

Sure Partners Limited

ARKLOW BANK WIND PARK
PHASE 2
**ONSHORE GRID
INFRASTRUCTURE**

**ENVIRONMENTAL IMPACT
ASSESSMENT REPORT**

VOLUME II

Chapter 22 Summary of Mitigation,
Monitoring and Residual Effects

ARUP

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Renewables

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22 Summary of Mitigation, Monitoring and Residual Effects

22.1 Introduction

This chapter provides a summary of the proposed mitigation and monitoring measures and residual likely significant effects associated with the proposed development (as identified in **Chapters 7 – 19**).

22.2 Summary of Mitigation Measures

Safeguards and management measures have been identified, which will be implemented, in order to mitigate negative environmental effects during construction, operation and decommissioning as described in detail in **Chapters 7 – 19**.

Mitigation measures that are embedded in the design are generally excluded, as these design measures have been documented as part of **Chapter 5 *Description of Development***.

The environmental management measures which will be implemented during construction are documented in the Construction Environmental Management Plan (CEMP), included in **Appendix 6.1 of Volume 3**.

Table 22.1 summarises specific mitigation measures. **Table 22.2** outlines good practice mitigation measures that Sure Partners Limited (SPL) will implement as a responsible developer.

Table 22.1: Summary table of specific mitigation and monitoring measures and residual effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Air Quality (Chapter 7)						
Population	Landfall, cable route, substation site, National Electricity Transmission Network (NETN)	Construction phase	Elevated air emissions, all elements of proposed development	Use of appropriate personal protective equipment (PPE) for excavation of made ground at substation site Where the asphalt layer is removed at the substation site this will occur in a phased basis and will be replaced with granular hardcore as soon as possible to prevent the generation of windblown dust. Refer to CEMP and detailed breakdown in Section 7.5 of Chapter 7 Air Quality .	Dust monitoring will be undertaken at the three nearest sensitive receptors. The TA Luft dust deposition limit values of 350 mg/m ² /day applied as a 30-day average.	None
Climate (Chapter 8)						
Global atmosphere (compliance with government targets and ETS objectives)	Landfall, cable route, substation site, NETN	Construction phase	CO ₂ emissions, all elements of proposed development, in construction phase	Other than the mitigation measures embedded in design, no other mitigation measures are proposed.	None	Slight, negative, long-term effect
Global atmosphere (compliance with	Landfall, cable route,	Operational phase	An additional source of renewable energy all elements of proposed	None	None	Long-term positive significant effect

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
government targets and ETS objectives)	substation site, NETN		development, in operation phase			
Land and Soils (Chapter 9)						
Excavation of made ground	Substation site	Construction phase	Small proportion of made ground on a local scale. Slight Effect.	<p>Earthworks design involves material re-use, the area in which soils will be removed permanently has been minimised in design</p> <p>Samples of ground suspected of contamination will be tested for contamination during the detailed investigation and ground excavated from these areas will be disposed of to a suitably licensed or permitted site in accordance with the current Irish waste management legislation.</p> <p>Any dewatering in areas of contaminated ground will be designed to minimise the mobilisation of contaminants into the surrounding environment.</p> <p>Where piling is undertaken, it will be completed following the placement of the deeper granular gas drainage layer or alternatively the piling will be completed after the gas drainage layer has been laid.</p> <p>Piling may also be completed after the GCL barrier and drainage layer has been laid, which</p>	Excavations in made ground will be monitored by an appropriately qualified person to ensure that any localised areas of contamination encountered are identified, segregated and disposed of appropriately	Imperceptible

