Celtic Interconnector

Volume 3A

Non Technical Summary

June 2021

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Contents

Introduction

The Celtic Interconnector[1] project will create an electrical interconnection between Ireland and France to allow the exchange of electricity between the two countries. It is being jointly developed by EirGrid, the electricity Transmission System Operator (TSO) in Ireland, and its French counterpart, RTE (Réseau de Transport d'Électricité).

Designated as a Project of Common Interest (PCI) by the European Union, the Celtic Interconnector project responds to European challenges by facilitating progress towards a low-carbon electricity mix and contributing to more secure, more sustainable and better priced electricity.

The main elements of the overall Celtic Interconnector project are:

- A High Voltage Direct Current (HVDC) submarine cable of approximately 500km in length laid between the coast in Brittany France, and the Cork coast in Ireland. The submarine cable will be either buried beneath the seabed or laid on the seabed and covered for protection;
- A landfall location in Ireland and France, where the HVDC submarine circuit will come onshore and terminate at a Transition Joint Bay (TJB);
- A HVDC underground cable (UGC) in both countries between the landfall location and a converter station compound;
- A converter station in both countries to convert the electricity from HVDC to High Voltage Alternating Current (HVAC) and vice versa;
- A HVAC UGC in both countries between the converter station compound and the connection point to the National Grid;
- A connection to the National grid; and,
- A fibre optic link, with associated power supply, will also be laid along the route for operational control, communication and telemetry purposes.

The key elements of the project are illustrated in Figure 0.1 and Figure 0.2.

Following pre-application consultation between EirGrid and the Irish Competent Authorities for the onshore element (An Bord Pleanála) and the offshore element (the Foreshore Unit of the Department of Housing, Local Government and Heritage) of the project, it has been agreed that Environmental Impact Assessment Reports (EIARs) will accompany the separate consent applications to assist the Irish Competent Authorities in carrying out EIA for these project elements.

Volume 3C (EIAR for Ireland Onshore) addresses the proposed development (Ireland Onshore element of the overall Celtic Interconnector project) between the grid connection point at Knockraha substation and the area of the High Water Mark (HWM) at Claycastle Beach in Youghal, both in County Cork.

Volume 3D (EIAR for Ireland Offshore) addresses the proposed development (Ireland Offshore element of the overall Celtic Interconnector project), between the area of the HWM at Claycastle Beach and the outermost limit of the Irish Exclusive Economic Zone (EEZ).

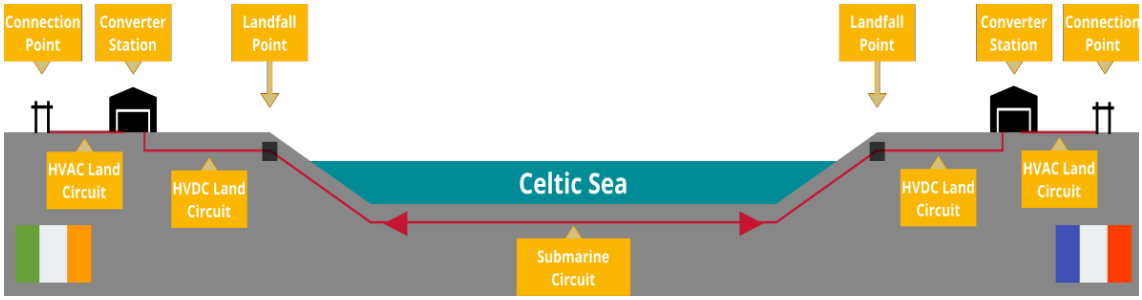
This document is a non-technical summary to Volume 3C providing a brief overview of the associated impacts and mitigation of the onshore elements of the Celtic Interconnector within for the Irish planning jurisdiction i.e. land–based elements. It is recommended that the planning drawings (Volume 1B) and the main EIAR document (Volume 3C) are reviewed in order to

[1] An interconnector is an electrical transmission connection which crosses or spans a border between countries connecting the transmission systems of those countries.

obtain detailed information. A Construction Environmental Management Plan, a Construction Waste Management Plan and a Traffic Management Plan are included in Appendix 3.1 of Volume 3C Part 2 (3C2).

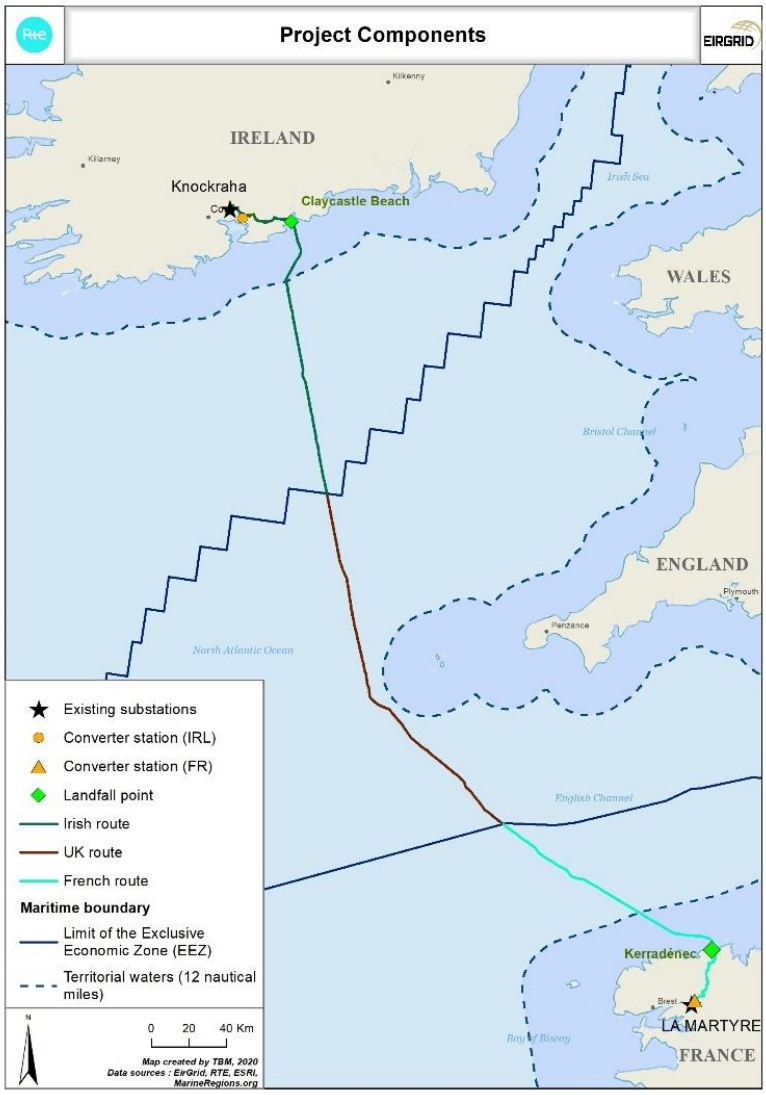
Information on associated impacts and mitigation of the elements of the Celtic Interconnector within the Irish jurisdiction for the foreshore and offshore elements is available in Volume 3B (the Non Technical Summary to Volume 3D) and Volume 3D (EIAR for Ireland Offshore).

Figure 0.1: Celtic Interconnector (Project Overview)



Source: EirGrid

Figure 0.2: The Celtic Interconnector

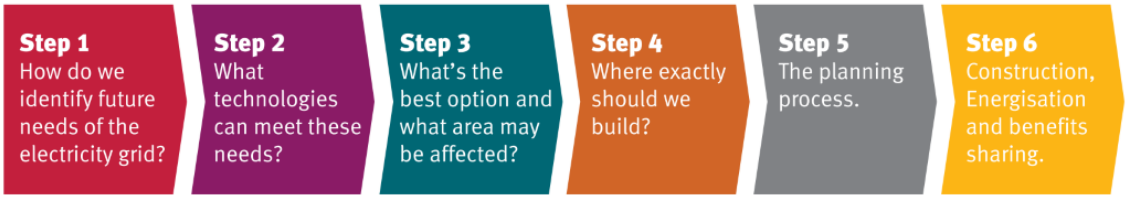


Source: TBM Consulting Group

Alternatives Considered

The Irish onshore elements of the Celtic interconnector project have been developed in accordance with EirGrid's bespoke six-step Framework for Grid Development, as presented in Figure 0.3.

Figure 0.3: EirGrid Six-Step Framework for Grid Development



Source: EirGrid

In accordance with EirGrid's Framework, a comprehensive and consistent multi criteria analysis was applied to decision making at various stages of project development, including in considering a variety of alternatives. The multi criteria analysis facilitated a balanced consideration of the following criteria relating to project development.

- Environmental;
- Socio-Economic;
- Technical;
- Deliverability; and
- Economic.

The alternatives considered for the onshore (land) elements of the project are presented in the reports below which are appended to Appendix 1 of EIAR Volume 3C Part 2. The reports are also available to view on EirGrid's project website[2].

- (Marine) Route Investigation Report (Intertek, 2015)
- Feasibility Study - Converter Station Site & Route Identification in Ireland (ESBI, 2016)
- Network Analysis Celtic Interconnector Feasibility Study (EirGrid, November 2016)
- Step 3 Onshore Constraints Report (Mott MacDonald, April 2019)
- Offshore Constraints Report (Wood, April 2019)
- Step 3 Performance Matrix Assessments (EirGrid, Spring 2019)
- Step 3 Preferred Options Report (Mott MacDonald, August 2019)
- Step 4A Consultant's Development Options Report (Mott MacDonald, November 2019)
- Step 4B Consultant's Development Options Report (Mott MacDonald, November 2020)
- Route Options Review in the Vicinity of Churchtown (EirGrid, March 2021)

Do Nothing Scenario

Non-implementation of the Celtic Interconnector project would mean foregoing its benefits and slowing down the development of renewable energy required to combat climate change.

Alternative proposals would likely be developed at the proposed site of the converter station compound within IDA owned lands zoned for Industrial use at Ballyadam in County Cork.

Connection to the Irish Transmission Network

A Step 2 feasibility study carried out by EirGrid in 2016 considered the substations at Knockraha in County Cork and Great Island in County Wexford as potential connection points for the Celtic Interconnector project to the Irish national grid. The analysis undertaken concluded that the transmission system can accommodate the potential power flows from the Celtic Interconnector significantly better by way of the connection point at Knockraha rather than a connection point at Great Island. Knockraha 220 kV substation was subsequently identified as the connection point for the Celtic Interconnector project to the Irish national grid.

Landfall Options

Following identification of Knockraha substation as the connection point, the following landfall options in the East Cork area were further considered:

- Inch Beach
- Ballycroneen Beach

[2] Related Documents (eirgridgroup.com) (https://www.eirgridgroup.com/the-grid/projects/celtic-interconnector/related-documents/index.xml)

- Ballinwilling Strand (Western Approach) (BW2)
- Ballinwilling Strand (Eastern Approach) (BW1)
- Redbarn Beach
- Claycastle Beach

Ballinwilling Strand 2, Redbarn Beach and Claycastle Beach landfall location options were shortlisted for further assessment. Claycastle Beach was chosen as the proposed Irish landfall for the submarine cable, primarily due to its offshore approach which follows a sediment channel with sufficient depth to bury the cable and protect it against fishing and shipping without the requirement for rock cutting or external protection (by way of rock placement).

Converter Station Site Options

Ten general location area options (Converter Station Location Areas) for the siting of the converter station were initially identified in 2016. A further four general location area options were identified and considered in 2019. The following seven Converter Station Site (CSS) options within six shortlisted converter station site zones were identified.

- CSS 1 Ballyadam;
- CSS 6 Leamlara;
- CSS 9A Knockraha;
- CSS 9B Knockraha;
- CSS 10 Pigeon Hill;
- CSS 12 Kilquane (Meeleen); and
- CSS 14 Ballyvatta.

In 2020, having reviewed and considered the outcomes of the assessment process from a multi-criteria perspective, as well as considering public and stakeholder feedback in respect of the options, and having undertaken technical, environmental and other analysis of the site options under consideration, the Ballyadam site was identified for the siting of the converter station.

In presenting this decision, the report cited social and deliverability aspects and management of challenges through technical and site design. This demonstrates the relevance and importance of undertaking a multi-criteria approach to project decision-making, as per EirGrid's Framework for Grid Development.

Onshore HVAC Route Selection

A HVAC connection is required between the proposed CSS at Ballyadam and the identified connection point at Knockraha. Given the length of any UGC route along relatively narrow local roads, and the need for the UGC to cross under the existing live railway line, there are a number of challenges associated with this HVAC connection. A number of options were therefore considered, as outlined below:

- A 220 kV UGC in a two cables per phase arrangement.
- A 400 kV UGC.
- A 220 kV double circuit overhead line (OHL) 'loop in' plus a 220 kV single cable per phase UGC.

The 220 kV "loop-in" was not considered further due to its performance against environmental, social, technical, deliverability and economic criteria, when compared with the 220 kV and 400 kV UGC options.

The 220 kV UGC option would require a trench width of approximately 2m while the 400 kV UGC option would require a trench width of approximately 1m.

Due to cross-country routing requirements, more hedgerow removal and more drain crossings would be required to facilitate the 220 kV option when compared with the 400 kV option. As the majority of the 400 kV option would be constructed in the road it is also preferred from a cultural heritage perspective. The 400 kV HVAC tail option was subsequently identified for the HVAC land circuit connection.

Onshore HVDC Route Selection

From an early stage, following identification of Claycastle Beach as the Best Performing landfall option, it was considered preferable to construct the UGC for the most part on the N25 Cork-Waterford National Primary Route, given its wide carriageway width and presence of hard verges, however, there are two key areas where the N25 is constrained and where local road, or local off-road options were considered. These are:-

- The area west of Churchtown / Two Mile Inn, comprising the built up area of Midleton, and further west on the N25 between Midleton and Carrigtwohill for which a significant road improvement scheme is planned; and
- The villages of Killeagh and Castlemartyr through which the N25 passes.

Also, from an early stage, the existing disused railway corridor between Midleton and Youghal was identified as a potential option, in part, for the HVDC route.

