected by the National Monuments Acts 1930 - 2004, which give rise to the following obligations: Further work on the site will require consultation with the archaeological staff of The Heritage Service, Department of Culture, Heritage and The Gaeltacht. Any newly discovered site will be archaeologically resolved, for example by excavation and preservation by record under licence, or avoidance where feasible.
- At the site of the proposed converter station, tail station and converter station construction compound, where a number of archaeological sites are extant in the wider area, and where previous works during gas pipeline construction uncovered previously unknown archaeological sites, a geophysical survey will be undertaken, under licence. If potential archaeological material is detected, this will be archaeologically resolved prior to construction.
- Financial support and sufficient time within the construction programme will be provided at the outset of the proposed development to facilitate any excavation or recording of archaeological material that may be uncovered during the developmental works. The construction programme will be developed and implemented to reflect this provision, to ensure the preservation of such archaeological material.
- All test pits for engineering purposes will also be archaeologically monitored to prevent accidental damage to buried archaeological features and to record any accidental discovery of features and/or finds. Previous archaeological monitoring of test pits is discussed further in Appendix 10.3 to the EIAR.
- As the proposed route for much of the cable route is along the existing road network it is not expected that any townland boundaries will be breached. If townland boundaries are impacted in greenfield areas, these will be archaeologically recorded.
- A 2.4m hoarding will be provided around contractors' compounds, which will mitigate temporary effects on visual receptors, in particular in the vicinity of the works near Baginbun Beach.

- If the preferred method for crossing the Kilmannock Stream is not used (mini-HDD), and open-cut techniques are used, a wade survey and metal detector survey of the crossing area will be carried out, under licence.

## 6.6 Landscape and Visual

To mitigate visual impacts during construction, solid board hoarding or heras fencing with opaque fabric will be erected to screen views of the works from adjacent houses.

## 6.7 Soils, Geology and Hydrogeology

### 6.7.1 General

**Regulatory Compliance:** The adopted construction techniques will comply with the requirements of statutory bodies and construction will be completed in accordance with the CEMP.

**Ground Contamination:** Good housekeeping (daily site clean-ups, use of disposal bins, etc.) will be carried out on sites during construction, and the proper use, storage and disposal of all substances and their containers will help prevent soil contamination. For all activities involving the use of potential pollutants or hazardous materials, there will be a requirement to ensure that the material such as concrete, fuels, lubricants and hydraulic fluids will be carefully handled and stored to avoid spillages. Potential pollutants shall also be adequately secured against vandalism and will be provided with proper containment according to codes of best practice. Any spillages will be immediately contained, and contaminated soil removed from site and disposed of in a licenced waste facility.

**Ground Contamination:** Excavations in made ground will be monitored by an appropriately qualified person to ensure that any hotspots of contamination encountered are identified, segregated and disposed of appropriately. Care will be taken to ensure that the hotspot does not cross contaminate clean soils elsewhere throughout the sites.

**Ground Contamination:** Potential soil and water pollution will be minimised by the implementation of good construction practices. Such practices will include adequate bunding for oil containers, wheel washers and dust suppression on site roads, and regular plant maintenance. The Construction Industry Research and Information Association (CIRIA) provides guidance on the control and management of water pollution from construction sites in their publication *Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors* (Masters-Williams et al, 2001) and this will be reflected in the detailed CEMP. A contingency plan for pollution emergencies will also be developed prior to the commencement of works and regularly updated, which would identify the actions to be taken in the event of a pollution incident. The CIRIA document recommends that a contingency plan for pollution emergencies will address the following:

- Containment measures;
- Emergency discharge routes;

- List of appropriate equipment and clean-up materials;
- Maintenance schedule for equipment;
- Details of trained staff, location and provision for 24-hour cover;
- Details of staff responsibilities;
- Notification procedures to inform the relevant environmental protection authority;
- Audit and review schedule;
- Telephone numbers of statutory water undertakers and local water company; and
- List of specialist pollution clean-up companies and their telephone numbers.

### **Compression of substrata**

**Excavation support:** Excavations shall be kept to a minimum, using shoring or trench boxes where appropriate. For more extensive excavations, a temporary works designer shall be appointed to design excavation support measures in accordance with all relevant guidelines

### **Loss of Agricultural Land and Solid Geology**

**Material Reuse:** The ground level of the converter station platform has been chosen to balance the volume of excavated material with the volume of fill. Excavated material will be used in the screening berms, which will be located to the south and the east of the converter station platform. Thus, the export of spoil, or import of fill, will be avoided.