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
				<p>will require excavation of material and sealing the GCL around piles.</p> <p>Care will be taken to ensure that the contaminated material does not cross-contaminate clean soils elsewhere throughout the site.</p> <p>The geotechnical design will ensure that any future settlement on site does not lead to a disruption of the integrity of the geosynthetic liner barrier layer that could lead to water ingress.</p> <p>Implementation of CEMP (Appendix 6.1 of Volume 3)</p>		
Soil and Groundwater	Substation site	Construction phase	<p>Mobilisation of contaminated ground</p> <p>Pollution of soil and groundwater</p>	<p>The barrier layer and upper drainage layer will be placed around the piles and sealed to prevent water ingress below liner</p> <p>Implementation of CEMP (Appendix 6.1 of Volume 3)</p>	Excavations in made ground will be monitored by an appropriately qualified person to ensure that any localised areas of contamination encountered are identified, segregated and disposed of appropriately.	Imperceptible
Water (Chapter 10)						
Existing watercourses and land	Landfall, cable route, substation site, NETN	Construction phase	Pollution associated with drilling fluid or silt-laden or cementitious construction run-off	If field drains are temporarily diverted, facilities will be put in place to over pump the water into a settlement pond to limit silt discharge	Visual monitoring of run-off from works, and turbidity monitoring at Templerainy, Kilbride and Johnstown North watercourses, monitoring of weather forecasts	No significant effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
				<p>If damming and over-pumping is adopted for the open cut watercourse crossings the water will be discharged through a filtering medium to limit silt carry over or bed disturbance downstream of the crossing point</p> <p>Silt pollution caused by working in surface water will be minimised or prevented by keeping water out of the works area using appropriate isolation techniques, such as cofferdams, flume pipes and by-pass channels</p> <p>Implementation of the CEMP (Appendix 6.1 of Volume 3)</p>		
Existing watercourses and land	Substation site	Construction phase	Excavation of contaminated made ground at the substation site may release contaminants via run off	<p>Excavation in made ground will be kept to a minimum, and the arisings will be tested and sent to a waste facility for disposal or recovery</p> <p>Implementation of the CEMP (Appendix 6.1 of Volume 3)</p>	Visual monitoring of run-off from works	No significant effects
Existing watercourses and land	Substation site	Construction phase	A geosynthetic liner will be installed across the site as part of the remedial strategy, preventing the mobilisation of contaminants	None	None	Slight long-term positive effect during operation
Land or sea	Landfall and cable route	Construction phase	The proposed horizontal directional drilling at the landfall and Templerainy Stream has the potential	Any groundwater or rainwater that collects in a HDD drilling pit or in a trench will be pumped away onto adjacent land, not directly into waterways	Visual monitoring of run-off from works	No significant effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
			to generate runoff containing sediment onto the adjoining land and/or into the sea.	Implementation of the CEMP (Appendix 6.1 of Volume 3)		
Existing watercourses or land	Landfall and cable route	Construction phase	Potential for pollutants associated with the HDD to enter the surface water environment as a result of a frack out	<p>Frac-out contingency measures outlined in Chapter 6 Construction Strategy include;</p> <p>The drilling Contractor will develop a location specific HDD frac-out contingency plan.</p> <p>A typical procedure for managing a breakout or frac-out on land would include:</p> <p>Stop drilling immediately;</p> <p>Contain the bentonite by constructing a bund e.g. using sandbags;</p> <p>Recover the bentonite from the bund by pumping to a suitable container or back to the entry pit for recycling;</p> <p>If necessary, inert and non-toxic lost circulation material (mica) will be pumped into the bore profile, which will swell and plug any fissures;</p> <p>A typical procedure for managing a breakout or frac-out under water would include:</p> <p>Stop drilling immediately.</p> <p>Pump lost circulation material (mica), which will swell and plug any fissures.</p> <p>Repeat process as necessary until the breakout has been sealed.</p>	<p>The drilling pressure will be monitored to avoid frac-out occurring.</p> <p>Should a frac-out occur the area will be monitored closely to determine if the breakout has been sealed.</p> <p>Check and monitor mud volumes and pressures as the works recommence.</p>	No significant effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Existing watercourses or land	Landfall, cable route, substation site, NETN	Operational phase	Accidental spillage of hydrocarbons from plant and equipment during operation and maintenance activities which may alter the water quality temporarily	Appropriately sized hydrocarbon interceptors will be installed at strategic locations along the proposed surface water drainage network to prevent any hydrocarbons from leaving the site of the proposed substation. Emergency procedures detailing the measures to be undertaken should any accidental spill happen during operation will be developed as part of the operations manual.	Visual monitoring of run-off from works controls An automated remote monitoring system will be put in place on the proposed attenuation pumping system to monitor on-site infrastructure in an extreme rainfall event. Where this monitoring system notifies an issue, appropriate measures will be adopted, based on the circumstances.	No significant effects
Agricultural land, construction personnel and local population	Substation site	Construction phase	High-levels of rainfall at the substation site has the potential to cause localised flooding and associated damage during the construction phase, prior to raising the embankment	None	Monitoring of weather forecasts	No significant effects
Agricultural land and local population	Substation site	Operational phase	Once constructed the flood defence embankment will have a slight positive long-term effect to flood risk	None	The existing flood defences will be inspected annually for signs of disrepair, together with additional inspections after significant flood events	Slight positive long term

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Noise and Vibration (Chapter 11)						
Noise and vibration receptors	Landfall, cable route, substation site, NETN	Construction phase	Noise and vibration from construction processes	<p>Temporary hoarding and/or fencing will be established around each of the working areas and temporary construction compounds before any significant construction activity commences.</p> <p>Prior to construction works being undertaken, liaison will be undertaken with occupiers of properties that may be adversely affected by construction noise and vibration. A Community Liaison Plan will be implemented</p>	Monitoring of noise and vibration levels at the construction site boundary will be undertaken to identify where work procedures need to be modified. In the event of a valid complaint a noise monitoring protocol will be submitted to Wicklow County Council prior to commencement of any noise monitoring.	Short term negative but not significant noise effects for nearby receptors
Noise and vibration receptors	Substation site	Operational phase	Long-term duration negative noise effects from the operation of the proposed development	No additional mitigation or specific plant noise control measures are proposed at this stage.	Noise generated from the operational substation site will be periodically reviewed.	Long-term negative but not significant effects for nearby receptors
Noise and vibration receptors	Substation site	Operational phase	Cumulative noise effects with the permitted Crag Digital Avoca Ltd data centre	A proposed reduction of sound power levels for the harmonic filters and the 33kV STATCOM reactors (e.g. selection of quieter plant; enclosures; louvres; sound shields, reactor top hats; dynamic vibration absorbers; or active noise cancelling) will be employed by the manufacturer as part of the onshore 220kV substation detailed design so as to avoid cumulative noise levels exceeding the NG4 criteria at surrounding receptors.	<p>Noise generated from the operational substation site will be periodically reviewed. This will include the following:</p> <ul style="list-style-type: none"> Examination of noise sources on site; Examination of noise propagation factors; Operational noise monitoring; and Review of any complaints. 	Long-term negative but not significant effects for nearby receptors