The N25 National Road between Carrigtwohilll and Midleton is planned for major upgrading, including widening to full dual carriageway status, and provision of a new or modified interchange in the vicinity of the IDA site at Ballyadam. The laying of the cable within the existing N25 between Midleton and Carrigtwohill would present very significant challenges, as there is no assurance of how the existing corridor relates to the planned future road corridor in terms of alignment, design and levels, all of which are critical to the operation of the Celtic Interconnector. Transport Infrastructure Ireland, Cork Road Design Office, and the Industrial Development Authority have all raised reasonable concern with regard to the scenario of the HVDC cables being laid within the N25 corridor west of Midleton.

Bringing the UGC off the N25 through the core built-up area of Midleton would also unduly impact on this town; particularly in terms of traffic disruption, disturbance and nuisance, and conflict with existing services.

Routing the UGC through Killeagh and Castlemartyr presents particular issues, summarised below:

- Castlemartyr is an Architectural Conservation Area. The route would need to cross the Kiltha River at the Kiltha River Bridge in Castlemartyr which is a stone bridge listed on the National Inventory of Architectural Heritage. The road surface on the bridge is too shallow to install the cable route with sufficient cover over the bridge. Navigating the bridge is also difficult given the parallel underground utilities at Castlemartyr as well as crossings of underground services;
- The Castlemartyr Forest Bridge is also a stone bridge on the N25 with insufficient cover for installation of the trench. In this situation, crossing the Kiltha River would require Horizontal Directional Drilling (HDD) which may be complex given the density of vegetation and apparent depth and width of the water crossing.
- Killeagh is a medieval village and conservation area with a high archaeological potential; bridge crossings are listed on the National Inventory of Architectural Heritage;
- The route would need to cross the Dissour River at the Killeagh River Bridge in Killeagh. The road surface on the bridge is too shallow to install the cable route with sufficient cover over the bridge. Further, the height of the bridge and road surface above the river combined with the bend of the N25 at this point means that HDD at this point would be challenging;

- There are numerous parallel underground utilities at Killeagh as well as crossings of underground services;
- The road in Killeagh has recently been re-surfaced;
- The Killeagh Railway bridge would need to be crossed but it has insufficient cover to install the cable to the appropriate depth; and
- The Ballymakeagh More Bridge has insufficient cover to accommodate the trench, and as such, an off road crossing of the water course would be required. The width of the water course may allow for a culvert, failing which, HDD would likely be required).

In addition to new off-road bridge crossings being required in Killeagh and Castlemartyr, it is also noted that both villages have undergone urban improvement works over the last number of years, with resulting construction impacts for the receiving communities, and the provision of a considerable number of services and utilities in the public road.

The Greenway along the disused Midleton to Youghal railway line is being developed by Cork County Council. This is occurring under licence, with the ownership of the alignment remaining with Iarnród Éireann. The infrastructure of the Celtic Interconnector project has an envisaged lifespan of at least 40-60 years. Over this time, and indeed beyond should that infrastructure be replaced, the integrity of the infrastructure is of paramount importance. It would be of considerable significance should the UGC require to be removed to facilitate the future operation of the corridor as a railway. This scenario cannot be ruled out by Iarnród Eireann, and this would continue to present a significant future risk to the proposed development should the HVDC UGC be laid and operated within the existing corridor of the disused railway corridor. Moreover, it has been confirmed by CCC that the integrity of the corridor is technically challenging in places for the laying of the HVDC UGC, in terms of its topography, constrained width, and the presence of natural drainage channels. This has implications for the complexity of construction methodology for the HVDC UGC, including its design and also the use of what will be an operational Greenway as the only means of access to the construction corridor. It must be anticipated that the Greenway would require to be taken out of operation of the duration of the construction of the HVDC UGC. The Greenway will comprise a tourism and amenity project for the County; its closure has the potential to have a significant socio-economic impact. Once laid in the ground and operational, the HVDC UGC cannot be relocated without significant challenges to the operation of the proposed development. The potential reopening of this currently disused railway line over the next decades cannot be discounted, as patterns of settlement, commuting and public transport evolve over this period.

Ballyvergan Marsh

Due to structural constraints associated with the railway bridge to the north of Claycastle Beach, it is necessary to divert the UGC off road under the proposed Mildleton to Youghal Greenway (currently under construction).

Approximately 65 metres of the 241 metres of land cable will be installed within Ballyvergan Marsh pNHA (site code 000078) to the west of the railway bridge. Installation of the cable to the east of the railway bridge was considered, however, there is insufficient space in the verge to facilitate the required works.

Project Overview

The Celtic interconnector will connect to the Irish electricity transmission system at Knockraha substation in County Cork via a High Voltage Alternating Current (HVAC) underground cable of approximately 11km in length. Alternating current (AC) is the technology utilised on the Irish electricity transmission network.

Electricity is best carried over long distances by means of HVDC technology. As such, a HVDC submarine cable will connect to a HVDC onshore underground cable at a Transmission Joint Bay (TJB) north of the car park at Claycastle Beach near Youghal in County Cork. The HVDC onshore UGC is approximately 32km in length.

The majority of the HVAC and HVDC underground cables (UGCs) will be installed within the existing public road network. Off-road (cross-country) routes are proposed at particular locations to avoid constraints. In particular, these include:-

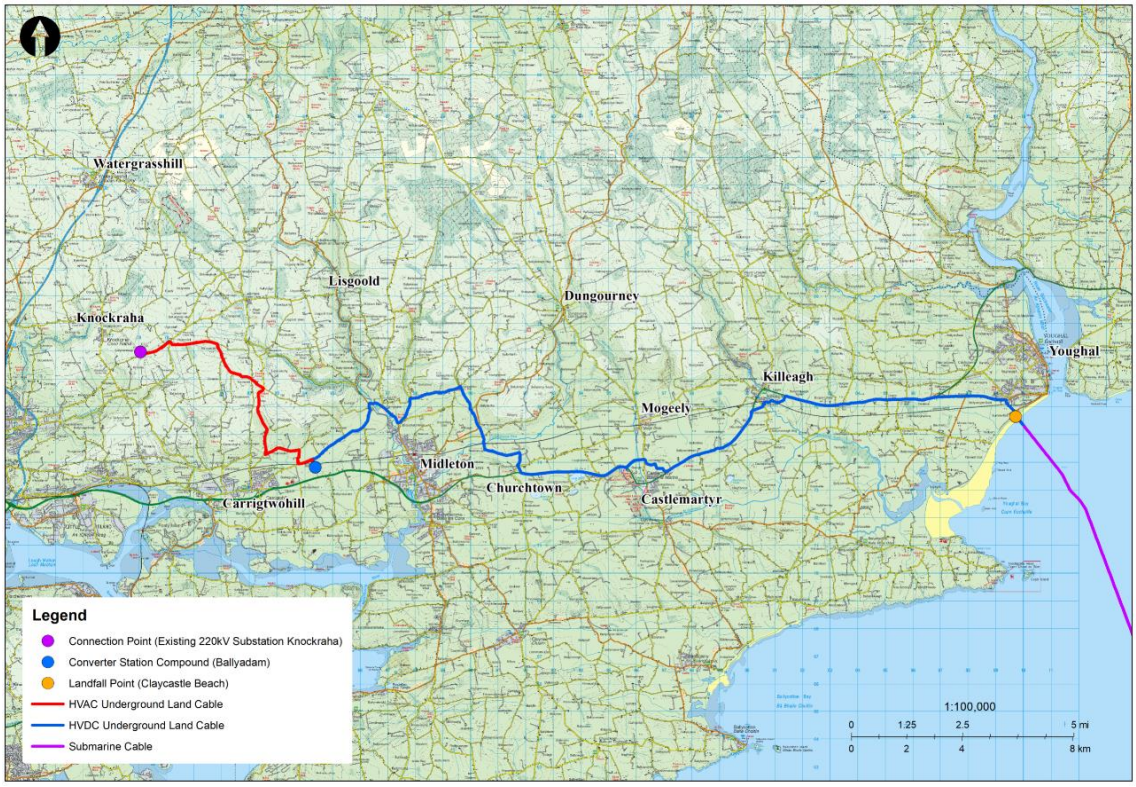
- The villages of Killeagh and Castlemartyr will be avoided by means of cross-country routing; this will minimise disruption and nuisance for these villages, their residents and communities, and for traffic passing through the villages which are both located on the N25 Cork-Waterford-Wexford / Rosslare National route.
- North of Claycastle Beach where, due to structural constraints associated with an existing narrow railway bridge, it is necessary to divert the UGC off road in the area of, and under, the planned Midleton to Youghal Greenway (currently under construction). Approximately 65 metres of the 241 metres of land cable for this off-road section will be installed within Ballyvergan Marsh proposed Natural Heritage Area (pNHA) (site code 000078).

The HVAC and the HVDC UGCs will terminate at a proposed converter station compound on a brownfield site within the Industrial Development Authority (IDA) development landholding at Ballyadam, between Carrigtwohill and Midleton, East Cork.

As the name suggests, the converter station will convert HVDC electricity to HVAC, and vice versa. The converter station compound and ESB substation will measure approximately 3.5 hectares. The converter station compound will measure approximately 250m x 150m and include three main buildings, the tallest element being up to 25m in height. The compound will also include associated and ancillary development such as electrical equipment and apparatus, stores and other buildings, drainage, road and landscaping infrastructure.

Figure 0.4 below illustrates the main elements of the proposals. A representation of what the structures may look like is presented in Figure 0.5. Detailed mapping is included in Volume 1B (Planning Drawings) of the SID planning application.

Figure 0.4: The Proposed Development



Source: Mott MacDonald

Figure 0.5: Representation of Converter Station Compound at Ballyadam

Source: Macroworks

Laying of Underground Cable

Cable trenches will be excavated (as noted above these will primarily be within or at the verge of public roads), and ducts will be installed, with the road reinstated. The UGC will be delivered to site on drums and will be pulled through the cable ducts. Fibre optic cables will also be laid along with the electricity cables.

Joint bays (underground chambers) will also be constructed along the cable routes, and are used to join together ('joint') consecutive lengths of cable and to facilitate the cable pulling. Typically, joint bay separation is between 500m and 850m, depending on the cable supplier, with all joint bays being located with the cable corridor.

To facilitate traffic management at locations where joint bays are to be located within the carriageway, the use of temporary passing bays is proposed. These are off-road strips of land on one side of a joint bay (approximately 50-80m in length), that are cleared and can facilitate vehicle movements around the joint bay, thereby avoiding or minimising the need for road closures. The creation of a passing bay is carried out prior to the commencement of joint bay construction. This will entail removing the top layer of ground to the side of the carriageway (including hedges where present) and temporarily storing it local to the site for reinstatement following the works.

The presence of trees on cable routes requires also careful management. The cable route and joint bays (and by proxy the adjacent passing bays), were, wherever possible, identified in places which minimised removal of hedgerows and mature trees. For instance by going off-road to avoid a double line of mature trees over a distance of approximately 0.6 km, between the R627 and the Greenway, at Roxborough. During periods of low or no rainfall, increased drying of the soil due to root capillary action may affect the thermal capability of the cable system.

Tree root systems may also cause damage to the ducting system. As a result, it is recommended (and sometimes imposed by local authorities) that sufficient distance be adopted between the cable system and trees. For narrow roads, the cable systems may need to be installed in the centre or may need to switch from one side of the road to another to reduce the impact on trees and also to accommodate the trench excavation works. If cables have to be laid in close proximity to trees (within approximately 10m) excavation by hand may need to be employed which is typically slower than mechanical excavation techniques.

The removal of hedgerows, treelines, scrub vegetation and other vegetation in which birds nest will not take place from March to August inclusive having regard to the Wildlife Act 1976, as amended (unless a suitably experienced ecologist has determined that nesting birds are absent or are otherwise protected from injury or disturbance).

Unless trees and hedgerows pose a health and safety risk or a risk to cable integrity, they will be replaced post construction with suitable native species, unless otherwise agreed with the local authority and/or third party landowners.

While the specifics of any cable laying schedule are dependent upon the nature and location of the project, it is generally the case that cable ducts can be laid in a road at a rate of approximately 20m - 50m per day. Joint bays, generally located at intervals of 750 metres along the UGC route of the proposed development (shorter intervals occur where the route alignment is more complex), are typically installed in 1 – 2 days with the road fully reinstated post installation. Figure 0.5 illustrates a typical passing bay and operational joint bay.

Figure 0.6: Operational Joint Bay with Passing Bay (on the Kilpaddoge Knockanure 220kV UGC Project, Co. Kerry – refer to Section 2.2.3 of the Volume 2A Planning Report)

Source: EirGrid

Cable Crossings

A number of crossings of watercourses, drainage ditches, utilities, railway lines and the Midleton to Youghal Greenway will also be required along the cable route. These crossings will be facilitated by either open cut trenching or by use of Horizontal Directional Drilling (HDD) as and when appropriate.

Open cut water crossings have the potential to generate silt and suspended solids. In order to reduce the risk of discharging sediment it is proposed to carry out all of these works in a dry works area. The dry works area will be isolated by installing an impermeable barrier between the watercourse and the works area. The impermeable barrier will be tailored to the watercourse in question. Potential techniques include the use of inflatable dams, frame dams or, in smaller watercourses, sandbags (double-bagged and underfilled; containing only clean washed sand). Water pumped from the dry works area will be treated using settlement tanks to remove sediment prior to discharge back to the watercourse. In more sensitive watercourses and in consultation with Inland Fisheries Ireland, greater filtration of silt may be achieved prior to discharge, e.g. through use of silt de-watering bags which trap silt and expel only clean water, and can be left to biodegrade on riverbanks as a habitat enhancement measure.

Water will be conveyed over the isolated section of channel by pumping or the use of a temporary diversion. Where sufficient capacity is available, and there is no risk of excessive scour, the diversion will be within the footprint of the existing channel.

Where open trenching is proposed, site restoration works will be carried out following completion of the crossing, in agreement with IFI. These works may include riverbank stabilization, gravel replacements etc. In all cases, the site will be restored post installation.

Works will not be carried out during extreme rainfall or high flow events. Met Éireann provides a 5-day weather forecast via its website (www.met.ie). The Contractor will monitor this and other appropriate weather forecasts on a regular basis, at least daily.

Except in exceptional circumstances and with the agreement of Inland Fisheries Ireland (IFI), any element of the scheme requiring instream works will be restricted to the fisheries open season (i.e. restricted to July to September inclusive). At a number of specific crossing locations electrofishing may be required to remove fish under licence from IFI.