### **Effects on the surrounding Ground**

**Movement Monitoring:** Ground settlement, horizontal movement and vibration monitoring will be implemented during the construction activities where required to ensure that the construction does not exceed the design limitations.

**Ground Settlement Control:** Ground settlements will be controlled through the selection of a foundation type and method of construction which are suitable for the particular ground conditions.

### **Effects of excavation of mineral soils beneath the cable route**

**Movement Monitoring:** Ground settlement, horizontal movement and vibration monitoring in the immediate vicinity of roadside buildings will be established during the construction activities to ensure that the construction does not exceed the design limitations.

**Ground Settlement Control:** Ground settlement will be controlled through the selection and method of construction which are suitable for the particular ground conditions.

## 6.8 Water and Hydrology

The following best practice water management measures will be implemented during the construction phase:

### Water Quality

#### General

As part of the assessment of the required construction mitigation, best practice construction measures which will be implemented for the proposed development were considered. A summary of the measures relevant to hydrology are provided as follows and are in accordance with Construction Industry Research and Information Association (CIRIA) guidance - Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (Masters-Williams et al, 2001).

To minimise the potential for elevated silt levels in surface water run-off, the working area used during construction will be clearly outlined prior to the commencement of works and will be kept to the minimum area necessary to effectively complete the works. Vegetation will be retained where possible.

A set of standardised emergency response procedures will govern the management of emergency incidents. These are provided in the CEMP (which is a live document which will be updated/added to as construction progresses), together with the Emergency Incident Response Plan.

A detailed spillage procedure will be put in place and all will be trained with respect to the relevant procedures to be undertaken in the event of the release of any sediment, hydrocarbons into a watercourse. Spill kits will be maintained on site and relevant staff will be trained in their effective usage. All site personnel will be trained and aware of the appropriate action in the event of an emergency, such as the spillage of potentially polluting substances. In the event of spillage of any polluting substance and/or pollution of a watercourse, Wexford County Council, Inland Fisheries Ireland and the NPWS shall be notified. Further measures include:

- A monitoring regime/programme for water quality will be put in place;
- All works undertaken will be fully consolidated to prevent run-off of silt;
- Silt fences/swales shall be provided at all locations where surface water run-off may enter/leave the working areas, and adjacent to the haul roads;
- There will be no tracking of machinery within watercourses;
- Dewatering, where required, will incorporate the use of filter media;
- Self-contained wheel wash facilities will be provided to protect watercourses from the carriage of silt on vehicles with the waste liquid contained on site, and dispatched off-site for disposal at an appropriately permitted facility;

- The length of trench excavation at any particular section of the cable route will be limited to ensure that the trench will not act as a conduit for stormwater run-off.
- Access/haul roads shall be set back from watercourses by at least 10m where possible.
- Refuelling of vehicles will take place at designated locations at a distance of 10m or greater from the nearest watercourse;
- Any fuel stored on site will be stored in double skinned, appropriately sized bunded containers and will be located in a designated work compound;
- No vehicles will be left unattended when refuelling;
- A spill kit including an oil containment boom and absorbent pads will be on site at all time;
- All vehicles will be regularly maintained, washed and checked for fuel and oil leaks;
- Concreting works will be carried out in dry conditions where possible and concrete works will be strictly controlled and monitored;
- No concrete washout will be allowed to discharge to watercourses. Wash out of concrete trucks will not be permitted on site;
- There will be no direct pumping of contaminated water from the works to a watercourse at any time; and
- All discharges will be in compliance with the European Communities (Surface Water) Regulations, 2009 (European Communities, 2009) and the European Communities (Groundwater) Regulations, 2010 (European Communities, 2010).

The following construction management measures will be implemented at all construction compounds, onshore cable routes and the converter station site;

#### **Contractor Compounds**

- Any containers of potential polluting materials such as fuels and oils will be stored in a bunded area (110% capacity) protected from flood damage and inundation;
- All bunded storage areas will be a minimum distance of 10m away from any watercourse;
- A designated bunded refuelling area on an impermeable surface will be provided at all construction compounds, again at a minimum distance of 10m away from any watercourse.