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Biodiversity (Chapter 12)						
Habitats						
Eroding river (FW1) Kilbride Stream	Cable route	Construction phase	Negative, slight, temporary	<p>Works will comply with the IFI’s Guidelines on <i>Protection of Fisheries During Construction Works in and Adjacent to Waters</i> (IFI, 2016) and IFI will be consulted with regard to any proposed over-pumping at the watercourse crossing.</p> <p>During the construction of the crossing of the Kilbride watercourse IFI will be consulted in relation to protecting fish populations. Measures include only undertaking instream works during the period July to September to avoid interference with the spawning migration and spawning process and to protect juvenile fish emerging from the gravels</p> <p>Refer to CEMP and detailed breakdown in Section 12.9 of Chapter 12 Biodiversity</p>	Water quality monitoring. Refer to CEMP and detailed breakdown in Section 12.9 of Chapter 12 Biodiversity	No significant effects
Eroding river (FW1) Johnstown North	Landfall	Construction phase	Negative, slight, temporary	<p>Works will comply with the IFI’s Guidelines on <i>Protection of Fisheries During Construction Works in and Adjacent to Waters</i> (IFI, 2016) and IFI will be consulted with regard to any proposed over-pumping at the watercourse crossing.</p> <p>Refer to CEMP and detailed breakdown in Section 12.9 of Chapter 12 Biodiversity</p>	Water quality monitoring. Refer to CEMP and detailed breakdown in Section 12.9 of Chapter 12 Biodiversity	No significant effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Landscape and Visual (Chapter 14)						
Vicinity of the substation site and NETN connection	Substation site, NETN	Construction and operational phase	<p>There will be locally minor to moderate short-term negative effects on the landscape character during the construction phase</p> <p>There will be minor to moderate effects on landscape character during the operational phase.</p> <p>The proposed 220kV substation and NETN connection will give rise to localised, minor and negative effects on views along the Vale Road.</p>	<p>Mitigation measures have been embedded in the design including the selection of materials and colours for building cladding</p> <p>At the 220 kV substation, the space between the main security fence and the outer timber fence will be planted with shallow rooting hedge and shrub species.</p> <p>Maintenance of site lighting, incorporating horizontal cut-off light fittings, will ensure light spill is minimised.</p>	<p>Implementation of the CEMP (Appendix 6.1 of Volume 3) for orderly maintenance and management of construction areas.</p> <p>Maintenance of lighting fixtures and substation site area during operation.</p>	<p>There will be locally minor to moderate short term negative effects during the construction phase.</p> <p>There will be minor to moderate negative visual impacts, and no significant impacts on landscape character during the operation of the proposed development.</p>
Vicinity of Landfall Site	Landfall	Construction and operational	<p>There will be short-term, localised, major adverse effects on the landscape character during the construction phase as the landfall will be located within the designated <i>Southern Coastal Area (AONB)</i> category which is of high landscape sensitivity.</p>	<p>The landfall is entirely underground (other than the surface manhole covers)</p> <p>Trees and hedgerows removed to facilitate construction corridors will be replaced or replanted with shallow rooted species above the underground cable circuits.</p>	<p>Implementation of the CEMP (Appendix 6.1 of Volume 3) for orderly maintenance and management of construction areas.</p>	<p>There will be negligible or locally minor effects on landscape character at the landfall expected.</p>

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
			There will be negligible and neutral effects during operation			
Vicinity of the Cable Route	Cable route	Construction and operational phase	<p>There will be short-term localised negative effects ranging from minor to moderate on landscape character</p> <p>The site access and construction compound directly opposite the grounds of Kilbride Church (in ruins) and <i>Howard Mausoleum</i> (RPS No. 16404006) will result in short-term major adverse effects on the setting of the historic site</p> <p>There will be negligible effects on views during operation except where vegetation loss is replaced with shallow rooted plants which will give rise to localised minor adverse effects on views</p>	<p>The entire length of the cable route from landfall to substation will be underground</p> <p>Trees and hedgerows removed to facilitate construction corridors will be replaced or replanted with shallow rooted species above the underground cable circuits.</p>	Implementation of the CEMP (Appendix 6.1 of Volume 3) for orderly maintenance and management of construction areas	Short-term localised negative effects during construction and no significant effects during operation