HDD technology has been widely used in the oil and gas industries for several decades. It has become more commonplace in recent times in municipal engineering projects, such as for the installation of electrical cables, optical cables and potable water pipes. Competent specialist contractors will be appointed to undertake the work.

The HDD Contractor will conduct the drilling works in a safe and controlled manner with due regard for site constraints including environmental issues. The Contractor will be required to ensure that their proposed works do not adversely affect, existing services / utilities, groundwater / aquifers.

For HDD, the launch and reception pits for the drilling rig requires the temporary installation of a level hardstanding area on a geotextile base. A pilot hole will be drilled from one side of the crossing to the other side while supporting the bored hole with bentonite. A comprehensive closed-loop drilling fluid mixing and circulation system with recycling capability will be utilised to minimise the volume of fluids required on site. Constant monitoring by the specialist drilling will be carried out. The volume of cuttings produced will also be monitored to ensure that no over cutting takes place and that hole cleaning is maintained. The mud returns will be pumped to the circulation system trailer by means of a bunded centrifugal pump. The nature of the cuttings will also be monitored to understand the ground conditions as the drilling progresses.

After the initial pilot hole is completed, it will be reamed in a number of passes to reach the required bore size to enable the cable ducts to be pulled through. To ensure that the prevailing geological conditions have suitable cohesion that can maintain the bore during the drilling and reaming process, close attention will be paid by the specialist drilling team to modelled drag forces during pullback with constant monitoring of load stress undertaken to ensure that modelled tensile stress, collapse pressures, hoop stress and buckling stress are not exceeded. In addition to the above measures, the rate of drilling progress will be monitored to assist with the identification of any voids or changes in strata.

On completion of the works, the stone and geotextile will be carefully removed using a back-hoe or 360^0 excavator and removed off-site to an appropriately permitted waste facility. The site will then be reinstated to its original condition. Reinstatement will comprise a suitable grass mix on agricultural land, hedge planting where it has been removed (to be native species-rich of 5 woody species per 30m section), native species-rich wildflower mix on verges or earth banks, or to the requirements of the relevant authority at that location should these be different.

There are limitations in entry angle and radius of curvature for drilling and often accommodating these to match favoured ground conditions can be challenging. The advantage with this method is that a number of standalone cable ducts can be provided as required with suitable separation to meet the preferred requirement. Unlike other installation techniques, a key advantage of HDD is that shafts are not required, but only entry / exit transition pits.

Where directional drilling takes place within limestone bedrock beneath a watercourse , settlement will be monitored at the surface to provide an early warning of any unexpected stability issues. The Contractor will record the results of such monitoring, and provide these to EirGrid and the local authority and in accordance with any conditions. If visible settlement occurs the directional drilling contractor will cease boring, although drilling fluid may still be circulated if required to maintain the stability of the drilled hole, until remedial measures can be put in place to stabilise the ground. The remedial measures used will vary depending on the exact situation encountered but may include switching to an alternative drilling fluid or the injection of grout.

In addition, the Contractor will monitor river / stream flows upstream and downstream of any directional drilling of watercourse crossings. The flow monitoring will be undertaken on a daily basis for five working days prior to the directional drilling, during the directional drilling and for five working days following completion of the directional drilling. The Contractor will record the results of such monitoring, and provide these to EirGrid and the local authority and in accordance with any conditions. If a measurable increase in losses from the watercourse to ground is observed in the reach where the directional drilling took place, bed lining will be undertaken if required by IFI.

Laydown areas, where construction materials can be temporarily stored, and construction compounds, where welfare facilities can be provided, will also be provided along the route.

Connection Point

The connection point is the point at which the proposed development will connect to the HVAC national transmission grid. The location for this connection point will be the existing 220 kV Knockraha substation in County Cork.

New Air Insulated Switchgear (AIS) equipment, similar to other bays in the substation., will be required to be installed. AIS is high voltage electrical equipment which uses the open air as its insulating medium.

This AIS equipment will consist of busbar disconnectors, circuit breakers, instrument transformers, transformer disconnectors, surge arresters, post insulators and tubular aluminium busbar. Three bunded transformers will be installed, while a spare transformer will be retained within the substation to facilitate immediate replacement should one of the operational transformers malfunction. The equipment will be installed within the existing footprint of the substation.

The proposed development at the connection point will be accommodated within the existing fence line of Knockraha substation.

The existing 220 kV Knockraha substation is in the ownership and management of the Transmission System Owner, ESB Networks (ESBN). The specific detailed design of equipment and apparatus at the substation will therefore be agreed with ESBN. A letter of consent to the making of the application for Approval of the proposed development dated 13 April 2021, insofar as it includes lands within the ownership and control of ESBN, has been included with the application particulars.

Converter Station Compound

The proposed converter station will be located in the townland of Ballyadam in the north eastern section of an overall landholding in the ownership of the IDA.

The overall IDA landholding is approximately 54 hectares and is located between the settlements of Carrigtwohill and Midleton County Cork. The overall landholding is bounded to

the south by the N25 national road and bounded to the north by the Cork to Midleton commuter rail line.

The site is zoned for industrial use and was formerly intended for the location of the Amgen biotechnology manufacturing facility. Planning consent for the Amgen facility was granted by An Bord Pleanála in July 2007 (Refer to Volume 2A of the application).

Prior to 2007, the site was in agricultural use and was largely improved grassland. Following grant of consent, the site was prepared for development. Extensive clearance of surface vegetation was carried out (with the exception of the woodland on a knoll to the south of the site) and substantial earthworks were undertaken. Stone / gravel was imported for roads and hardstand areas. The preparatory site works were abandoned in ca. 2009 / 2010, and since then, revegetation has been taking place with grassland vegetation / habitat developing on calcareous soils in recent years.

The proposed development site now includes Near Threatened plants, and European protected habitat parcels. Prior to enabling works (and in the appropriate season), these will be moved to a temporary storage area to be located within a proposed construction compound. Post-construction, these features will be moved from the temporary storage area to their new permanent location south of the converter station compound (refer to Planning Drawing 229100428-MMD-00-XX-DR-E-2998).

The site is low lying and is located within an area of known karst (soluble rock) features. Karst regions typically contain un-mapped underground draining systems with sinkholes and caves.

There are two depressions within the proposed converter station footprint. It is understood that these were excavated as part of previously permitted ground improvement works and were subsequently abandoned between approximately 2007 and 2009 / 2010. These depressions currently collect rainwater and will be infilled to facilitate development of the converter station. An area of compensation rainwater storage will be developed to replace this storage capacity. This proposed ‘cut’ could potentially be used to ‘fill’ the existing depressions, subject to geotechnical and ground investigation studies.

An existing small building will be removed to facilitate the proposed converter station. It is understood that it was constructed to facilitate the previously permitted development but works were not completed. The building has an unremarkable interior which over time has suffered from vandalism.

Due to the ground conditions on the Ballyadam site, it is likely that rotary bored cast-in-place reinforced concrete piles socketed into rock will be adopted for all foundations on this site.

Specialist and experienced piling Contractors will be employed to carry out any such piling works. The Contractor will conduct the works safely, in accordance with acceptable industry practices taking due consideration to constraints specific to the area where the drilling is to take place. The Contractor will take due consideration to mitigation measures aimed at preventing adverse effects of the piling regime for example, groundwater / aquifer protection and the implementation of robust monitoring of the works and an emergency response plan.

The presence of voids would be recognised by an experienced piling operator during the boring of the piles, prior to concrete placement. In such cases, the piling Contractor will install a permanent casing (likely a thin steel sleeve) to retain concrete within the pile bore / shaft. This requirement will be clearly stated in the piling performance specification and contractual agreements.

As with all construction works proposed, no drilling works will be allowed to commence until the relevant Risk Assessment Method Statements (RAMS) and pertinent Health and Safety documents are received from the specialist Contractor and are reviewed and agreed by the

Client's representative. These Contractor documents will include method statements, drilling risk assessments and environmental management plans specific to the area where the drilling is to take place.

Additional measures to be outlined in contracts will include, but will not be limited to:

- A minimum of one Geotechnical Engineer and one Resident Engineer will supervise the piling works. Supervision of each piling rig will be required.
- The piling operator will be experienced in successful piling within Karst regions.
- Clear lines of communication with defined roles and responsibilities will be maintained between the site team, the Contractors and the Design Engineers throughout the works.
- Monitoring of the concrete volumes poured into the pile against the estimated volume that the pile requires will be carried out, to ensure that concrete is not being lost into voids in the ground.
- Monitoring of piles for potential vertical settlement of fresh concrete; an indicator of potential concrete loss.

Outline Construction Schedule and Timing of Works

Subject to the grant of statutory approvals, it is anticipated that the construction phase will commence in Q4 2022 and construction works will commence in Q1 2023 with the Celtic Interconnector becoming fully operational by the end of 2026.

Construction activities will gradually phase out from pre-construction to predominantly civil activities followed by commissioning and testing.

In general, it is anticipated that construction will occur during normal working hours i.e. Monday to Friday 7 am to 7 pm and Saturday from 7 am to 2 pm. There may be instances where extended hours / days are required however should working outside these hours / days be required they will only be undertaken with prior agreement with the statutory authorities.

The following seasonal restrictions will apply:

- Any element of the scheme requiring instream works in watercourses with fisheries value will be restricted to the fisheries open season [i.e. will only take place during the period July to September), unless with the agreement of IFI]
- For duct installation, restrictions will apply to works in Ballyvergan Marsh pNHA (and additionally to vegetation clearance in particular).
- The removal of hedgerows, treelines, scrub vegetation and other vegetation in which birds nest will not take place from March to August inclusive having regard to the Wildlife Act 1976, as amended (unless a suitably experienced ecologist has determined that nesting birds are absent or are otherwise protected from injury or disturbance).

The number of construction workers required during the construction phase is expected to peak at approximately 100 persons for the converter station. Crew sizes for the installation of the cable routes are estimated at approximately 10 persons per crew.

Subject to the grant of statutory approvals, it is anticipated that the construction phase, including finalisation of management plans and discharge of conditions, will commence in Q4 2022. The construction of the converter station, including enabling works and equipment installation, will take approximately 36 months, commencing in Q4 2022. Installation of the land cables is anticipated to take approximately 24 months. Overall, construction of the Celtic Interconnector project is currently anticipated to be complete by 2026. Thereafter, there will be a lengthy period of testing and commissioning prior to full energisation of the Interconnector. Safety requirements for the installation operations / procedures and weather condition will however ultimately dictate the final programme.

Construction works will be carried out in line with the Construction Environmental management plan and the Traffic Management Plan appended to Appendix 3.1 of Volume 3C Part 2.

The following sections provide a summary of the impact assessments presented in Volume 3C for each topic in turn. Mitigation and monitoring measures are presented separately below.

Project Need

As a Project of Common Interest, the Celtic Interconnector project has been identified as meeting the criteria detailed in Article 4 of the EU Regulation 347/2013 on guidelines for trans-European energy infrastructure i.e. the project contributes significantly to at least one of the following specific criteria:

- Market integration, inter alia through lifting the isolation of at least one Member State and reducing energy infrastructure bottlenecks; competition and system flexibility;
- Sustainability, inter alia through the integration of renewable energy into the grid and the transmission of renewable generation to major consumption centres and storage sites; and,
- Security of supply, inter alia through interoperability, appropriate connections and secure and reliable system operation.

The Celtic Interconnector will:

- **Facilitate an increase in the use of renewable energy**: an interconnection between Ireland and the continent will increase the integration of renewable energy at the European level and enable France and Ireland to move forward in terms of the energy transition (in line with national policies in respect of the development of renewables);
- **Provide security of supply**: pooling resources will enable both countries to better cope with contingencies and spikes in electricity consumption. Interconnection will promote mutual assistance between both countries and will work in both directions;
- **Improve European solidarity on energy**: the Celtic Interconnector project will be a benchmark project in terms of European Solidarity on energy. It will enable Ireland to benefit directly from the European integrated electricity market. The Celtic Interconnector will be Ireland's only direct transmission link with another Member State of the European Union;
- **Promote the movement of electricity flows at a European level**: by promoting the movement of electricity in Ireland, in France and throughout all of continental Europe, the Celtic Interconnector will enable European consumers to benefit from a more open electricity market; and
- **Support the development of a more sustainable electricity mix in France and in Ireland**: The Celtic Interconnector will contribute to European objectives of a low-carbon energy future, promoting the development of other renewable energy sources and their integration into the European electricity system.

In this context, the project enjoys strong support from both the French and Irish governments, as well as from the European Commission. Of particular note in this regard, the completion of the project is specifically included in the current Programme for Government.

Population and Human Health

Electric and magnetic fields, often referred to as EMFs, are produced both naturally and as a result of human activity. Natural sources of EMFs include the earth's geomagnetic field and electric fields from storm clouds. When electric current flows, both electric and magnetic fields are produced and are present wherever electricity is used, such as in the home, office or farm, and in the vicinity of equipment that makes up the electricity supply system.

A field is defined by the force it exerts on an object placed in it, for example, a gravitational field is used to describe the force of attraction that the Earth exerts on living beings and objects situated within its influence.

Electric and magnetic fields can be considered as the regions around electrical equipment in which these effects can be felt or measured. Electric fields are produced by voltages, irrespective of how much current is flowing and indeed whether any current is flowing at all. Magnetic fields are produced by currents, irrespective of the voltage.

EirGrid designs, develops and operates the transmission grid in accordance with stringent safety recommendations which are made by national and international agencies. Several of these recommendations come from the International Commission for Non-Ionizing Radiation Protection (ICNIRP). This is an independent body, funded by public health authorities around the world. ICNIRP has investigated the safety of EMFs, and provides guidance on safe levels of exposure. This is addressed in more detail further in this section.

Independent and authoritative international panels of scientific experts have reviewed studies on possible health effects from EMFs. These have concluded, based on the weight of the evidence available, that the power frequency electric and magnetic fields encountered in normal living and working conditions do not cause adverse health effects in humans when properly designed and constructed. These form the basis for guidelines published by the International Council on Non-Ionising Radiation Protection (ICNIRP) with regard to EMF, to which EirGrid and ESB Networks have strict regard in the design and operation of the transmission system.