#### **Converter Station Site**

- Secure oil and chemical storage in over-ground bunded areas (110% capacity), limited to the minimum volume required to serve immediate needs with specified delivery and refuelling areas;
- Emergency spill kits retained onsite at sensitive locations;



- Cessation of work and development of measures to contain and/or remove pollutant should an incident be identified;
- Temporary measures will be provided to ensure only clean water is discharged from site i.e. de-silting and temporary oil interceptor. These will be subject to daily inspection to ensure they remain adequate and effective;
- Interceptor/dump/attenuation tanks will be secured at designated points, strapped down to the concrete slab. Backfill will be carefully controlled, ensuring this is balanced and even around all sides of the tank, while the tank is gradually filled internally with water, to avoid distortion or damage from external backfill pressures. The interceptor washdown slab will be constructed. Interceptors will be commissioned by a specialist contractor;
- Silt traps will be employed and maintained in appropriate locations;
- Temporary interception bunds and drainage ditches will be constructed up slope of excavations to minimise surface runoff ingress and in advance of excavation activities;
- Excavation and earthworks will be suspended during and immediately following periods of heavy rainfall in order to minimise sediment generation and soil damage;
- Below ground drainage will be installed prior to erection to completion of building superstructure/roof drainage. Final connection will be made when down pipes are installed to ensure accurate positioning;
- The treated water will discharge directly into the surface water drainage system as it is suitable for direct discharge into the local watercourses, having passed through the oil separator.

#### Surface Water Drainage from the Converter Station

Oily water is classified as rainwater runoff and/or surface wash down which may potentially contain small amounts of low hydrocarbon concentrates in oil containment areas. This is to be treated directly by oil separator facilities on site.

It is proposed to include a Class 1 full retention oil separator unit for the oily water system. Oil storage volume will be provided by the separator and the separator shall be fully capable of isolating all upstream oil flow in the event that the high-level oil alarm is activated. Oil resistant nitrile rubber seals will be employed throughout the oily water drainage systems. The oil separator will be vented in accordance with the manufacturer's recommendations, with vents located clear of all site operating areas, a minimum of 2000mm above ground level. Vent pipes will be supported by means of a concrete post and protected from vehicular traffic by means of spaced concrete bollards, if required.

The treated water will discharge directly into the surface water drainage system as it is suitable for direct discharge into the local watercourses, having passed through the oil separator described above.

#### **Onshore Cable Route**

- Any groundwater or rainwater that collects in a trench will be pumped into locations agreed with the landowners and local authorities. Typically, this will be onto adjacent land, not directly into waterways, and through a filter

medium, to avoid the build-up of silt, as some granular material will, inevitably, be pumped out with the water. A similar arrangement will apply at joint bays, where a sump will be cast into the concrete base for a pump.

- The flowrates will have to match that of the water into the trench, as it must be kept generally free of water. A single pump with a 75mm hose will usually be adequate to deal with rainwater running into a trench.
- For the HDDs, any groundwater or rainwater that collects in a HDD drilling pit shall be pumped away as described above. Any bentonite (or similar HDD drilling head lubrication material) shall be handled and removed by the drilling contractor. Typically for a land-based HDD the volume of bentonite would be approximately 5 cubic metres per shift, and for the landfall HDD the volume of bentonite would be approximately 15 cubic metres per shift. Further information on bentonite is provided in **Section 6.8.1** below.

### Watercourse Crossing - Newtown River

- The preferred method to cross the Newtown River is a HDD using a mini rig. The non-preferred alternative is an open-cut methodology. For the open-cut method the watercourse will be temporarily dammed to allow for cable installation. At the stream crossing, the cable trenching detail will not differ, however, a one metre separation between the protective measures and the bed of the watercourse will be maintained to account for any future erosion. If the open-cut methodology is required the Newtown River watercourse will be temporarily dammed immediately upstream and downstream of the cable installation. Over-pumping will be employed to ensure continuous flow in the watercourse.
- Appropriate silt control measures such as silt fences will be employed where required. Once reinstatement of the cable trench is complete, the temporary dams will be removed and over pumping ceased. No haul road is proposed at the watercourse crossing; plant will utilise existing accesses used by landowners to avoid further works within the watercourse.

### Foul Drainage

The temporary foul drainage at the construction compounds will cater for welfare facilities including a canteen, toilets, showers and hand wash basin only, and will comprise self-contained sanitary facilities, with wastewater stored and tankered off-site to appropriately licensed disposal facilities.