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Vicinity of the landfall site and cable route	Landfall and cable route	Operational phase	Coastal woodland planting will have a positive effect on landscape character	An area of coastal woodland planting will be provided at the landfall site extending to 16,000m ² and comprising native woodland species	The Contractor will be required to include a 24-month defects liability clause for replacement landscaping and any planting that fails to establish or dies will be replaced. The coastal woodland planting at the landfall site will incorporate stock proof fencing and have a 5 year aftercare programme to ensure proper establishment of the woodland	Coastal woodland planting will have a positive effect on landscape character
Archaeology, Architectural and Cultural Heritage (Chapter 15)						
Visual Receptors	Landfall, cable route	Construction phase	None	None	None	No significant effects
Greenfield sites of archaeological potential	Landfall, cable route,	Construction phase	Ground disturbances may result in direct negative effects on previously unrecorded features that have the potential to survive beneath the current ground level without surface expression. This may range from moderate to profoundly negative effects.	A programme of archaeological testing will be carried out in advance of construction within all greenfield areas, by an archaeologist under licence. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record and/or archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoHLGH.	Monitoring may be required if any features of archaeological potential are discovered.	No significant effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Architectural Heritage	Landfall, cable route, substation	Construction phase	Neutral	None	None	No significant effects
Underwater Archaeology	Cable route	Construction phase	The proposed development will cross eight small watercourses. Disturbances may result in direct negative effects on previously unrecorded features or deposits that have the potential to survive in and within the immediate vicinity of the watercourses. This may range from moderate to profoundly negative effects.	A programme of underwater archaeological assessment, in the form of wade surveys, will be carried out on each watercourse in advance of construction, by an archaeologist under licence. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record and/or archaeological monitoring. Any further mitigation will require approval from the National Monuments Service of the DoHGLH.	Monitoring may be required if any features of archaeological potential are discovered.	No significant effects
Material Assets (Chapter 17)						
Irish Electricity Network	Landfall, cable route, substation site, NETN	Operational phase	Supply of an additional 520MW of renewable energy	None required	None	Long-term significant positive effects
Land use	Landfall, cable route, NETN	Construction and operational phases	Temporary occupation of land during construction. Restrictions on operations and development over the cable during operation.	None	None	Long-term slight negative effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Electricity supply	Landfall, cable route, substation site, NETN	Construction phase	Increase in demand for electricity from the construction of the proposed development.	None	None	No significant effects
Mains water supply	Landfall, cable route, substation site, NETN	Construction phase	Slight increase in water demand during construction	None	None	No significant effects
Foul wastewater treatment and drainage	Landfall, cable route, substation site, NETN	Construction phase	Increase demand for foul wastewater treatment and drainage capacity during construction.	None	None	No significant effects
Population and Human Health (Chapter 18)						
Business, Tourism and Employment	Landfall, cable route, substation site, NETN	Construction and Operational Phase	<p>The construction and operational phase will provide employment which will have a positive effect on the local economy</p> <p>The proposed development will enable an additional renewable energy supply in Ireland</p> <p>The construction works will have limited effects on tourism.</p>	None	None	Long-term positive effects through renewable energy supply and economic benefits to the community

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
			<p>There is potential for a short-term disturbance to tourists in the form of noise and air emissions and possible visual effects.</p> <p>A multi-million-euro community benefit fund will be established once the Project is operational to support communities near the wind farm, having a long-term positive effect on population.</p>			
Human Health	Landfall, cable route, substation site, NETN	Construction and Operational Phase	<p>Possible effects on human health as a result of the construction works</p> <p>There will be no significant effects from electro-magnetic fields during the operation of the proposed development</p>	<p>No significant health effects are predicted with the mitigation already proposed and embedded in the design.</p> <p>Implementation of the CEMP (Appendix 6.1 of Volume 3)</p>	None	None
Major Accidents and Disasters (Chapter 19)						
Sensitive ecological receptors	Landfall and cable route	Construction Phase	Effects to biodiversity	A location specific HDD frac-out contingency plan, detailing measures to be taken to reduce the risk of bentonite breakout and measures to	The drilling pressure will be monitored to avoid frac-out occurring.	None

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
				be taken for the protection of sensitive ecological receptors	Should a frac-out occur the area will be monitored closely to determine if the breakout has been sealed. Check and monitor mud volumes and pressures as the works recommence.	

22.3 Good Practice Mitigation

Table 22.2 outlines the good practice mitigation measures that will be implemented by Sure Partners Limited as a responsible developer.

Table 22.2 Summary table of good practice mitigation and monitoring measures and residual effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Air Quality (Chapter 7)						
Population	Landfall, cable route, substation site, NETN	Construction phase	Elevated air emissions	Re-vegetate earthworks and exposed areas/soil stockpiles Cover stockpiles Ensure vehicles entering and leaving site are covered to prevent escape of materials during transport Use water-assisted dust sweeper(s) Implement a wheel washing system Use water sprays	The Contractor will undertake on-site and off-site inspection. Refer to CEMP and detailed breakdown in Section 7.5 of Chapter 7 Air Quality .	None

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
				<p>Site layout planned so that machinery and dust causing activities are located away from receptors</p> <p>Erect a 2m minimum site hoarding around construction compounds.</p> <p>Keep site fencing, barriers and scaffolding clean using wet methods.</p> <p>Cover, seed or fence stockpiles</p> <p>Ensure an adequate water supply on the site</p> <p>Use enclosed chutes and conveyors and covered skips</p> <p>Hold regular liaison meetings with other construction sites within 500m to the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised</p> <p>Record all dust and air quality incidents, complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.</p> <p>Minimise drop heights</p> <p>Only remove the cover in small areas during work and not all at once</p> <p>Ensure equipment and spill kits are readily available on site</p>		