The proposed development has been assessed as having no significant adverse effects arising from EMF.

Given the nature of the proposals, the potential for impacts on population and human health are for the most part associated with the construction phase. Significant adverse impacts during the operational phase are not likely. There will however be benefits for communities impacted by the proposals due to the proposed community benefit scheme.

Due to the width of the joint bays and nature of the road network in the area mans that road closures may be required along the route during the construction phase. Accessibility to private properties and lands will be maintained at all times during construction, however there may be potential temporary disruptions. There will be a permanent change in land use due to construction of the converter station site. There will also be increased traffic in the area surrounding the site due to construction vehicles and alteration of access tracks. There will be a temporary negative impact on housing, land use and facilities during the construction phase of the development as the majority of the HVAC / HVDC cable routes follow the existing road alignment. Temporary disruption will be transient in nature and impacts will be brief / temporary in nature.

Construction works at the landfall at Claycastle will result in temporary nuisance in relation to traffic, dust and noise and restricted movements along Claycastle Beach and the car park during the construction phase. There will be temporary to short-term negative impacts on tourism recreation and amenities (such as at Claycastle Beach, and the Midleton – Youghal Greenway) as a result of the proposals due to severance of access and disturbance.

Air Quality and Climate

A qualitative assessment of construction dust effects has been undertaken for the different construction activities associated with the proposed development. Across the different construction activities, the level of risk of dust creating nuisance and/or loss of amenity and particulate matter (PM_{10}) leading to adverse health effects (without mitigation) is predicted to range from ‘negligible’ to ‘medium risk’. Following the appropriate implementation of the

mitigation measures the air quality impacts associated with dust are predicted to be not significant. As the air quality impacts associated with the proposed development are not significant and ambient pollutant concentrations are well below the relevant air quality standards, no exceedances of air quality standards are anticipated.

The greenhouse gases (GHG) assessment considered the embodied carbon of materials used for construction, transport of materials to site, construction plant emissions, and emissions of sulphur hexafluoride (SF_6). through operation. The total emissions associated with the proposed development are estimated to be 39,650tCO_2e.Implementation of the measures outlined in this application will contribute towards reducing construction emissions. Considering the Irish Government's commitment to net zero by 2050 and the impact all GHG emissions have upon the climate, any increase or decrease in GHG emissions can be considered to be significant based on their effect on the global climate[3]. Considering the overall benefit of the project to facilitate development and use of renewable energy sources, lifetime savings of GHG emissions are anticipated to outweigh the calculated embodied emissions during construction and anticipated SF_6 emissions during operation.

Land, Soils and Hydrogeology

During the construction phase, impacts to land and land use are anticipated to be moderate adverse but localised and temporary in duration, with land use reinstated where practicable after the works are completed. Operational phase impacts are anticipated to be minimal due to the infrequency of maintenance required. Maintenance activities will be carried out predominantly through manholes where embedded mitigation will ensure that access will result in minimal impacts. The residual risk to land and land use is therefore considered to be insignificant.

Impacts to soils and geology are anticipated to be adequately mitigated through the replacement of vegetation and use of compensation storage. The risk to these receiving environments, once mitigation measures have been implemented, is therefore considered to be insignificant.

For the majority of receptors within the hydrogeological receiving environment, impacts are mitigated by design, and therefore the residual risk is considered to be insignificant. Several boreholes/water wells are in close proximity to the proposed construction works. However, it is anticipated that the residual risk to these receptors will be insignificant. With the implementation of the embedded and additional mitigation measures proposed, the proposed development will not result in a change in status of any Water Framework Directive quality elements or prevent any groundwater bodies from reaching good status in the future.

A robust Construction and Environmental Management Plan (CEMP) will be in place during construction to ensure that there are no impacts to groundwater quality during construction.

Surface Water, including Flood Risk

Excavation works, the storage of excavated material, vegetation clearance, crossing of watercourses and infilling of trenches can pose a risk to surface water quality through surface water run-off and the release of sediment to watercourses. Ground damage from construction vehicles and machinery can also cause rutting and increased erosion of soils. Access tracks used during construction may affect surface run-off patterns, creating alternative flow paths, promoting erosion and localised flooding. The sensitivity of the receiving surface water environment ranges from low to very high. The magnitude of adverse surface water quality impacts in the absence of additional mitigation is expected to be Small to Moderate resulting in

[3] IEMA, 2017, Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance

Moderate to Significant adverse impacts of temporary to short-term duration prior to the implementation of additional mitigation measures.

A number of unnamed watercourses are required to be crossed within the road network. The drainage patterns associated with watercourses confined to existing culverts will not be impacted significantly as a result of the proposals. Open cut trenching will be carried out in a dry works area. The existence of a temporary impermeable barrier to facilitate open cut trenching will have a direct impact on the cross section of the channel and is expected to give rise to localised but temporary changes in water depth, velocities and sediment erosion/deposition. The proposed activities could result in localised changes to surface water drainage patterns and restrictions to infiltration of rainfall in soils. Given the largely rural locations of the proposed works existing drainage networks are available and any disturbance would be localised and temporary in duration. Surface water contributions would remain unchanged and would likely discharge to the same catchment. Significant construction phase impacts on surface water drainage patterns are not likely. The sensitivity of the receiving surface water environment ranges from low to very high. The magnitude of adverse impacts in the absence of additional mitigation is expected to be Negligible to Small. There could be some localised temporary Imperceptible to Moderate adverse impacts prior to the implementation of additional mitigation measures.

All reasonable measures will be taken to avoid unplanned disruptions to water services during the proposed works. This will include thorough investigations to identify and reconfirm the location of all utility infrastructure within the works areas, and the implementation of robust procedures when undertaking works around known infrastructure services. Service disruptions impacting the surrounding residential, social and commercial properties will be kept to a minimum, only occurring where unavoidable. Prior notification of disruptions will be given to all impacted properties. This will include information on when disruptions are scheduled to occur and the duration of the disruption. Consultation with relevant neighbouring parties will be undertaken prior to any proposed disruptions.

During the construction phase temporary construction compounds will be required in proximity to the connection point (Knockraha substation), at the converter station (Ballyadam) and at the landfall (the area of the car park at Claycastle Beach). Welfare facilities will be provided at these locations and any discharges will be connected to a sealed holding tank to be emptied and disposed of off-site by a licenced contractor to an approved licenced facility. Water will be tankered onto site as required. Consequently, significant adverse impacts on water services during the construction phase are not likely.

The converter station will be unmanned and so foul wastewater will only be generated on days that maintenance crews are present on site. Foul water will be collected in proprietary holding tanks which will be periodically emptied by a licensed waste disposal contractor. A storm water drainage system incorporating SuDS (Sustainable Drainage Systems) features will be constructed to manage the quantity and quality of runoff during rainfall events. Runoff is proposed to be discharged to an existing 600mm diameter storm water drainage pipe which has been laid in the south-west corner of the existing IDA site.

A compensation storage area is required and will consist of a below ground and covered storage tank, which will be emptied at a controlled rate via a pumped connection to the storm water drainage system for the proposed converter station access road. It is expected that adverse impacts on surface water quality during operation will be imperceptible.

As the cables are solid insulation type there are no sources of pollution and as they are buried, they will not offer a pathway to any surface water receptors. Site restoration works will be carried out following completion of water crossings, in agreement with Inland Fisheries Ireland. These works may include riverbank stabilization, gravel replacements etc. In all cases, the site

will be restored post installation. Adverse impacts in terms of water depth, velocities and sediment erosion/deposition are therefore expected to be imperceptible.

The increase in impermeable surfaces at the converter station site will result in a corresponding increase in surface water runoff, while filling of existing low points and depressions will alter existing drainage patterns within the catchment of the wider IDA site. However, since all surface water generated at the converter station site or flowing towards it will be intercepted and diverted to a sealed underground collection system incorporating SuDS features (flow and pollution control elements plus attenuation storage tanks), there will be a negligible impact on the local surface water drainage patterns and water environment. An imperceptible impact on surface water drainage routes along the cables routes is expected as the land will continue to drain as per the existing situation.

A desk based flood risk assessment of the cable route was undertaken which concludes that the impact on flood risk is considered to be negligible at operation stage due to the cables being buried and so not influencing flood waters. In addition, the cables are characterised by being designed to be not vulnerable to flooding within areas of high / moderate flood risk.

Developments that need to be in areas of high / moderate flood risk for reasons of proper planning and sustainable development require a Justification Test. However, the cable will be designed so that it is considered not to be vulnerable to flooding, thereby being considered appropriate and as such not subject to a justification test for flooding.

A detailed and site-specific flood risk assessment has been undertaken to assess the level of flood risk associated with the proposed converter station at Ballyadam. The report concludes that the proposed storm water drainage system will provide sufficient mitigation so as not to increase flood risk elsewhere. Access to the site under heavy rainfall conditions will be limited to vehicles with 4X4 capabilities due to ponding on the existing access road, though the flooding will be of short duration.

With the implementation of the embedded and additional mitigation measures proposed the proposed development will not result in a change in status of any Water Framework Directive (WFD) quality elements or prevent any waterbodies from reaching good status in the future. During the construction phase impacts on surface water quality are anticipated to be localised and brief to temporary in duration of imperceptible significance

During the construction phase, impacts on surface water drainage and water supply and wastewater discharge networks are anticipated to be localised and brief to temporary in duration of imperceptible to moderate significance. Adverse impacts during the operational phase are expected to be imperceptible.

Biodiversity

A Natura Impact Statement (Volume 6A) has concluded that, with the implementation of mitigation measures, there will be no adverse effects on the integrity of any European sites in light of the site's conservation objectives as a result of the proposals. The impacts of the Proposed Development, once the mitigation measures are implemented, are presented overleaf.

Table 0.1: Biodiversity

Receptor		Importance	Potential for Impact in Absence of Mitigation	Potential for Residual Impact
Notable habitats	Annex I fixed Dune Habitat and degraded dune habitat	County Importance	Permanent moderate negative effect	The works are focused in degraded fixed dune habitat. Implementation of the reinstatement measures for the habitat are such that there will be no long-term loss of habitat. Thus, the residual effect on the sand dune habitat will be a **temporary and not significant effect** at a local geographic scale.
	Oak Ash Hazel Woodland	County Importance	Permanent moderate negative effect	Where removal of habitat is required within the passing bay, trees will be replanted post works. It will not, however, be possible to replant trees along the roadside. These require removal to prevent interference with the cable itself. As such the residual effects on the woodland are will be a **permanent slight negative effect** at a local geographic scale.
	Ballyadam Site: Priority Annex 1 Calcareous Grassland (6210*)	Local Importance (Higher Value)	A permanent significant negative effect	The implementation of translocation, reinstatement and the monitoring regime is such that there will be no permanent loss of Annex I calcareous grassland associated with the proposed development. The residual effect on the habitat will be a **temporary slight negative effect** at a local geographic scale.
	Ballyadam Site: Other recolonizing bare ground (ED3) transitioning to calcareous and neutral grassland (GS1):	Local Importance (Higher Value)	A permanent Slight negative effect	No specific mitigation proposed . This is a **permanent slight negative** effect to a habitat of local importance.
	Ballyadam Site: Scrub (WS1)	Local Importance (Higher Value)	A permanent Slight negative effect	The replanting of a species rich hedgerow at Ballyadam will offset loss of scrub habitat e.g. for breeding birds with **imperceptible residual effects** (i.e. **not significant**).
	Ballyadam Site: Wet grassland (GS4)	Local Importance (Higher Value)	A permanent Slight negative effect	No specific mitigation proposed. This is a permanent slight negative effect to a habitat of local importance.
	Treelines and hedgerows	Local Importance (Higher Value)	Permanent moderate negative effect	Where removal of habitat is required within the passing bay, treelines and hedgerows will be reinstated. It will not, however, be possible to reinstate deep rooted trees in areas where there is potential for interference with the cable itself. As such the residual effects on the woodland are will be a **permanent slight negative effect** at a local geographic scale

Receptor		Importance	Potential for Impact in Absence of Mitigation	Potential for Residual Impact
	Wet grassland	Local Importance (Higher Value)	Short term slight negative effect	Wet grassland occurring along the cable route is rank low diversity example and will be expected to regrow with similar species assemblage. The residual effects to are anticipated to be **imperceptible effect at** a local geographic scale (i.e. not significant).
Rare and Protected Flora	Orange foxtail	Local Importance (Higher Value)	Permanent slight negative effect	The implementation of pre-construction confirmatory surveys, and where required, translocation of these rare and protected flora will ensure that there is no permanent loss of these species associated with the works. The residual effects to these species are anticipated to be **imperceptible effect at** a local geographic scale (i.e. **not significant**) No long term adverse effects are likely.
	Penny royal	Local Importance (Higher Value)	Permanent slight negative effect	
	Tufted feather-moss	Local Importance (Higher Value)	Permanent slight negative effect	
	Wild clary	Local Importance (Higher Value)	Permanent slight negative effect	
	Greater knapweed	County Importance	Permanent significant negative impact	
Mammals	Otter	County Importance	Permanent slight negative effect	As outlined previously, while no otter holts were recorded during surveys, there is potential for holts to become established prior to construction commencing. The implementation of confirmatory pre-construction surveys and measures to protect holts should they be recorded are such that the residual effects to otter will be a **temporary imperceptible effect** (i.e. **not significant)** at a county geographic scale. No long term adverse effects are likely.
	Badger	Local Importance (Higher Value)	Permanent significant negative impact	The implementation of confirmatory pre-construction surveys and measures to protect any new or known setts are such that the residual effects to badger will be a **short term imperceptible effect** at a local geographic scale (i.e. **not significant**).. No long term adverse effects are likely.
	Bats	Local Importance (Higher Value)	Permanent significant negative impact	The implementation of confirmatory pre-construction surveys, and associated mitigation as outlined previously to replace lost roosting features are such that residual effects will be a **short term imperceptible effect** at a local geographic scale (i.e. **not significant**).. No long term adverse effects are likely.
	Red squirrel	Local Importance (Higher Value)	Permanent slight negative impact.	The reinstatement of supporting habitat within the passing bays for red squirrel will reduce the footprint of habitat loss for the species. There will be trees adjacent to the road which cannot be reinstated as they will interfere with the cable itself. As such, the residual impact will be a **short**

Receptor		Importance	Potential for Impact in Absence of Mitigation	Potential for Residual Impact
				term imperceptible effect at a local geographic scale (i.e. **not significant**). No long term adverse effects are likely.
	Pygmy shrew	Local Importance (Higher Value)	Short term slight negative impact	As outlined in the mitigation measures, clearance of vegetation outside of the breeding season for these species. As such residual impacts will be a **short term imperceptible effect** at a local geographic scale (i.e. **not significant**). No long term adverse effects are likely.
	Hedgehog	Local Importance (Higher Value)	A temporary slight negative impact.	
	Stoat	Local Importance (Higher Value)	A temporary slight negative impact.	
Watercourses	Owenacurra River	County Importance	Permanent significant negative impact	The measures outlined to protect the watercourses are such that residual impacts will **be short term slight effect** at a local geographic scale. No long term adverse effects are likely.
	All other watercourse crossings	Local importance (Higher Value)	Permanent significant negative impact on watercourses associated with the proposed development.	
Wintering Birds	Waterfowl	National importance	Short-term moderate negative impact on wintering waterfowl associated with the proposed development	Measures to reduce disturbance effects are such that any residual effect to wintering waterfowl will be a **temporary imperceptible effect (i.e. not significant)** at a national geographic scale. No long term adverse effects are likely.
	Winter raptor roost	National importance	Short-term moderate negative impact	Measures to reduce disturbance effects to hen harrier are such that any residual effect will be a **temporary imperceptible effect** at a national geographic scale (i.e**. not significant**). No long term adverse effects are likely.
Breeding birds	General	Local Importance (Higher Value)	Permanent slight negative impact on breeding birds.	Mitigation measures outlined to protect breeding birds are such that any residual effects will be **imperceptible** at a local geographic scale. No long term adverse effects are likely.
	Breeding Kingfisher and other riparian birds	Local Importance (Higher Value)	Permanent slight negative impact on kingfisher.	