### Flooding

The following best practice construction measures relevant to the hydrological regime and flooding will be implemented for the duration of the construction phase;

- All construction compounds will be in areas that are at low risk of flooding (outside 1:100-year flood zone);
- Material storage locations will be set back from watercourses and surrounded with silt fencing and covered. There will be no material storage in floodplains or areas at risk of pluvial flooding. Material excavated from trenches along the roads will be loaded onto trucks and removed from the site;
- Weather warnings will be monitored during construction to ensure that there is no risk to construction workers installing the cable. A risk

- assessment will be carried out in the case of a weather warning to determine what works can proceed, and what works need to be postponed;
- No material will be stored in flood plains or in areas which would impede flood flow paths;
  - Temporary works (including haul roads) will be designed so as not to affect the connectivity between the relevant channel and the floodplain to maintain adequate flood storage during the construction phase;
  - Where the proposed works encounter an existing drainage line, arrangements will be made to reinstate the existing drainage system. This will mitigate the risk of excess run-off from the proposed works. All road and drainage system modifications are to be designed following relevant best practice guidelines; and
  - Road run-off will be channelled during excavation works for the cable, to avoid potential ponding on roads or flooding of adjacent lands during construction.

### 6.8.1 General mitigation / avoidance of bentonite breakout

#### Design

The first step in minimising drilling fluid breakout is through correct design of the HDD. The depth of cover of the drill will be maximised but must be balanced with the requirements of the cable, particularly dissipation of heat from the cable. Hydrofracture analysis of the design - comparing drilling fluid pressures to the inherent ground strength along each point of the design - will be used to optimise the design and identify any locations with increased risk of breakout.

#### Construction

Identification of higher risk locations allows the contractor to instigate additional measures such as optimising the drilling fluid properties and instigating additional hole cleaning to increase the margin of safety against drilling fluid losses. The use of downhole pressure monitoring tools during pilot hole drilling gives the driller live readings of the drilling fluid pressure in the borehole near the drilling bit. This allows early warning of downhole pressures that are higher or lower than a safe working window at any point along the drill. The safe working window is determined by the hydrofracture modelling of the design prior to construction using ground strength parameters determined by testing results in ground investigation boreholes and samples.

The drilling fluid properties can be optimised during the drilling by the drilling fluids engineer. The formulation will be changed to suit the requirements at particular locations; in zones with low risk of bentonite breakout the fluid viscosity will be increased to ensure all cuttings are removed from the hole, thereby increasing the cross sectional area available for fluid flow resulting in a reduction in the drilling fluid pressure in the hole.

#### 6.8.1.1 Campile Estuary

The conceptual HDD design for Campile Estuary has 16m depth of cover beneath the bed of the Estuary. Unfortunately, there is no ground investigation information directly beneath the estuary, however the geophysics just to the

south of the estuary indicates that the HDD will have 6m of stiff clay and 10m of rock overlying it when drilling beneath the estuary. As a general rule of thumb, 10m cover in rock alone is sufficient to avoid risk of drilling fluid breakout and the risk at the estuary is assessed as low.

Bentonite drilling fluid is composed of approximately 30kg of bentonite clay, a natural occurring clay, per 1m<sup>3</sup> of fresh water. Depending on ground conditions, polymer additives may be added. The polymer additives (e.g. polyacrylamide (PHPA) and polyanionic cellulose (PAC)) are organic, usually starch or sugar based. Polymers can be used as a drilling fluid themselves, instead of bentonite, however they are not as effective as bentonite.

The environmental risk from bentonite is that in freshwater environments they are not readily dispersed and, having a higher specific gravity than water, cover the bottom of the watercourse, smothering benthic flora and breeding sites for fauna. In saltwater environments the bentonite drilling fluid is quickly degraded by to ionic exchange between the salts in the seawater and the bentonite clays in the fluid. The bentonite flocculates and is dispersed by currents and wave action with turbidity (discolouration) the only noticeable effect.

Polymer drilling fluids are biodegradable so for most environments they are acceptable. However, they are not recommended where there is a risk of dispersal in artesian water, particularly if the aquifer is used for potable water. When the starches and sugars decay or are broken down by microbes they can affect the water quality.