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
				<p>Access gates to be located at least 10m from receptors where possible</p> <p>A Community Liaison Plan that includes community engagement before work commences on site will be implemented.</p> <p>Dust mitigation measures described in the CEMP (Appendix 6.1 of Volume 3) will be implemented.</p> <p>Refer to CEMP and detailed list of measures in Section 7.5 of Chapter 7 Air Quality.</p>		
Land and Soils (Chapter 9)						
Topsoil and subsoil	Landfall, cable route, substation site, NETN	Construction phase	Loss or damage of topsoil and/or subsoil	<p>Earthworks design involves material re-use, the area in which soils will be removed permanently has been minimised in design</p> <p>Implementation of CEMP (Appendix 6.1 of Volume 3)</p>	Excavations in made ground will be monitored by an appropriately qualified person to ensure that any contaminated material is identified, segregated and disposed of appropriately	Imperceptible
Soils and groundwater	Landfall, cable route, substation site, NETN	Construction phase	Loss, disturbance and/or contamination due to spills or mobilisation of contaminants	<p>Implement the measures in Environmental Incident and Emergency Response Plan as detailed in the CEMP (Appendix 6.1 of Volume 3). This identifies the actions to be taken in the event of a pollution incident.</p> <p>The CEMP addresses spoil management, containment measures, emergency discharge routes, a list of appropriate equipment and clean-up materials.</p>	Excavations in made ground will be monitored by an appropriately qualified person to ensure that any contaminated material is identified, segregated and disposed of appropriately	Imperceptible

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
				Refer to CEMP (Appendix 6.1 of Volume 3) and Section 9.7 of Chapter 9 Land and Soils.		
Loss of solid geology	Landfall, cable route, substation site, NETN	Construction phase	Loss of a small proportion of any possible aggregate reserves	Earthworks design involves material re-use, the area in which soils will be removed permanently has been minimised in design Implementation of CEMP (Appendix 6.1 of Volume 3)	None	Imperceptible
Earthworks haulage	Landfall, cable route, substation site, NETN	Construction phase	Soil compaction and disturbance of natural ground	Excavation support Haulage routes will be along predetermined routes Implementation of CEMP (Appendix 6.1 of Volume 3)	Movement monitoring shall be carried out during any activities which may result in ground movements or movements of any nearby structures	Imperceptible
Effects on surrounding ground	Landfall, cable route, substation site, NETN	Construction and decommissioning phase	Adequate design of temporary works limits movements to an acceptable limit	Ground settlement control Implementation of CEMP (Appendix 6.1 of Volume 3)	Movement Monitoring	Imperceptible
Loss or damage of proportion of aquifer through pollution	Landfall, cable route, substation site, NETN	Construction and operational phase	Mobilisation of contaminants into the aquifer	Excavation of made ground will be kept to a minimum in line with the proposed remediation strategy	Groundwater monitoring	Imperceptible
Soil improvement for platform works	Substation site	Construction phase	Piling works at substation site, volume of material for soil improvement is low on a local scale	Ground settlement control Implementation of CEMP (Appendix 6.1 of Volume 3)	Movement monitoring	Imperceptible