Receptor		Importance	Potential for Impact in Absence of Mitigation	Potential for Residual Impact
Amphibians	Common frog	Local importance (Higher value)	Permanent slight negative impact.	Mitigation measures outlined to protect frog and newt are such that any residual impacts will be **imperceptible** at a local geographic scale (i.e. **not significant**). No long term adverse effects are likely.
	Smooth newt	Local Importance (Higher Value)		
Reptiles	Common lizard	Local Importance (Higher Value)	Permanent slight negative impact.	Mitigation measures outlined to protect lizards re such that any residual impacts will be **imperceptible** (i.e. **not significant).** No long term adverse effects are likely.
Other species of note	Invertebrates of conservation concern presumed present (none protected)	Local Importance (Higher Value)	Permanent medium term slight negative impact	Reinstatement of vegetation and planting with pollinator friendly species mixes are such that effects are anticipated to be **imperceptible** (i.e. **not significant**). No long-term adverse effects are likely.

The Landscape

There will be construction stage effects from all of the proposed elements, but these will be temporary / short term in duration and for some aspects, including the landfall and HVDC / HVAC Onshore Circuits, Construction Compounds, Laydown Areas and Passing Bays there will be no material operational stage effects as they will remain underground with the landcover above reinstated.

The main consideration in terms of permanent operational stage landscape and visual effects relates to the proposed Converter Station at Ballyadam. Although this will be a large electrical infrastructure facility, it is proposed in a robust hinterland landscape setting within an underlying industrial zoning. Eight viewpoints were selected to undertake the visual impact of this element on the proposed development. The highest level of impact is deemed to occur in respect of local receptors on elevated ground to the north of the proposed converter station. In a pre-mitigation scenario a clear and close view of the proposed converter station is considered to give rise to a Substantial-moderate visual impact. Once the proposed dispersive and recessive colour scheme is applied to the proposed buildings and perimeter screen planting has become established the significance of impact is considered to reduce to Moderate. On the basis of similar reasons for the further distant receptors, a pre-mitigation significance of Moderate will reduce to Moderate-slight once mitigation is established.

For the reasons outlined above, it is considered that the Proposed Development will not give rise to any significant landscape or visual impacts.

Archaeology and Cultural Heritage

There is abundant evidence for prehistoric settlement in County Cork, and this is evident in the study area for the proposed development. Though few can confidently be dated to early prehistory—Mesolithic to Neolithic—there is clear evidence for settlement from at least the early Bronze Age along the route of the proposed development.

Most impacts during the construction phase are likely to be direct impacts as a result of sub-surface disturbance or construction works. All impacts at this phase are considered to be negative and permanent. It is not considered that the on-road route options will have any impact on townland boundaries where the townland boundary has already been transected by the existing roadway (and the route will be within that existing break) or where the existing roadway demarcates the current townland boundary.

Direct impacts to townland boundaries have only been identified where the proposed scheme requires a new break or the removal of a section of extant townland boundary. Indirect impacts at operation stage would largely occur as a result of impacts on the setting of site (notably visual impacts) and on the integrity and character. With the exception of the Connection Point at Knockraha, Converter Station at Ballyadam and Landfall at Claycastle the scheme infrastructure should be largely sub-surface with limited potential for visual impacts. As a result, no indirect impacts or impacts on setting have been identified at operational phase.

All sub-surface groundworks associated with the proposed development works will be subject to a programme of archaeological monitoring. Residual archaeology and cultural heritage impacts range from slight to moderate significance.

A description of impacts to cultural heritage sites is provided in Table 0.2 overleaf. Mapping, showing the locations of the cultural heritage sites referred to overleaf, is available in appendix 10.1 of Volume 3C2.

Table 0.2: Description of Impacts to cultural heritage sites at Construction Phase

CH No	Phase	Impact Type	Mitigation Measures	Magnitude of Impact after implementation of mitigation measures	Baseline Value	Significance of Impact after implementation of mitigation measures
CH005	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate
CH010	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate
CH011	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate
CH018	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate
CH026	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate
CH027	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate
CH028	Construction	Direct	• A combination of pre-construction advance geophysical survey and advance archaeological test trenching will be carried out for all off-road sections of the cable routes.	Moderate	Very High	Moderate
CH029	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate
CH030	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate
CH031	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate
CH032	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate
CH033	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate
CH048	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate
CH050	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate
CH061	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate

CH No	Phase	Impact Type	Mitigation Measures	Magnitude of Impact after implementation of mitigation measures	Baseline Value	Significance of Impact after implementation of mitigation measures
CH062	Construction	Direct	• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.	Moderate	Very High	Moderate
CH120	Construction	Direct	• A pre-construction underwater archaeological survey will be undertaken for all watercourses along the route of the proposed development with particular regard to the Disour River (CH120), Kiltha River and associated demesne landscape (CH122), Dungourney River (CH123) and Owenacurra River (CH137) and its tributary (CH124). • A combination of pre-construction advance geophysical survey and advance archaeological test trenching will be carried out for all off-road sections of the cable routes. • HDD methodology to be used to cross Disour River in section DC08-DC09	Moderate	Medium / High	Slight
CH122	Construction	Direct	• A pre-construction underwater archaeological survey will be undertaken for all watercourses along the route of the proposed development with particular regard to the Disour River (CH120), Kiltha River and associated demesne landscape (CH122), Dungourney River (CH123) and Owenacurra River (CH137) and its tributary (CH124). • A combination of pre-construction advance geophysical survey and advance archaeological test trenching will be carried out for all off-road sections of the cable routes. • HDD methodology to be used to cross Kiltha River in section DC06-DC07	Moderate	Medium / High	Slight
CH123	Construction	Direct	• A pre-construction underwater archaeological survey will be undertaken for all watercourses along the route of the proposed development with particular regard to the Disour River (CH120), Kiltha River and associated demesne landscape (CH122), Dungourney River (CH123) and Owenacurra River (CH137) and its tributary (CH124). • HDD methodology to be used to cross Dungourney River in section DC03-DC04	Moderate	Medium / High	Slight
CH124	Construction	Direct	• A pre-construction underwater archaeological survey will be undertaken for all watercourses along the route of the proposed development with particular regard to the Disour River (CH120), Kiltha River and associated demesne landscape (CH122), Dungourney River (CH123) and Owenacurra River (CH137) and its tributary (CH124).	Moderate	Medium / High	Slight
CH127	Construction	Direct	• A combination of pre-construction advance geophysical survey and advance archaeological test trenching will be carried out for all off-road sections of the cable routes.	Moderate	Medium / Low	Slight

CH No	Phase	Impact Type	Mitigation Measures	Magnitude of Impact after implementation of mitigation measures	Baseline Value	Significance of Impact after implementation of mitigation measures
CH130	Construction	Direct	• A combination of pre-construction advance geophysical survey and advance archaeological test trenching will be carried out for all off-road sections of the cable routes.	Moderate	Medium / High	Slight
CH131	Construction	Direct	• A combination of pre-construction advance geophysical survey and advance archaeological test trenching will be carried out for all off-road sections of the cable routes.	Moderate	Medium / High	Slight
CH132	Construction	Direct	• A combination of pre-construction advance geophysical survey and advance archaeological test trenching will be carried out for all off-road sections of the cable routes.	Moderate	Medium / Low	Slight
CH137	Construction	Direct	• A pre-construction underwater archaeological survey will be undertaken for all watercourses along the route of the proposed development with particular regard to the Disour River (CH120), Kiltha River and associated demesne landscape (CH122), Dungourney River (CH123) and Owenacurra River (CH137) and its tributary (CH124). • HDD methodology to be used to cross Owenacurra River in section DC01-DC02	Moderate	Medium / High	Slight
CH138	Construction	Direct	• A suitably qualified and experienced archaeologist will monitor all ground-breaking works at the proposed landfall site at Claycastle Beach (CH138). This monitoring will: – Be carried out by a suitably qualified archaeologist under licence. – Include all works associated with cable installation (Options 1 or 2) at this location. – Result in a detailed report setting out any findings and outlining any further measures, within the parameters assessed in this EIAR, that should be employed in relation to the proposed development. This report should be submitted to the National Monuments Service (DHLGH). • A suitably qualified and experienced Project Environmental Specialist will develop a Project Environmental Remains Strategy in accordance with the TII Palaeo-environmental Sampling Guidelines. • A pre-construction programme of advance archaeological test trenching will be carried out at the landfall site. • A buffer zone of 15m diameter to be established around exposed peat deposits to the SW of the cable route including the site of a possible fulacht fiadh trough (CA3007) and fenced off for duration of construction works. • The site of the metal object (CA3001) will be either be fenced off from the construction works for their duration (minimum buffer zone of 15m) or fully archaeologically excavated.	Moderate	High	Moderate

CH No	Phase	Impact Type	Mitigation Measures	Magnitude of Impact after implementation of mitigation measures	Baseline Value	Significance of Impact after implementation of mitigation measures
			• All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring. A suitably qualified and experienced Project Environmental Specialist will develop a Project Environmental Remains Strategy in accordance with the TII Palaeo-environmental Sampling Guidelines. • A buffer zone of 15m diameter to be established around exposed peat deposits to the SW of the cable route including the site of a possible fulacht fiadh trough (CA3007) and fenced off for duration of construction works. • The site of the metal object (CA3001) should be either be fenced off from the construction works for their duration (minimum buffer zone of 15m) or fully archaeologically excavated. • All sub-surface groundworks associated with the proposed development works shall be subject to a programme of archaeological monitoring.			
CH142	Construction	Direct	• Where a section of an upstanding townland boundary must be removed then a representative cross-section of the townland boundary will be investigated and recorded	Moderate	Medium / Low	Slight
CH146	Construction	Direct	• Where a section of an upstanding townland boundary must be removed then a representative cross-section of the townland boundary will be investigated and recorded	Moderate	Medium / Low	Slight
CH148	Construction	Direct	• Where a section of an upstanding townland boundary must be removed then a representative cross-section of the townland boundary will be investigated and recorded	Moderate	Medium / Low	Slight
CH150	Construction	Direct	• Where a section of an upstanding townland boundary must be removed then a representative cross-section of the townland boundary will be investigated and recorded	Moderate	Medium / Low	Slight
CH155	Construction	Direct	• Where a section of an upstanding townland boundary must be removed then a representative cross-section of the townland boundary will be investigated and recorded	Moderate	Medium / Low	Slight
CH162	Construction	Direct	• Where a section of an upstanding townland boundary must be removed then a representative cross-section of the townland boundary will be investigated and recorded	Moderate	Medium / Low	Slight
CH191	Construction	Direct	• Where a section of an upstanding townland boundary must be removed then a representative cross-section of the townland boundary will be investigated and recorded	Moderate	Medium / Low	Slight

Roads and Traffic

Likely significant impacts on roads and traffic can be summarised as follows:

- Driver delay: disruption and delay to users of roads from cable installation work in road corridors;
- Driver delay: disruption and delay to users of roads as a result of the additional traffic movements that will be generated by the Project; and
- Community Effects: Disruption and delay of users of footpaths and cycle paths from cable installation work in or adjacent to active travel infrastructure;
- Accidents and Safety: Detrimental impact on road safety as a result of the additional traffic movements that will be generated by the Project.

The temporary effects of construction (none of which have been assessed as 'significant') or otherwise) will be mitigated through adoption of a regulated and approved Traffic Management Plan (Refer to Appendix 3.1 of Volume 3C2).

Table 0.3 overleaf provides a summary of the impact assessment undertaken for both construction and operation phases of the proposals in terms of roads and traffic, with the implementation of mitigation.