For the Campile Estuary, if fluid was lost it would be in the order of 1-5m<sup>3</sup> which would have a clay content of 30-150kg. The saltwater in the estuary would flocculate the bentonite fluid and the clay content would initially be in suspension before settling. It is important to stress that the bentonite clay is inert. It used because of its swelling properties in water, however when it contacts seawater, ionic exchange removes its capacity and it is equivalent in properties to the silt and clay that forms the bed and banks of the Campile Estuary.

### 6.8.1.2 Baginbun

#### Beach

The conceptual design for Baginbun has its minimum depth of cover at the base of the cliffs where the cover is 18m. As a general rule of thumb, 10m cover in rock alone is sufficient to avoid risk of drilling fluid breakout and the risk of breakout on the beach is assessed as very low. For a breakout to occur it would require an open fracture extending from the drill to surface. The risk of this is extremely low - any fracture will be infilled with sediment and even very soft clay would provide sufficient resistance at 18m depth to prevent breakout.

While the design is sufficient to minimise the risk ALARP (as low as reasonably practicable), annular pressure monitoring and good drilling practices will be used as a precaution.

#### Exit

It must be understood that there will be unavoidable loss of drilling fluid when the HDD exits at the sea floor; this occurs on all landfall HDD's. Containment of the fluid at the exit point is not a practical option in active coastal environments; silt curtains are ineffective and liable to be damaged or lost by wave and current action and engineered solutions such as exit casing and coffer dams introduce much greater environmental risk.

As discussed above, when the loss of bentonite drilling fluid to marine environment results in the bentonite being quickly broken down and dispersed, localised discolouration of the water around the exit point typically lasts for 20-60 minutes before it is dispersed by currents. A strategy that can be used is to drill the majority of the HDD with bentonite drilling fluid and then switch to a biodegradable polymer fluid (starch and sugar based) for the exit.

The volume of losses at the exit point depends on the methodology and the strength of the ground at exit. For Baginbun the HDD contractor will stop the pilot hole 50m before the exit then forward ream the hole to the final diameter by push reaming from land towards the exit. The pilot hole is then continued to the seafloor and drilling fluid in the bore is lost to the sea. The final 50m must then be reamed to final diameter and drilling fluid used during this time will mostly be lost to the sea. Finally, when the duct is inserted into the hole drilling fluid will be displaced from the hole and lost to the sea.

Very approximate volumes are 20 m<sup>3</sup> for pilot hole exit, 100 m<sup>3</sup> for reaming exit, and 50 m<sup>3</sup> for the duct installation. Note that these are fluid volumes; the clay percentage is typically 3% if bentonite fluid is used, the cuttings percentage (rock chippings, generally coarse sand size) is typically 1-5%.

Note that on dozens of previous landfall projects, even on those in very quiet coastal environments, there has been no observable sediment on the beach due to the losses at the exit point, so the beach at Baginbun will not be affected by the exit losses.

## 6.9 Resource and Waste Management

### Construction and Demolition Waste Management Strategy

The following is the Construction Waste Management Strategy (CWMS) for the proposed development.

- Description of the proposed development;
- Quantities of wastes arising including procedures for minimisation/reuse/recycling and storage;
- Estimated cost of waste management;
- Management structure, roles and responsibilities C&D waste including names of responsible persons, qualifications and training;
- Procedures for education of workforce and planned dissemination programme;
- Record keeping procedures;

- Details of waste contractors and recycling and disposal sites, including names of relevant permits or licences;
- Waste auditing protocols; and
- Procedures change management and approval protocols.

The CWMP addresses waste generation and arrangements made for prevention, reuse, recycling disposal and collection of recyclables and wastes.

### Construction - General

In addition to the measures inherent in the design of the project, which will be implemented during the construction phase, the following mitigation measures will be implemented:

- Waste disposal will be minimised so far as is reasonably practicable;
- Waste from the proposed development will be transported by authorised waste collectors in accordance with the relevant Irish waste legislation;
- Waste from the proposed development will be delivered to authorised waste facilities in accordance with the relevant Irish waste legislation;
- Source segregation: Where possible, metal, timber, glass and other recyclable material will be segregated during construction works and removed off site to a permitted/licensed facility for recycling. Waste stream colour coding, and photographs of wastes to be placed in each container as required, will be used to facilitate segregation. Where waste generation cannot be avoided this will maximise the quantity and quality of waste delivered for recycling and facilitate its movement up the waste hierarchy away from landfill disposal and reduce its environmental effect;
- Material management: ‘Just-in-time’ delivery will be used so far as is reasonably practicable to minimise material wastage;
- Supply chain partners: The contractor will engage with the supply chain to supply products and materials that use minimal packaging, and segregate packaging for reuse;
- Waste Auditing: The quantity in tonnes and types of waste and materials leaving site will be recorded during the construction phase;
- Waste fuels/oils will be generated from equipment used on-site during construction and will be classified as hazardous waste. Such wastes will be stored in a secure, bunded area on-site prior to collection by a Contractor who holds the appropriate waste collection permit;
- Possibilities for re-use of clean non-hazardous excavation material as fill on the site or in landscaping works will be considered following appropriate testing to ensure material is suitable for its proposed end use. Where excavation material cannot be re-used within the proposed works, every effort will be made to send material for re-use as a by-product, recovery or recycling so far as is reasonably practicable. Re-use as a by-product can be done under an Article 27 notification once the established EPA criteria for such re-use are met;

- The name, address and authorisation details of all facilities and locations to which waste and materials are delivered will be recorded along with the quantity of waste in tonnes delivered to each facility. Records will show material which is recovered, and which is disposed of; and
- Any off-site interim storage or waste management facilities for excavated material will have the appropriate waste licences or waste facility permits in place.

## 6.10 Population and Human Health

Measures which will be implemented to minimise effects on the general amenity of residents will include:

- The erection of directional and information signage where paths are temporarily closed;
- The provision of information to local householders during the construction phase;
- The provision of community liaison and nomination of personnel to manage community relations; and
- The preparation of an emergency response plan to cover foreseeable risks; and
- Construction works in the landfall site (close to Baginbun Beach), Dunbrody, Ramsgrange and wider cycle routes will be completed outside of July and August to avoid effects during the peak season in the area.

Industry-standard traffic management measures will be put in place to alleviate construction-related traffic disruptions. Refer to **Section 6.1** for further details.

Dust emissions will be controlled throughout the construction phase. Refer to **Section 6.2** for details of dust mitigation measures.

Noise and vibration disturbance will also be minimised. Best practice measures for noise control on construction sites will be adhered to during construction. Refer to **Section 6.3** for further details of noise and vibration mitigation measures.

As required by regulation and legislation, a Health and Safety Plan will be prepared to address health and safety issues during the construction phase. This plan will be reviewed and updated as required, as the development progresses. The Project Supervisor Construction Stage will assemble the Safety File as the project progresses. Further details are provided in **Section 5.9**.

## 6.11 Material Assets

GIL will require the contractor to put measures in place to ensure that there are no interruptions to existing services unless this has been agreed in advance with the relevant service provider. Adequate separation distances will be established between the cables and the existing services. Further methods that

will be used to mitigate the risk of damage to existing services will be as follows.

- Assessing route records for existing assets to understand their depth, location and proximity to the planned cable trenches;
- The use of Ground Penetration Radar (GPR), to provide greater confirmation of the locations of existing assets;
- The use of trial holes, again to provide greater knowledge on the exact location of existing assets; and
- Full liaison with asset owners to discuss and agree clearances and where necessary designs.

All works near existing services and utilities will be carried out in ongoing consultation with the relevant utility company or local authority and will follow any requirements or guidelines they may have.

## 6.12 Major Accidents and Disasters

The proposed development will be designed and built in line with best international current practice and, as such, mitigation against the risk of major accidents and/or disasters will be embedded throughout the design.

The scenarios with the highest risk score in terms of a major accident and/or disaster during the construction phase was identified as fire and/or explosion, with a secondary effect of fire water/foam/powder reaching nearby receptors, and a vehicle collision (involving construction traffic or at temporary on-road works).

The mitigation measures, which will limit the likelihood and consequence of a fire or explosion, will include:

- The storage of fuels and oils in contained and bunded areas will mitigate, by prevention, the risk of fire/explosion resulting from the potential spillage of fuels or oils.
- Portable fire extinguishers will be available for use at each of the onshore working areas.
- The proposed development will be subject to a fire safety risk assessment which will assist in the identification of any major risks of fire on site, and mitigation of the same during the construction phase.
- All fire safety requirements will be provided for in co-ordination with Wexford County Council and Greenlink Interconnector Limited. Appropriate site personnel will be trained as first aiders and fire marshals. An emergency response plan will be maintained which will cover all foreseeable risks i.e. fire. In preparing this plan the emergency response services will be consulted.