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Soil improvement works for flood defences	Substation site	Construction phase	Localised raising of embankment	Silt mitigation measures will need to be implemented to minimise the transfer of sediment into the adjacent Avoca River. Implementation of CEMP (Appendix 6.1 of Volume 3)	Movement monitoring	Imperceptible
Change to groundwater regime	Landfall, cable route, substation site, NETN	Construction phase	Pumping of excavations below the existing groundwater table could lead to temporary change in the groundwater flow.	Dewatering for (M11) HDD platforms Implementation of CEMP (Appendix 6.1 of Volume 3)	Groundwater monitoring	Imperceptible
Water (Chapter 10)						
Existing watercourses and land	Landfall, cable route, substation site, NETN	Construction phase	Pollution associated with drilling fluid or silt-laden or cementitious construction run-off	No materials will be stored in flood plains or in areas which would impede flood flow paths Where possible, soil excavation will not be completed during periods of prolonged or heavy rain Earthworks operations shall be carried out such that surfaces shall be designed with adequate falls, profiling and drainage to promote safe run-off and prevent ponding and flooding 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	None	No significant effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
				<p>The temporary foul drainage at the construction compounds will comprise self-contained sanitary facilities, with wastewater stored and tankered off-site to appropriately licensed treatment facilities</p> <p>The CEMP includes surface water management measures which will cover all potentially polluting activities to minimise the risk to waterbodies.</p> <p>Specific environmental control measures to minimise the effect on the hydrological regime, water quality and flooding are outlined in the CEMP.</p> <p>Refer to CEMP (Appendix 6.1 of Volume 3) and Section 10.6 of Chapter 10 Water.</p>		
Existing watercourses and land	Landfall, cable route, substation site, NETN	Construction phase	The construction activities have the potential to alter the hydrological regime temporarily	<p>There will be no tracking of machinery within watercourses other than the stream bed excavation for the temporary works</p> <p>Implementation of the CEMP (Appendix 6.1 of Volume 3)</p>	None	No significant effects
Existing watercourses and land	Landfall, cable route, substation site, NETN	Construction phase	Pollution associated with washing of vehicles and equipment during construction	Implementation of the CEMP (Appendix 6.1 of Volume 3)	Visual monitoring of run-off from works	No significant effects
Existing watercourses and land	Landfall, cable route, substation site, NETN	Construction phase	Pollution associated with spills of fuel or oils during construction	Implementation of the CEMP (Appendix 6.1 of Volume 3)	Visual monitoring of run-off from works	No significant effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Agricultural land, construction personnel and local population	Landfall, cable route	Constriction phase	The temporary open cut method for watercourse crossings will have the potential to locally increase flood risk to adjoining agricultural land, and associated risk to construction personnel. This would have a short term slight negative effect.	Implementation of the CEMP (Appendix 6.1 of Volume 3)	Monitoring of weather forecasts	Temporary slight negative effects
Existing watercourses or land	Landfall, cable route, substation site, NETN	Construction phase	Potential water contamination resulting from accidental spillages of effluent and sanitary waste from construction welfare facilities provided for the construction staff on site	Implementation of the CEMP (Appendix 6.1 of Volume 3)	Visual monitoring of run-off from works	No significant effects
Noise and vibration (Chapter 11)						
Noise and vibration receptors	Landfall, cable route, substation site, NETN	Construction phase	Noise and vibration from construction processes	Noise and vibration will be minimised through the adoption of good industry practice. Vehicles and mechanical plant will be operated in such a manner as to minimise noise emissions. Compressors will be fitted with properly lined and sealed acoustic covers. Pneumatic percussive tools will be fitted with mufflers or silencers.	Monitoring of noise and vibration levels at the construction site boundary will be undertaken to identify where work procedures need to be modified.	No significant effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
				<p>Equipment which breaks concrete, brickwork or masonry by bending, bursting or “nibbling” will be used in preference to percussive tools.</p> <p>Rotary drills and bursters activated by hydraulic, chemical, or electrical power will be used for excavating hard or extrusive material.</p> <p>Machines in intermittent use will be shut down or throttled down to a minimum when not in use.</p> <p>Wherever possible, equipment powered by mains electricity will be used in preference to equipment powered by internal combustion engine or locally generated electricity</p> <p>No part of the works nor any maintenance of plant will be carried out in such a manner as to cause unnecessary noise except in the case of an emergency when the work is absolutely necessary for the saving of life or property or the safety of the works</p> <p>Plant will be maintained in good working order so that extraneous noise from mechanical vibration, creaking and squeaking is kept to a minimum</p> <p>Noise emitting machinery which is required to run continuously will be housed in a suitable acoustically lined enclosure.</p> <p>Refer to CEMP (Appendix 6.1 of Volume 3) and Section 11.6 of Chapter 11 Noise and Vibration.</p>		

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Biodiversity (Chapter 12)						
Habitats						
All habitats	Landfall, cable route, substation site, NETN	Construction phase	Negative, neutral to moderate, long-term	<p>All site staff and sub-contractors will have the responsibility to:</p> <p>Work to agreed plans, methods and procedures to eliminate and minimise environmental impacts.</p> <p>Understand the importance of avoiding pollution on-site, including noise and dust, and how to respond in the event of an incident to avoid or limit environmental impact.</p> <p>Respond in the event of an incident to avoid or limit environmental impact.</p> <p>Report all incidents immediately to the site manager and the ecological clerk of works (ECOW).</p> <p>Monitor the workplace for potential environmental risks and alert the site manager if any are observed. Co-operate as required, with site inspections.</p> <p>Preventing surface water run-off</p> <p>Effects to habitats will be minimised through adoption of good industry practise and mitigation measures as outlined in the CEMP (Appendix 6.1 of Volume 3) and Section 12.9 of Chapter 12 Biodiversity.</p>	None	No significant effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Non-native invasive species	Flood defence embankment	Construction phase	Negative, significant, permanent	Implementation of Invasive Species Management Plan, Appendix D of the CEMP (Appendix 6.1 of Volume 3) and Section 12.9.1 of Chapter 12 Biodiversity	Monitoring to detect any new or re-occurrence of infestation	No significant effects
Fish						
Loss of habitat due to permanent culvert in Johnstown South Stream	Landfall, cable route,	Construction phase	Negative, slight, permanent	Refer to CEMP and detailed breakdown in Section 12. 9 of Chapter 12 Biodiversity	None	No significant effects
Noise and vibration	Landfall, cable route, substation site	Construction phase	Negative, not significant, short term	Refer to CEMP and detailed breakdown in Section 12. 9 of Chapter 12 Biodiversity	None	No significant effects
Effects from electromagnetic fields	Landfall, cable route, substation site, NETN	Construction phase	Negative, not significant, short term	None	None	No significant effects
Otter						
Habitat	Landfall, cable route, substation site, NETN	Construction phase	Slight, short-term, not significant	None	None	No significant effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Bats						
Roosting sites, foraging sites, hibernation sites	Landfall, cable route, substation site, NETN	Construction phase	Long-term, slight, not significant	None	None	No significant effects
Badger						
Habitat and setts	Landfall, cable route, substation site, NETN	Construction phase	Negative, slight, imperceptible	None	None	No significant effects
Birds						
Habitat	Landfall, cable route, substation site, NETN	Construction phase	Negative, slight, temporary during construction	None	None	No significant effects
Shoreline / Estuarine Habitats			Negative, temporary, slight	None	None	No significant effects
Other Fauna						
Amphibians, reptiles, invertebrates	Landfall, cable route, substation site, NETN	Construction phase	Negative, slight, temporary	None	None	No significant effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Traffic and Transport (Chapter 13)						
Local population	Landfall, cable route, substation site, NETN	Construction phase	Effects on traffic flows on the surrounding road network	<p>Deliveries of materials will be planned and programmed to ensure that the materials are delivered only as they are required at the working areas.</p> <p>Works requiring multiple vehicle deliveries, such as concrete pours, will be planned so as to ensure there will be no queuing on the public roadways around the working areas.</p> <p>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.</p> <p>Roads immediately adjacent to the construction compounds will be visually inspected on a daily basis and power swept and washed as and when required.</p> <p>Trucks will not be allowed to park on public roads. Adequate parking will be provided at the substation site and temporary construction compounds.</p> <p>For any works related to the cable route that require lane closures the length of lane closure and the required working area will be kept as small as possible</p> <p>Roads immediately adjacent to the construction compounds will be visually inspected on a daily basis and power swept and washed as and when required</p>	Monitoring of traffic volumes and compliance. Compliance with Construction Traffic Management Plan as part of the CEMP (Appendix 6.1 of Volume 3)	Short-term slight negative