Table 0.3: Impact Assessment Summary

Phase	Aspect	Embedded design, mitigation and enhancement measures	Duration of impact	Magnitude of impact (with mitigation)	Significance impact
Construction	Driver Delay – disruption and delay to users of roads from cable installation work in road corridors	Implementation of TMP Co-ordination and engagement with relevant authorities	13 weeks (worst case)	13 minutes (worst case)	Minor (Not Significant) Temporary - less than a year
	Driver Delay – disruption and delay to users of roads as a result of the additional traffic movements that will be generated by the proposed development	Implementation of TMP Co-ordination and engagement with relevant authorities	1st Peak - 3 months 2nd Peak – 11 months Or 9 months for a specific road	12% traffic increase on several roads	None (Not Significant) Temporary
	Community Effects (including Severance) - Disruption and delay of users of footpaths and cycle paths from cable installation work in or adjacent to active travel infrastructure	Implementation of TMP Co-ordination and engagement with relevant authorities	1st Peak - 3 months 2nd Peak – 11 months Or 9 months for a specific road	Potential temporary access arrangements	Minor (Not Significant) Temporary - less than a year
	Accidents and Safety - Detrimental impact on road safety as a result of the additional traffic movements that will be generated by the proposed development	Implementation of TMP Co-ordination and engagement with relevant authorities	1st Peak - 3 months 2nd Peak – 11 months Or 9 months for a specific road	Less than 1	None (not significant)
Operation	Driver Delay – disruption and delay to users of roads from cable installation work in road corridors	None	None	None	None
	Driver Delay – disruption and delay to users of roads as a result of the additional traffic movements that will be generated by the proposed development	None	None	None	None
	Community Effects (including Severance) - Disruption and delay of users of footpaths and cycle paths from cable installation work in	None	None	None	None

Phase	Aspect	Embedded design, mitigation and enhancement measures	Duration of impact	Magnitude of impact (with mitigation)	Significance impact
	or adjacent to active travel infrastructure				
	Accidents and Safety - Detrimental impact on road safety as a result of the additional traffic movements that will be generated by the proposed development	None	None	None	None
Decommission	Driver Delay – disruption and delay to users of roads from cable installation work in road corridors	None	None	None	None
	Driver Delay – disruption and delay to users of roads as a result of the additional traffic movements that will be generated by the proposed development	None	None	None	None
	Community Effects (including Severance) - Disruption and delay of users of footpaths and cycle paths from cable installation work in or adjacent to active travel infrastructure	None	None	None	None
	Accidents and Safety - Detrimental impact on road safety as a result of the additional traffic movements that will be generated by the proposed development	None	None	None	None

Material Assets

There is potential for disruption to services during construction works. Impacts would be localised and brief in duration, however, the measures detailed below will ensure that this will not result in significant impacts in the receiving environment.

All reasonable measures will be taken to avoid unplanned disruptions to any services during the proposed works. This will include thorough investigations to identify and reconfirm the location of all utility infrastructure within the works areas, and the implementation of robust procedures when undertaking works around known infrastructure services.

Service disruptions impacting the surrounding residential, social and commercial properties will be kept to a minimum, only occurring where unavoidable. Prior notification of disruptions will be given to all impacted properties. This will include information on when disruptions are scheduled to occur and the duration of the disruption. Consultation with relevant neighbouring parties will be undertaken prior to any proposed disruptions.

During the construction phase temporary construction compounds will be required at the connection point (Knockraha substation), the converter station (Ballyadam) and the landfall (the area of the car park at Claycastle Beach). Welfare facilities will be provided at these locations and any discharges will be connected to a sealed holding tank to be emptied and disposed of off-site by a licenced contractor to an approved licenced facility. Water will be tankered onto site as required. Consequently, significant adverse impacts on utility services during the construction phase are not likely.

The volume of fill (stone) required to construct the converter station is estimated for worst-case assessment purposes at approximately 127,357m^3. The volume of cut required to construct the converter station is estimated at approximately 13,180m^3. These volumes can be reduced if cut ground can be reused on site. Excavated material will be re-used on site where possible. Waste will be managed in accordance with the Waste Management Hierarchy and *Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities* (EPA. 2020) and the Waste Management Act 1996, and associated Regulations. Consequently, significant adverse effects associated with waste management are not anticipated.

Minimal waste will be generated during the operational phase of the proposals. Any waste generated will be managed in accordance with the Waste Management Act 1996 and associated regulations. Consequently, no significant adverse impacts associated with waste management are anticipated.

No significant adverse operational phase impacts on utilities are anticipated. Further detail on waste management is provide in Appendix 3.1 of Volume 3C2.

Noise and Vibration

An assessment of predicted noise and vibration impacts arising during the construction and operation of the proposed development has been undertaken. This has been informed by the prediction of impacts using theoretical and empirical models and the results of background noise surveys conducted in 2020 and 2021.

Noise and vibration arising during construction will be controlled by the implementation of measures set out in the CEMP. In general, noise impacts arising during the construction of the connection point, convertor station site compound and landfall are not predicted to result in significant effects provided the works are undertaken during normal daytime working hours.

A large proportion of the proposed route of the HVAC / HVDC underground cable follows the alignment of major and minor roads and consequently passes in close proximity to adjacent

dwellings. Noise arising from works to install the HVAC / HVDC underground cable is not expected to be significant due to the its short-term, transient nature in any particular location. The level of ground-borne vibration due to vibratory compaction at residential distances (approximately 16m) is predicted to exceed the threshold at which complaint is likely. However, potential cosmetic damage to light-framed structures (e.g. dwellings) is only likely at distances within approximately 3m of the works. Where this is likely condition surveys will be undertaken before and after works.

At the proposed Landfall at Claycastle, the use of vibratory sheet piling to construct the temporary cofferdams is predicted to generate vibration above the threshold associated with likely complaint at any occupied building within approximately 55m of the works.

Providing occupiers with prior notification and limiting the works to less sensitive times of the day are key measures to mitigate the human perception of vibration.

Operational noise impacts are expected to arise at the Connection Point and Convertor Station Site Compound only. In the case of the latter, mitigation of noise from the various items of equipment is required in the form of attenuators, noise shields and acoustic barriers. In both cases, the magnitudes of the predicted noise impacts, including a +5 dB penalty for acoustic features, are not assessed as significant. However, the tonal characteristics of electrical equipment may introduce a noticeable change to the area. The specification of low noise equipment will be given priority in the selection and procurement of equipment.

Major Accidents and / or Disasters

The potential for significant adverse effects of the proposed land cable on the environment deriving from its vulnerability to risks of relevant major accidents and / or disasters has been assessed. In all cases it was concluded that the reasonable worst consequences are managed to an acceptable level with existing mitigation in place.

Interaction of Effects

The nature of the environment is such that interactions between all environmental topics are potentially possible and / or may occur to a certain extent for most projects. Key environmental interactions that have been identified are discussed overleaf.

Table 0.4: Interaction of Effects

Interaction	Description
Population and Human Health and Air Quality and Climate and Surface Water, including Flood Risk and Biodiversity	Climate has potential to impact on human health and surface water. The overall benefit in facilitating development and use of renewable energy sources and lifetime savings of greenhouse gas emissions are anticipated to outweigh the calculated embodied emissions during construction and operation. Flooding has the potential to impact on population and surface water and biodiversity. The flood risk assessment of the proposed converter station site concluded that the proposed surface water drainage system will provide sufficient mitigation so as not to increase flood risk elsewhere. Access to the site under heavy rainfall conditions will be limited to vehicles with 4X4 capabilities due to ponding on the existing access road, though the flooding will be of short duration. Consequently, no significant residual effects are anticipated in relation to flood risk associated with the proposed development. Water quality has the potential to impact on human health. With the implementation of the embedded and additional mitigation measures the proposed development will not result in a change in status of any WFD quality elements or prevent any waterbodies from reaching good status in the future. During the construction phase impacts on surface water quality are anticipated to be localised and brief to temporary in duration of imperceptible significance. During the construction phase, impacts on surface water drainage and water supply and wastewater discharge networks are anticipated to be localised and brief to temporary in duration of imperceptible to moderate significance. Adverse impacts during the operational phase are expected to be imperceptible. Consequently, no significant residual effects on human health or biodiversity are anticipated in relation to water quality associated with the proposed development.
Population and Human Health and Air Quality and Climate and Surface Water, including Flood Risk and Biodiversity and Roads and Traffic	There is a potential interaction between dust emissions and human health and surface water and biodiversity and roads and traffic during the construction phase of the proposed development. Given the nature of the proposed development, significant air quality impacts during the operational phase are not likely. Dust nuisance can impact human health, run off from works areas can impact water quality and biodiversity, dust deposition and soiling can impact on biodiversity and dust can impact on roads and traffic. Following the implementation of mitigation measures dust impacts are not predicted to be significant. Consequently, no significant residual dust effects on human health, surface water quality or biodiversity are predicted.
Population and Human Health and Biodiversity and Noise and Vibration and Roads and Traffic	Impacts on biodiversity and loss of amenity have potential to adversely impact population and human health, including well-being. No significant residual effects on population and human health are anticipated in relation to biodiversity impacts associated with the proposed development further to the implementation of mitigation specified in Volume 3C2. Traffic has potential to impact noise and vibration and noise and vibration has potential to interact with biodiversity and human health in terms of disturbance and nuisance. Following the implementation of the proposed mitigation measures, no significant residual effects are anticipated on biodiversity or human health due to noise effects from the proposed development.

Interaction	Description
Population and Human Health and The Landscape and Biodiversity and Archaeology and Cultural Heritage	Visual impacts associated with the proposed development have the potential to impact on population and human health, including well-being. During the construction phase the impacts on visual receptors will range from Slight at the connection point at Knockraha substation, Moderate to Slight at construction compounds, laydown areas and passing bays and Moderate at the converter station a Ballyadam. During the operational phase, the proposed converter station has the potential to have an adverse impact on visual amenity and have a consequential adverse impact on population. With the implementation of mitigation measures the impact on receptors ranges from Imperceptible to Moderate. Landscape mitigation in respect of the converter station compound indicates the use of pollinator species insofar as possible within the context of the perimeter screen planting bands, which will also serve as wildlife corridors.
Population and Human Health and Material Assets and Roads and Traffic	The installation of the HVAC / HVDC cable has potential to impact on services within roads thereby impacting on Population and Human Health. The proposed development also has potential to impact on population and human health through driver delay, accidents and safety, and community effects. The implementation of the mitigation measures. No significant residual traffic and road impacts on population and human health are predicted during the construction and operational phases of the proposed development with the successful incorporation of the prescribed mitigation measures. Certain brief and temporary impacts such as relocation of utilities may be unavoidable, however, no significant impacts are anticipated provided the mitigation measures are implemented.
Land, Soils and Hydrogeology and Surface Water, including Flood Risk, The Landscape and Archaeology and Cultural Heritage	As with any civil construction works of this nature, there is potential for previously unrecorded archaeology to be encountered during excavation works. Disturbance of ground and drainage patterns can also impact unrecorded archaeology and cultural heritage. The implementation of the mitigation measures will ensure that such impacts are minimised.
Major accidents and / or disasters and Population and Human Health, Air Quality and Climate, Land, Soils and Hydrogeology and Surface Water, including Flood Risk, Biodiversity, The Landscape, Archaeology and Cultural Heritage, Roads and Traffic, Material Assets and Noise and Vibration	The potential for significant adverse effects of the proposed development on the environment deriving from the vulnerability of the proposed development to risks of relevant major accidents and / or disasters has been assessed. Significant adverse effects are not likely given the nature of the proposed development and the embedded and additional mitigation measures that will be implemented.

Decommissioning Phase

The activities associated with the decommissioning phase will be similar to those associated with the construction phase. Therefore, provided that appropriate mitigation is used, the impacts of the decommissioning phase should be, as a worst-case scenario, similar to those at construction phase.

Cumulative Effects

Cumulative effects take account of the addition of many minor or significant effects to create larger, more significant effects.

Intra-Project effects refer to the combined impacts of the Ireland onshore proposed development and other elements of the Celtic Interconnector project within the shared Zone of Impact (ZoI). Information on the cumulative effects of the proposed development with Other Developments (refer to see Table 4.2 of Volume 3C Part 1) has also been considered.

All activities associated with the construction and operation and decommissioning of the Celtic Interconnector were assessed for the likely significant cumulative effects within the topic specific ZoI. Where likely significant cumulative effects are identified, discussion is provided on the contribution of the proposed development to that cumulative effect. The table overleaf summarises the conclusions of said cumulative effects assessments with reference to the chapters in Volume 3C Part 2.

Table 0.5: Cumulative Effects (Volume 3C Part 2)

Chapter	Cumulative Effects
Chapter 4 Population and Human Health	**Intra-Project:** Construction works will result in temporary nuisance and disturbance in relation to traffic, dust and noise and restricted movements along Claycastle Beach and the car park during the construction phase. There will be temporary disruption to some amenities during the construction phase and temporary to short-term negative impacts on tourism recreation and amenities due to potential disruption to access, and general disturbance. Given the nature of the development, the sensitivity of human health and wellbeing receptors to disturbance impacts is considered to be medium during the construction phase. There will be no significant long-term adverse effects. **Other Developments:** Prior to commencement of construction and during the construction phase engagement with the proponents of these developments (including ESBN, Transport Infrastructure Ireland, the IDA and Cork County Council will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts on population and human health are minimised.
Chapter 5 Air Quality and Climate	**Intra-Project:** Intra-Project air quality impacts primarily relate to the construction activities occurring at the Construction Compound at Claycastle Beach (the compound includes areas above and below the high-water mark). The construction dust assessment for the Construction Compound at Claycastle included the entire extent of construction activities associated with the Construction Compound. Therefore, the assessment has included a consideration of cumulative intra-project effects such as those from installation and the connection of the submarine cable using either Option 1 or Option 2. The results from this assessment found that the overall effect of dust nuisance and/ or loss of amenity from the Construction Compound at Claycastle Beach was 'negligible' to 'medium risk', without mitigation. Application of the mitigation measures presented is anticipated to reduce this predicted risk to 'negligible'. **Other Developments:** In general, there should be no cumulative impact associated with construction dust due to phasing of the construction period and the geographic extent of the proposed development. There will be more than 350m separating different construction sites so sensitive receptors will not experience cumulative effects from construction dust generated from the different construction sites. The exception to this is the construction of a proposed ESBN substation adjacent to the Ballyadam Converter Station. There is also a risk of cumulative construction dust impacts associated with the construction phases of the proposed development occurring at the same time as the construction phases of nearby committed developments. It is therefore recommended, in line with IAQM guidance, that regular liaison meetings are held with construction sites within 500m of the site boundary to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. Provided this and other appropriate mitigation measures are implemented the cumulative air quality impact associated with the construction phase will not be significant. GHG emissions are by nature cumulative, as it is the combined cumulative effect of all GHG emissions that contribute to the changing climate. The GHG assessment does not consider cumulative effects as GHG emissions do not result in a regional effect on climate and the nature of the effect on climate would not differ when combined with other developments. Other proposed developments would be required to consider the GHG emissions from the construction activities associated with that development. The GHG assessment does not consider cumulative effects as GHG emissions do not result in a regional effect on climate. The effect of the emissions from this proposed development on climate would not differ when combined with other developments. Other proposed developments would be required to consider the GHG emissions from the operational activities associated with that development.