The mitigation measures, which will limit the likelihood and consequence of a vehicle collision, include a construction traffic management plan.





## Appendices

### Preliminary Environmental Control Plans

Greenlink Interconnector Ltd  
**Greenlink [Ireland Onshore]**  
Appendix 4.1.1 - Frack-out  
contingency plan

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# 1 Frack-Out

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Frac-Out” occurs when fluid pathways are developed between the bore hole and surface, due to the hydraulic pressure of drill fluid within the annulus of the bore exceeding the confining formation strength of the surrounding lithology.

Stakeholders should be reminded that Drilling Fluids are freshwater suspensions of inert clay particles. Although slippery, they are environmentally benign and in fact can be utilised to improve the water retention of poor quality soils. Control Of Substances Hazardous to Health, (COSHH), and Material Safety Data Sheets, (MSDS), are kept on site for all products involved in the drilling operation.

During the drilling of the pilot hole entry and exit curves, when the depth of cover, formation consolidation and confining strength are at a minimum, Frac-Out is most likely.

Frac-Out can also travel to surface via existing pathways, e.g. previously installed utilities, foundation piles and existing boreholes. Any Site Investigation bores sunk must be offset to the proposed drill line and sealed up on completion.

Once punch out at exit point has been achieved, the annular pressure within the bore is relieved. Frac-Out during Hole Opening and Pipe Pulling operations is therefore much less likely to occur.

There are three stages to the management of Frac-Out:

- 1) Prevention
- 2) Containment
- 3) Control

## 1.1 Prevention

As previously noted, Frac-Out occurs when annular fluid pressures exceed formation fracture pressures. Annular fluid pressures are minimised by constant monitoring of the drilling fluid parameters.

The Drill Fluids Operator will monitor Drill Fluid density, viscosity and solids content on a regular basis, (hourly), to ensure that the fluid does not increase in viscosity, requiring additional pressure to maintain mobility.

In critical cases, viscometers will be used to measure Drill Fluid gel strength and shear strength so that Reynolds Numbers can be monitored. Filtrate can also be

measured to calculate the amount of wall cake building up on the internal wall of the bore.

The Driller will monitor the Drill Fluid pressures, volumes, viscosities and densities of mud being pumped through the bore. Any increases in pump pressure will be investigated immediately to prevent the risk of pressure build up within the annulus.

The Fluids Technician will monitor active fluid tank volumes and account for any unexpected changes. The amount of fluid being taken by the additional hole volume drilled will be calculated. (The Drill Fluid is designed to allow water loss in porous formations in order to build filter cake).

The bore hole will be reamed on a regular basis to keep the annulus clear. Rates of Penetration and circulated cuttings volumes will be monitored to ensure that drilled cuttings are being flushed from the bore and are not building up creating pressure restrictions.

Annular fluid velocity will be kept below Critical Velocity to prevent eddying and subsequent erosion caused by turbulent flow.

When drilling clay based formations, inhibitors may be used to prevent the absorption of water and subsequent swelling and sloughing of the formations.

## 1.2 Containment

A Frac-Watch programme will be operated at all times whilst circulating, particularly when drilling past potential pathways. Frac-Out may occur some distance from the bore path.

Prior to drilling, potential Frac-Out pathways will be identified and contingency plans put in place. Sand Bags will be available to control drill fluid at surface. Traffic Management systems will be available in the event that drill fluid spills onto a road.

An excavator will be available to dig a pit to contain fluid. Vacuum trucks will be available to transfer drill fluid from the containment point back to the recycling system.

If Frac-Out occurs in a riverbed, pressure relief bores may have to be drilled on the river bank.

If drilling is being undertaken in contaminated land, Frac-Out may be contaminated.

In the event that Frac-Out is experienced, the rig will immediately shut off the pumps and the drilling assembly will be pulled off bottom to reduce annular pressures.

## 1.3 Control

The freshwater based, bentonite suspension, drill fluid systems utilised by Südkabel are, essentially, low viscosity grouts. In most cases, the fracture pathways will quickly seal up.

Frac-Out is likely to indicate that the bore hole requires reaming to reduce the pressure required to return drill fluid to surface. A Wiper Trip may be sufficient to prevent further Frac-Out.

Various Lost Circulation Material (LCM) drill fluid additives are available to seal fractures in the formation. These vary from locally available substances such as sawdust, wheat chaff, kapok, etc to specifically produced materials such as mica flakes and proprietary chemical additives such as Diamond Seal™ or Micro-Fill™.