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
				Refer to CEMP (Appendix 6.1 of Volume 3)		
Landscape and Visual (Chapter 14)						
Vicinity of the proposed development	Landfall, cable route, substation, NETN	Construction phase	Negative, short term effects during construction (particularly at the landfall area and close to areas of historical significance)	The substation site, temporary construction compounds and temporary work areas will be managed in an orderly manner, with security fencing or hoarding as appropriate kept in good condition, and vehicular access managed to avoid congestion outside the development site, in accordance with the CEMP (Appendix 6.1 of Volume 3). All vehicular traffic leaving work areas will be clean, and the local road network kept clean in accordance with the CEMP (Appendix 6.1 of Volume 3).	Implementation of the CEMP (Appendix 6.1 of Volume 3) for orderly maintenance and management of construction areas	Short-term localised negative effects during construction and no significant effects during operation
Vicinity of the Cable Route	Cable route	Construction phase	There will be short-term localised negative effects ranging from minor to moderate on landscape character There will be negligible effects on views during operation except where vegetation loss is replaced with shallow rooted plants which will give rise to localised minor adverse effects on views	Tree protection fencing in accordance with BS 5837: 2012 will be used to protect trees during construction works. All excavations will be backfilled using stockpiled materials	Implementation of the CEMP (Appendix 6.1 of Volume 3) for orderly maintenance and management of construction areas	Short-term localised negative effects during construction and no significant effects during operation

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
Resource and Waste Management (Chapter 16)						
Waste Recycling and Disposal Facilities	Landfall, cable route, substation site, NETN	Construction Phase	<p>Displacement of available waste management capacity during the construction phase</p> <p>Waste generated during the operation will not be significant</p>	<p>The Contractor will minimise waste disposal so far as is reasonably practicable</p> <p>The Contractor will engage with the supply chain to supply products and materials that use minimal packaging.</p> <p>Where possible recyclable material will be segregated during construction works and removed off site to a permitted/licensed facility for recycling.</p> <p>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</p> <p>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</p> <p>Excavated material will be stored onsite within the planning (red line) boundary prior to re-use.</p> <p>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.</p>	<p>Ongoing monitoring during construction as part of the Construction and Demolition Waste Management Plan (C&DWMP) as included in the CEMP (Appendix 6.1 of Volume 3) to ensure all opportunities for reduction, reuse and recycling are taken.</p>	<p>Minor, negative, and short-term during the construction phase</p>