Chapter	Cumulative Effects
Chapter 6 Land, Soils and Hydrogeology	**Intra-Project:** Construction phase impacts on land / landuse have been assessed as imperceptible. Construction phase impacts on soils and geology range from slight (soils and sub-soils) to Moderate significance (bedrock). Construction phase impacts on hydrogeology range from imperceptible (boreholes/abstractions) to moderate / slight (aquifer) to significance (groundwater/surface water interactions). Operational phase impacts on land / land use, soils and geology and hydrogeology will be imperceptible. **Other Developments:** A number of developments are proposed within the immediate environs of the proposals, for example the wider IDA site surrounding the Converter Station site at Ballyadam is scheduled for significant development activity and which will require meeting similar standards of assessment and construction as detailed herein. The proposed Converter Station compound, drainage and access and HVDC / HVAC routes have been developed independent of these other potential future proposals. Such future proposals do not affect the conclusions of this EIAR. Prior to commencement of construction and during the construction phase engagement with the proponents of these developments (including ESBN, Transport Infrastructure Ireland, the IDA, Cork County Council, Irish Water and the OPW) will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised.
Chapter 7 Surface Water, including Flood Risk	**Intra-Project:** The sensitivity of the receiving surface water environment associated with the installation of the submarine cable (i.e. Youghal Bay and the large unnamed drain located approximately 190m west of the car park) is very high. Excavation works and the storage of materials can pose a risk to surface water quality through surface water run-off and the release of sediment and potentially polluting substances to watercourses. The magnitude of adverse surface water quality impacts in the absence of additional mitigation is expected to be Moderate resulting in Significant adverse impacts of up to short-term duration prior to the implementation of additional mitigation measures. With the implementation of the mitigation measures specified, impacts on surface water quality are anticipated to be localised and brief to temporary in duration of imperceptible significance. **Other Developments:** A number of developments are proposed within the immediate environs of the proposals. The proposed converter station compound, drainage and access and HVDC / HVAC routes have been developed independent of these other potential future proposals. The design of the proposed development can readily connect into such proposals in the future without affecting the conclusions of this EIAR, consequently significant cumulative effects are not likely. Prior to commencement of construction and during the construction phase engagement with the proponents of these developments (including ESBN, Transport Infrastructure Ireland, the IDA, Cork County Council and the OPW) will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised.
Chapter 8 Biodiversity	**Intra-Project:** The following relates to works associated with the installation of the submarine cable at Claycastle Beach, below the HWM. Given the nature of the Proposed Development there is potential for overlapping of the ZoI at the landfall location. Landfall sequencing requires sheet piles to be installed to create a cofferdam. Excavation along the beach to the TJB will also be required. Assuming a worst-case scenario where works associated with the cable route up to the high water mark take place concurrently to the works at the landfall location, there is potential for increased noise emissions which has potential to cause disturbance. Mitigation measures are such that any residual disturbance effects will not be significant.

Chapter Cumulative Effects

Other Developments:

An assessment of proposed and permitted developments that have the potential to generate cumulative impacts cumulative with the proposed development is detailed below..

Midleton to Youghal Greenway

The project comprises a Greenway route which runs from the north-eastern corner of Midleton to the old railway station at Youghal in east Cork. As part of the application an Appropriate Assessment Screening report was prepared.

This screening report for the greenway concludes that:

"*Appropriate Assessment, based on the best available scientific information, demonstrates that construction and operation of the proposed Greenway between Midleton and Youghal, Co. Cork, poses no risk of likely significant effects on Natura 2000 sites (e.g. Great Island Channels SAC, Cork Harbour SPA, Ballymacoda (Clonpriest and Pillmore) SAC or Ballymacoda Bay SPA)*."

Construction works for the greenway are currently progressing. No potential for disturbance to wintering birds was identified in the AA screening for the greenway, as no supporting habitat was identified within or along the scheme.

There is potential for surface water run-off associated with the Midleton to Youghal Greenway works, however, the timing of the works is such that the greenway will be constructed prior to the commencement of the construction phase of this proposed development. With mitigation outlined for the proposed development no potential for significant residual cumulative impacts has been identified.

Lower Lee Flood Relief Scheme

The OPW in conjunction with Cork County Council are advancing the Lower Lee (Cork City) Flood Relief Scheme. The scheme will run from Inniscarra Dam to the City Centre. A Screening Report for Appropriate Assessment was developed for the scheme. Among other European sites, the report examined the potential for significant effects on the Cork harbour SPA, and the Great Island Channel SAC.

The report concluded that "*The evaluation undertaken has identified that there will be no potential significant impact on any Special Conservation Interests and their conservation objectives, either alone or in-combination with any other plans and projects, for European sites given their distance either downstream or upstream of the proposed works and due to the operational proposals for the scheme.*"

Given the location of the flood relief scheme in relation to the proposed development, more than 10km to the west, no potential for cumulative impacts is identified.

Midleton Carrigtwohill WWTP upgrades

Irish Water have identified plans to upgrade the capacity of the sewage treatment system in the greater Midleton area. GI works are required to inform the design of the treatment plant. These GI works are anticipated to commence in Q1 2021. As such they will be taking place prior to works for Celtic Interconnector. Further, the ground investigation works are temporary and small scale in nature. As such there is no potential for cumulative or in-combination impacts identified.

Following the design of the proposed upgrades, the project for the upgrade of the Midleton and Carrigtwohill WWTPs will be subject themselves to the provisions of the Directives, i.e. requiring screening for Appropriate Assessment and screening for EIA.

N25 Carrigtwohill to Midleton Scheme

The Cork Roads Design Office (RDO) in liaison with Transport Infrastructure Ireland (TII) are currently planning the upgrading of the part of the existing N25 between Carrigtwohill and Midleton, including that portion which adjoins the proposed converter station site. This road project will involve the expansion of the existing road corridor to dual carriageway. A number of potential options affecting the wider IDA landholding at Ballyadam are currently being considered

Chapter	Cumulative Effects
	by the RDO, including the provision of a full dumb-bell interchange at Ballyadam, with associated slip roads, on the southern portion of the overall landholding. There is potential for an overlap in construction for the period of 2025-2026 The potential for cumulative impacts is dependent on the route option selected for the N25 upgrade. Given the nature of the potential for impact to biodiversity that is associated with the converter station works, the location of the Carrigtwohill to Midleton scheme, and the mitigation proposed to ameliorate same, no potential for cumulative effects is identified in combination with the N25 Carrigtwohill to Midleton Scheme *Midleton Flood Relief Scheme* The flood relief scheme for Midleton is currently under development. There is potential for the scheme's construction to run concurrently with the construction for the proposed development. There is potential for surface water impacts associated with the flood scheme. Given that the project has not yet been defined at the time of writing, the extent of this potential is unclear. Prior to commencement of construction and during the construction phase engagement with Cork County Council and the Office of Public works (OPW) will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised. *Ballyadam 110kV Substation* The Electricity Supply Board (ESB) propose to construct a new 110kV substation to the east of the proposed converter station compound. These works may require additional site clearance within the wider IDA site, and may result in additional surface water impacts. Given that the project has not yet been defined at the time of writing, the extent of this potential is unclear. Prior to commencement of construction and during the construction phase engagement with the ESB will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised. *IDA lands at Ballyadam* Although there were no definitive projects or plans at the time of writing this EIAR (outside of the 110kV substation previously mentioned) it is likely that other developments within the wider Ballyadam site will be developed and that these may have potential for cumulative effects. The IDA are also likely to develop internal access roads and utility connections for the wider Ballyadam site. As the nature of these projects and plans are not known the associated cumulative impacts cannot be assessed. However, it is likely that the plans will require additional site clearance within the wider IDA site, and may result in additional impacts to ecological receptors within the site. Prior to commencement of construction and during the construction phase engagement with the proponents of these developments (including ESBN, Transport Infrastructure Ireland, the IDA, Cork County Council and the OPW) will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised
Chapter 9 The Landscape	**Intra-Project:** The landfall construction stage at Claycastle will involve trenching of a channel on the beach through the municipal car park that sits adjacent and above the beach and the excavation of an underground transition joint bay within the grassed amenity strip just inland of the carpark. Whilst the transition joint bay will be located above the HWM and forms part of the Proposed Development, the associated cable trench through the beach and carpark is a separate element of the Celtic Interconnector Project. The cable will be pulled into the transition joint bay from its near shore approach. The construction process will involve excavation machinery, sheet piling of the trench, temporary storage of excavated material and construction material, security fencing as well as welfare

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	facilities and car parking for workers. It will appear much like any other infrastructure building site, albeit the majority of work will occur below ground level and no permanent above ground structures will emerge. The construction stage will generate localised negative impacts on landscape character and visual amenity at this relatively scenic seaside location enjoyed by recreationalists. However, the duration of construction works will be only 18 weeks and therefore 'temporary' (less than 1 year) in accordance with EPA guidance. The landscape sensitivity of the Landfall study area is deemed to be Medium and so too is the sensitivity of visual receptors being predominantly recreational users of the camping ground and beach. On balance of the factors described above and particularly the temporary duration, the magnitude of landscape impacts and visual impacts during the Landfall construction stage is deemed to be no greater than Medium-low. A Medium receptor sensitivity judgement coupled with a Medium-low impact magnitude judgement is deemed to result in a Moderate-slight significance of construction stage impact. Once the construction phase is complete, and the prevailing ground cover reinstated at the landfall site (Proposed Development and other elements of the Celtic Interconnector Project), the only above ground expression of the proposed development will be a small hatch to the communications cabinet. Although visible and contained within amenity grassed picnic area at the back of the car park the access hatch will have no discernible effect on even the very localised landscape character and visual amenity. For this reason the magnitude of operational stage landscape impact and visual impact is deemed to be Negligible. When coupled with the Medium sensitivity of the landscape and visual receptors at this located, the overall significance of impact is deemed to be Imperceptible during the operational phase. **Other Developments:** The main potential for cumulative impacts to occur in conjunction with the proposed Celtic Interconnector development relate to other substantial scale developments in close proximity to the proposed Converter Station Compound. In particular, the adjacent ESB 110 kV substation, other future industrial / infrastructure developments that might occur within the industrial zoned IDA lands at Ballyadam and the proposed upgrade works to the N25. Also, potential residential expansion between Midleton and Carrigtwohill. In respect of the adjacent ESB 110kV substation the cumulative effect is likely to be one of intensification and scale of developments of a similar nature. Mitigation screen planting will help to reduce cumulative visual impacts, particularly for those residential receptors that occur uphill to the north of the IDA landholding. Cumulative impacts for these two developments will be noticeable, but are not likely to be significant. Similarly, other forms of industrial or commercial development within the overall IDA landholding will result in increased intensity, scale and extent of large and potentially bulky buildings. Internal landscaping similar to that set up as a precedent by measures proposed on the converter station site (southern boundary) will aid visual integration and consolidation of development within the wider IDA site (if implemented). Though likely to occur adjacent to the other side of the IDA site to the proposed converter station, the N25 upgrade and potential intersection with the IDA site is likely to also increase the scale and intensity of infrastructure development in the vicinity of the converter station. Together these developments would serve to reduce the integrity of the current rural hinterland setting of the IDA landholding and the visual amenity of those afforded views across the site, particularly from the slopes to the north. While the cumulative developments outlined above have the potential to generate moderate or even significant cumulative landscape and visual impacts in-combination with the proposed converter station, there is also strong potential to mitigate such impacts from considered siting and design. It is also important to consider such cumulative impacts in the context of a quickly evolving hinterland landscape that already hosts a rich variety of productive and infrastructural land uses in terms of its baseline context.
Chapter 10 Archaeology and Cultural Heritage	**Intra-Project:** Installation of HVDC subsea cable will require ground reduction at Claycastle Beach, with two differing construction methodologies being proposed. Option 1: the cable ducts will be placed within an excavated trench (c.14 m wide and varying in depth from 1.8–3m) up the beach from the sea to the TJB chambers. The excavation into the intertidal zone will require the temporary construction of a causeway, to form a stable platform from which excavators can work freely above the tidal zones. The platform and the trench excavation will be formed by a cofferdam (sheet piling). Option 2: involves the cable being pulled to shore by winch through conduits placed in trenches running from the TJB chamber to the sea. A 10 m long receiver pit will be excavated at low tide