As a worst case scenario, cement may be forced into the bore to seal up the pathways. The cement plug can subsequently be drilled out or side-tracked. It is often the case that a combination of containment and control will be required to enable economic completion of the bore.

## 2 Drilling Fluids

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### 2.1 DRILLING FLUIDS - Loss of Circulation

Loss of fluid to the surface in accessible areas or into the river remains our priority at all times. Should mud circulation be lost or become visible during drilling operations we will cease operations immediately. An inspection of the drilling line will be implemented to determine if the fluid loss is to the surface, or being lost down-hole into the surrounding ground formations.

If the fluid loss is upwards towards the surface, then the muds will be contained either by bunding or digging a retaining pit and if possible pumped back to the drilling m/c mud containment pit.

To reduce or halt the mud fracture, the drilling string will be drawn from the hole to a position where mud returns are regained to the rig site.

The pulling back in of the drill-rod string will not only recondition the drilled hole but will also have allowed time for any surface fracture to self-seal.

Once the hole has been re-conditioned, drilling can achieve sealing the fracture whereby new cuttings generated build up in the fracture to the surface eventually packing it off.

Loss of fluid to the surface in accessible areas or into a river remains a priority. This will be contained and controlled immediately. Should the frac-out be under the river then we will have straw bales on the bank ready to place into the river to control and filter the loss whilst any drilling fluid is sucked away by the vacuum tanker.

## 2.2 DRILLING FLUIDS-General

We will have on hand an Enviro-Formfill (or similar) to deal with any major frac out which may occur whilst drilling. During drilling of the bore hole, the drilling fluid lubricates the drill-rod string, removes solids from the borehole, and cools the drilling bit which contains the “downhole instrumentation”.

The drilling fluid system design will be based on expected ground conditions, to be confirmed by yourselves prior to commencement and adjusted as required by the “mud engineer” throughout the drilling operations. The drilling mud has very good sealing properties and is often used in construction of dams, where the water table is close to ground level.

One of the primary functions of drilling mud in Horizontal Directional Drilling, is that it provides a very good “filter cake”. This means that, due to the flat, snake like, platelets of clay and the minute size of the particles, the mud soaks into permeable and porous drilled hole walls, and provides a seal.

Mud viscosity will be varied according to the prevailing conditions and monitoring will be an ongoing operation. It is envisaged that a viscosity of 40-90 seconds will be maintained. Mud pump volumes and pressures will vary according to conditions and the nozzle sizes used in the tools.

## 2.3 DRILLING FLUIDS - Cleaning, Spoil Separation and Disposal

During the drilling of the holes, cuttings will be produced. The cuttings will be carried back along the drilled path by the drilling fluids to the mud pit. The mud holding pit or tank is a pit that is excavated as close as possible to the HDD entry point. The sidewalls of the mud pit are built-up or embanked to form a bund around the mud pit.

The level of drilling fluid in the mud pit is monitored at all times during drilling operations. The drill rig hands will be able to monitor the level of the drilling fluid in the mud pit. The drilling engineer will keep the circulating drilling fluid system in balance and control the rate of pumping from the mud pit to the drilling fluid recycling system.



Fluid and suspended solids will be pumped from the mud pit using bentonite type via vortex type pumps into the fluids re-cycling unit. The cuttings are there separated from the drilling fluids using a series of desander screens, and finally de-silters with hydrocyclones. The solids are separated and vibrated into a holding skip and the cleaned fluid pumped back down the borehole via a mud pump.

At exit, or pipe side of the crossing a tractor and vacuum bowser/tanker combination unit is used to transfer drilling fluid back to rig side.

Cuttings are generated from the drilling process, (similar to a swarf when drilling a hole in wood or metal say) and brought to the mud recycling system by the drilling fluid. The cuttings are then separated from the drilling fluid in the drilling fluid recycling system, and the recycled drilling fluid is used again for drilling. The cuttings fall from shaker screens as a relatively dry product with a small percentage of drilling mud.

Any waste drilling fluids remaining at the completion of all Horizontal Drilling Operations will be removed from site and disposed of by a licensed fluid /solid waste contractors to the nearest appropriate landfill site.

We may use a “Supasorb granule” to absorb the water content and solidify the remaining sludge which can then be excavated and removed by conventional grab wagon and disposed of as Solid waste.