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
				<p>The Contractor will record the quantity in tonnes and types of waste and materials leaving site during the construction phase</p> <p>The Contractor will ensure that any off-site interim storage or waste management facilities for excavated material have the appropriate waste licences or waste facility permits in place.</p> <p>Implementation of a Construction Waste Management Plan, as part of the CEMP (Appendix 6.1 of Volume 3)</p>		
Material Resources	Landfall, cable route, substation site, NETN	Construction Phase	Consumption of finite resources	<p>Sustainable earthworks embedded in design including re-use of materials</p> <p>Implementation of a construction waste management plan, as part of the CEMP (Appendix 6.1 of Volume 3)</p>	Ongoing monitoring during construction as part of the C&DWMP to ensure all opportunities for reduction, reuse and recycling are taken.	Imperceptible
Material Assets (Chapter 17)						
Existing utilities	Landfall, cable route, substation site, NTN	Construction phase	Interference with existing services during construction	<p>Adequate separation distances will be established between the cables and the existing services.</p> <p>Measures will be put in place to protect existing services</p> <p>Assessing route records for existing assets to understand their depth, location and proximity to the planned cable trenches.</p> <p>Use Ground Penetration Radar (GPR), to provide greater confirmation of the locations of existing assets.</p>	Ongoing consultation with service providers	No significant effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
				<p>Use of trial holes, to provide greater knowledge on the exact location of existing assets.</p> <p>Refer to CEMP and detailed breakdown in Section 17.6 of Chapter 17 Material Assets.</p>		
Chapter 18 Population and Human Health						
Accessibility, journey patterns and journey amenity	Landfall, cable route, substation site, NETN	Construction phase	<p>Possible effects on road network during the construction phase</p> <p>Traffic generated during the operational phase will be minimal</p>	<p>Access to local residences, shops and community facilities along the onshore cable route will be maintained during the construction phase.</p> <p>The provision of community liaison and nomination of personnel to manage community relations</p> <p>The implementation of a Construction Traffic Management Plan as included in the CEMP (Appendix 6.1 of Volume 3) to minimise effects on traffic flow.</p> <p>Implementation of the CEMP (Appendix 6.1 of Volume 3)</p>	None	No significant effects
Residential Amenity	Landfall, cable route, substation site, NETN	Construction and Operational phases	<p>Slight, negative, short term effects on the general amenity of the surrounding area during the construction phase</p> <p>The proposed development would support enough energy to offset 530,225 tonnes of annual carbon emissions, having positive effect</p>	<p>Mitigation measures relating to air quality, noise, traffic and transportation and visual amenity are discussed in Chapters 7, 11, 13 and 14 respectively.</p> <p>Access to local residences, private property, shops and community facilities along the proposed cable route will be maintained during the construction phase.</p> <p>Implementation of the CEMP (Appendix 6.1 of Volume 3)</p>	None	Long-term positive effects through renewable energy supply and economic benefits to the community

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
			during the operational phase.			
Local population	Landfall, cable route, substation site, NETN	Construction phase	Disturbances to local population during the construction phase	<p>Community liaison will be undertaken in order to reduce nuisance to residents during the works, to ensure public safety and welfare by implementing the following:</p> <p>Providing information for the public during the construction phase, (particularly nearby sensitive receptors)</p> <p>Providing the correct points of contact and being responsive</p> <p>The implementation of the emergency response plan to cover foreseeable risks</p> <p>Ensuring good housekeeping in all aspects of the operations.</p> <p>A ‘good neighbour’ policy will also be implemented</p> <p>As required by regulation and legislation, a Health and Safety Plan will be prepared to address health and safety issues during the construction phase</p> <p>Reduction of nuisance factors</p> <p>Maintaining access to neighbouring premises</p> <p>Undertaking timely liaison with stakeholders.</p>	None	No significant effects

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
				<p>A Community Liaison Plan will be implemented as included in the CEMP (Appendix 6.1 of Volume 3),</p> <p>The implementation of a CEMP to minimise effects of construction works on local amenity and on traffic flow (Appendix 6.1 of Volume 3)</p>		
Major Accidents and Disasters (Chapter 19)						
Human beings	Substation site	Construction phase	Fire and/or explosion during construction	<p>The storage of fuels and oils in contained and bunded areas, with quantities stored being limited to the minimum volume required to meet the immediate requirements.</p> <p>Portable fire extinguishers will be available for use at each of the onshore working areas.</p> <p>Appropriate site personnel will be trained as first aiders and fire marshals.</p> <p>Implementation of the Environmental Incident and Emergency Response Plan as presented in the CEMP (see Appendix 6.1 of Volume 3).</p>	None	None
Human beings	Substation site	Operational phase	Fire and/or explosion during operation	<p>The proposed development will comply with BS 9999 <i>Fire safety in the design, management and use of buildings</i>.</p> <p>Fire detection and alarm will be designed to BS 5839 <i>Fire Detection and Alarm Systems for Buildings</i></p>	Monitoring of site activities to minimise fire and explosion risk will be a key part of the duties of the site safety officer and fire marshals	None

Receptor	Location	Timing	Potential Effects	Mitigation	Monitoring	Residual Effects
				<p>The buildings will be equipped with fire suppression equipment that may aide safe evacuation in the event of a fire.</p> <p>Fire suppression systems will be fitted to all enclosed areas with equipment/plant containing oil unless it can be demonstrated at detailed design stage that it is safe not to do so.</p> <p>Cable routes and other holes through walls and floors will be designed to be capable of being fire sealed after installation of all equipment/plant and cables.</p> <p>A Fire Plan specific to the substation site will detail the pre-planned procedures in place for use in the event of a fire.</p> <p>Smoke detection will be provided throughout the substation building.</p>		

22.4 References

Environmental Protection Agency (2017) *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft August 2017)*

European Commission (2017) *Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report*

IFI (2016) *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.*