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	at the end of each trench to allow the messenger wires to be attached to the main cable and ensure a smooth transition during winching. Once in place the cables will be winched to shore and following secure connection at the TJB a plough/ jetter will be used to bury the cable. The ground reduction required will impact upon the Area of Archaeological Potential (AAP) for Claycastle Beach (CH138) as there is potential that the works would uncover previously unknown archaeological features, in particular associated with the palaeo-landscape and peat deposits that characterise the AAP. Surveys of the intertidal zone carried out as part of the assessment of the Ireland Offshore development have identified a number of potential archaeological features located below the HWM that relate to the AAP (CH138) including a metal object (CA3001) and a possible fulacht fiadh trough (CA3007) (see EIAR Volume 3D2). There is a potential that impacts to these features could occur as a result of ground reduction during construction phase. The cumulative impact from the proposed development and the Ireland Offshore development to the AAP at Claycastle Beach (CH138) incorporating its associated features below the HWM is considered to be significant. With the implementation of the measures the impact is anticipated to be moderate. **Other Developments:** A number of developments are proposed within the immediate environs of the proposed development. The cumulative impacts of the proposed development and these projects on archaeology and cultural heritage are considered to be 'not significant'. Effects to archaeology and cultural heritage as a result of the proposed development are direct effects limited to its boundaries so any potential for cumulative impact is restricted to developments whose boundary overlap with the proposed development or with receptors that will be affected by the proposed development. These would be the future development of the IDA lands at Ballyadam (including the proposed new ESB substation) and the proposed upgrade to the N25 from Carrigtwohill to Midleton (which is considering a number of options that would affect the IDA lands at Ballyadam also). However, a previous phase of work at the Ballyadam site in the period 2006-2009 resulted in mitigation (through archaeological excavation or preservation by record) of impacts to (previously unknown) sub-surface archaeological sites / features across a substantial proportion of this site. As a result, any potential further direct impacts to archaeological sites or features within the IDA lands as a result of the proposed development or any other future development within its bounds (such as the proposed ESB substation or N25 expansion) have already been minimised.
Chapter 11 Roads and Traffic	**Intra-Project:** Having regard to the nature of the traffic assessment, a cumulative intra-project assessment of roads and traffic effects was carried out. The conclusion of the assessment is that the impacts are not significant: **Other Developments:** Committed developments with known information have been included within the assessment, however, some developments do not have traffic / construction information currently available. Under this scenario it is possible that the combined cumulative effect could exceed the traffic significance thresholds. In this case, it is important that plans are co-ordinated and any adverse roads and traffic impacts are minimised. With specific reference to TII's, in conjunction with Cork County Council's, plans for an upgrade to the N25 corridor between Carrigtwohill and Midleton; the proposal includes upgrading the part of the existing N25 between Carrigtwohill and Midleton, including that portion which adjoins the proposed converter station site. This road project will involve the expansion of the existing road corridor to dual carriageway. A number of potential options affecting the wider IDA landholding at Ballyadam are currently being considered by the Roads Design Office (RDO), including the provision of a full dumb-bell interchange at Ballyadam, with associated slip roads, on the southern portion of the overall landholding. The options are available to view on the N25 Brochure published by Cork County Council's RDO in October 2020. The project is also included in Project Ireland 2040 and the National Development Plan 2018-2027.There is potential for an overlap in construction for the period of 2025-2026. Whilst this will be an improvement to the N25 construction is not anticipated to commence until 2025 and as such it will not be in place during the construction of the proposed development. Prior to commencement of construction, and during the construction phase, engagement with the proponents of other developments (including Transport Infrastructure Ireland, the IDA, Irish Water and Cork County Council) will continue and where there is potential for works to be carried out in parallel,

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	appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts on population and human health are minimised. The specific detail will be developed by the appointed contractor within the parameters assessed in Volume 3C2. Provided this and other appropriate mitigation measures are implemented, such as those outlined below, the cumulative roads and traffic impacts associated with the construction phase, based on our assessment, will not be significant.
Chapter 12 Material Assets	**Intra-Project:** The Contractor will be obliged to aim for a recycling rate in accordance with EU targets under the Waste Framework Directive (2008/98/EC). Waste generated during the installation of the submarine cable will be managed in accordance with the Waste Management Hierarchy and *Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities* (EPA. 2020) and the Waste Management Act 1996, and associated Regulations. Consequently, significant adverse effects associated with waste management are not anticipated. **Other Developments:** There is a risk of cumulative construction phase impacts associated with the construction phases of the proposed development occurring at the same time as the construction phases of other developments. Consequently, there will be a need to ensure that where works are occurring in parallel that appropriate mitigation measures are considered within the parameters assessed in Volume 3C2, including the scheduling of works, regular liaison meetings between project teams to ensure plans are co-ordinated and impacts are minimised. With the implementation of these, and the subsequently identified mitigation measures, the cumulative impacts associated with the construction phase will not be significant.
Chapter 13 Noise and Vibration	**Intra-Project:** Intra-Project noise impacts relate to the construction activities occurring at the Construction Compound at Claycastle Beach (the compound includes areas above and below the high-water mark) and the installation of the submarine cable along Claycastle Beach (Options 1 and 2). The construction impacts assessment for the Construction Compound at Claycastle include the entire extent of construction activities associated with the Construction Compound and the installation of the submarine cable. Therefore, the assessment has included a consideration of cumulative intra-project effects. Following the implementation of mitigation measures, there will be no significant noise and vibration effects. **Other Developments:** No other developments have been identified which have the potential to generate cumulative impacts with the potential to result in significant adverse effects.
Chapter 14 Major Accidents and/or Disasters	In all instances the reasonable worst consequence is managed to an acceptable level with mitigation in place

Transboundary Effects

All elements of the proposed development are found in County Cork, Ireland and no international boundaries are crossed by the works, significant transboundary effects are not likely to occur as a result of the proposals.

Mitigation and Monitoring Measures

The table overleaf sets out the mitigation controls and other best practice measures identified in EIAR Volume 3C Part 2 and identifies the means by which those controls and measures will be secured. The following are provided:

- a unique reference number for each item (corresponding to Volume 3C Part 2);
- the section of the EIAR (Volume 3C Part 2) where the mitigation measure is referenced; and
- the monitoring and mitigation measures, as set out in the EIAR.

These measures and conditions have been incorporated into the CEMP (refer to Appendix 3.1 of Volume 3C2).

A contractual obligation will be included within the tendering processes and implemented on appointment of the Contractor to ensure that the proposed works are developed in compliance with the requirements of the CEMP, and the methods, monitoring and mitigation included in Volume 3C Part 2.

As detailed previously, the Developer will monitor the contractor(s) performance on a regular basis and will undertake compliance checks throughout the duration of the construction period, including:

- Review contractor documents against the requirements of the CEMP;
- Undertake regular audits;
- Continuously check records;
- Set up a contractor reporting structure; and
- Conduct regular meetings where Environmental Health and Safety is an agenda item.

Records of the implementation of the measures identified in the CEMP will be provided if required to the Planning Authority at a time scale to be agreed.

Table 0.6: Mitigation and Monitoring Measures (Volume 3C Part 2)

Reference	Aspect	Mitigation and / or Monitoring Measure
Chapters 1 to 3		
Not Applicable	Not Applicable	These chapters do not include any additional mitigation measures
Chapter 4 Population and Human Health		
4.1	Construction Phase	• All work will be carried out having regard to international and national legislation, and best practice guidance, as detailed in the topic specific chapters of the EIAR.
4.2	Construction Phase	• The CEMP will be finally agreed by the contractor in consultation with Cork County Council and implemented during the construction phase to safeguard the environment, site personnel, and nearby sensitive receptors, i.e. occupiers of residential and commercial properties, from site activities which may cause harm or nuisance.
4.3	Construction Phase	• The appointed contractor (in collaboration with EirGrid) will be required to maintain close liaison with local community representatives, landowners and statutory consultees throughout the construction period. This is likely to include circulation of information about ongoing activities; particularly those that could potentially cause disturbance, including due to traffic. A telephone number will be provided and persons with appropriate authority to respond to calls and resolve or escalate any problems arising will be available.
4.4	Construction Phase	• The appointed Contractor will also implement the Traffic Management Plan included as Appendix B of the CEMP, which will be finally agreed with Cork County Council to mitigate any potential construction traffic impacts on the public road network. All construction activities, including construction traffic, will be managed through the CEMP.
4.5	Cumulative Effects	• Prior to commencement of construction and during the construction phase engagement with the proponents of these developments (including ESBN, Transport Infrastructure Ireland, the IDA and Cork County Council will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts on population and human health are minimised.
Chapter 5 Air Quality (AQ) and Climate (C)		
5.1	AQ: Construction Phase Mitigation applicable to HVAC/HVDC Onshore circuits, laydown areas and passing bays	• Communication: – Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary; and – Display the head or regional office contact information. • Site Management: – Record all dust and air quality complaints, identify causes and take appropriate measures to reduce emissions in a timely manner and record the measures taken: and – Record any exceptional incidents that cause dust and or air emissions, either on or off site, and the action taken to resolve the situation in the log book. • Monitoring: – Carry out regular site inspections to monitor compliance with the CEMP and record inspection results.

Reference	Aspect	Mitigation and / or Monitoring Measure
		• Preparing and maintaining the site – Avoid site runoff of water or mud. • Operating vehicles/ machinery and sustainable travel: – Ensure all vehicles switch off engines when stationary – no idling vehicles; and, – Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable. • Operations: – Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction; – Ensure an adequate water supply on the site for effective dust/ particulate matter suppression/ mitigation using non-potable water where possible and appropriate; and, – Use enclosed chutes and conveyors and covered skips. • Measures specific to demolition: – Ensure effective water suppression is used during demolition operations. • Measures specific to trackout: – Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport; – Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable; and, – Record all inspections of haul routes.
5.2	AQ: Construction Phase Mitigation applicable to Ballyadam Converter Station	• Communication: – Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary; and, – Display the head or regional office contact information. • Site Management: – Record all dust and air quality complaints, identify causes and take appropriate measures to reduce emissions in a timely manner and record the measures taken; and, – Record any exceptional incidents that cause dust and or air emissions, either on or off site, and the action taken to resolve the situation in the log book. • Monitoring: – Carry out regular site inspections to monitor compliance with the CEMP and record inspection results; and, – Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out during prolonged dry or windy conditions. • Preparing and maintaining the site: – Avoid site runoff of water or mud; – Plan site layout so that machinery and dust causing activities are located away from receptors as far as possible; – Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles;

Reference	Aspect	Mitigation and / or Monitoring Measure
		– Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period; – Remove materials that have a potential to produce dust from site as soon as possible unless being re-used on site; if they are being reused on site cover as described below; and, – Cover seed or fence stockpiles to prevent wind whipping. • Operating vehicles / machinery and sustainable travel: – Ensure all vehicles switch off engines when stationary – no idling vehicles; – Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable; and, – Impose and signpost a maximum-speed limit of 15mph on surfaced and 10mph on unpaved surface haul roads and work areas. • Operations – Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction; – Ensure an adequate water supply on the site for effective dust/ particulate matter suppression/ mitigation using non-potable water where possible and appropriate; – Use enclosed chutes and conveyors and covered skips; – Minimise drop heights from conveyors loading shovels hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever available; – Avoid bonfires and burning of waste materials; and, – Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods. • Measures specific to demolition: – Ensure effective water suppression is used during demolition operations; and, – Avoid explosive blasting, using appropriate manual or mechanical alternatives. • Measures specific to construction: – Avoid scabbling (roughening of concrete surfaces) if possible: – Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place; – Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos where suitable emission control systems to prevent escape of material and overfilling during delivery: and, – For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust. • Measures specific to earthworks: – Re-vegetate earthworks and exposed areas/ soil stockpiles to stabilise surfaces as soon as practicable; – Use hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil as soon as practicable; and,

Reference	Aspect	Mitigation and / or Monitoring Measure
		– Only remove the cover in small areas during work and not all at once. • Measures specific to trackout: – Use water-assisted dust sweepers on the access and local roads, to remove as necessary any material tracked out of site; – Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport; – Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable; – Record all inspections of haul routes; – Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable); – Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit and layout permits; – Install hard surfaced haul routes which are regularly damped down with fixed or mobile sprinkler system or mobile water bowsers and regularly cleaned; – Avoid dry sweeping of large areas; and, – Access gates to be located at least 10m from receptors where possible.
5.3	AQ: Construction Phase Mitigation applicable to construction compound at Claycastle Beach	• Communication: – Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary; and, – Display the head or regional office contact information. • Site Management: – Record all dust and air quality complaints, identify causes and take appropriate measures to reduce emissions in a timely manner and record the measures taken; and, – Record any exceptional incidents that cause dust and or air emissions, either on or off site, and the action taken to resolve the situation in the log book. • Monitoring: – Carry out regular site inspections to monitor compliance with the CEMP and record inspection results; and, – Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. • Preparing and maintaining the site: – Avoid site runoff of water or mud; – Plan site layout so that machinery and dust causing activities are located away from receptors as far as possible: and – Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles. • Operating vehicles / machinery and sustainable travel: – Ensure all vehicles switch off engines when stationary – no idling vehicles; and, – Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.

Reference	Aspect	Mitigation and / or Monitoring Measure
		• Operations: – Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction; – Ensure an adequate water supply on the site for effective dust/ particulate matter suppression/ mitigation using non-potable water where possible and appropriate; – Use enclosed chutes and conveyors and covered skips. – Minimise drop heights from conveyors loading shovels hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever available; and, – Bonfires and burning of waste materials will be prohibited. • Measures specific to demolition: – Ensure effective water suppression is used during demolition operations; and, – Avoid explosive blasting, using appropriate manual or mechanical alternatives. • Measures specific to earthworks: – Re-vegetate earthworks and exposed areas/ soil stockpiles to stabilise surfaces as soon as practicable; – Use hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil as soon as practicable; and, – Only remove the cover in small areas during work and not all at once. • Measures specific to trackout: – Use water-assisted dust sweepers on the access and local roads, to remove as necessary any material tracked out of site; – Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport; – Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable; – Record all inspections of haul routes; – Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable); and, – Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever the site size and layout permits.
5.4	C: Construction Phase Greenhouse Gas Emissions Mitigation	• Ensure all vehicles switch off engines when stationary – no idling vehicles; and, • Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable. • A Construction Waste Management Plan (as part of the CEMP, Appendix 3.1 of Volume 3C2) will be developed further by the appointed contractor, within the parameters assessed in this EIAR, and agreed with the Planning Authority prior to commencement of development. The plan provides for the segregation of all construction wastes to facilitate optimum levels of re-use, recovery, and recycling operations.

Reference	Aspect	Mitigation and / or Monitoring Measure
5.5	C: Operational Phase	• Staff or any sub-contractors involved in equipment installation, servicing or disposal will be trained to ensure they understand the techniques required to minimise the generation of fugitive emissions. The training will include best management practices for handling, managing and monitoring SF_6. • The supply and maintenance of the proposed equipment will comply with all relevant international standards and best practice: – BS EN 62271-203:2004 High-voltage switchgear and control gear. Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV; – BS EN 62271-4. High-voltage switchgear and control gear. Part 4. Use and handling of sulphur hexafluoride (SF6); – PD CLC/TR 62271-303:2009 High-voltage switchgear and control gear. Use and handling of sulphur hexafluoride (SF6); – BS EN 60376:2005 Specification of Technical Grade Sulphur Hexafluoride(SF6) for Use in Electrical Equipment; – BS EN 60480:2004 Guidelines for the checking and treatment of Sulphur Hexafluoride (SF6) taken from electrical equipment and specification for its re-use; – CIGRE 276: Guide for the Preparation of Customised 'Practical SF6 Handling Instructions.' Task Force B3.02.01 (2005); and – BS 6867:1987 Code of practice for maintenance of electrical switchgear for voltages above 36 kV. • Leak detection methods, i.e. pressure or density monitoring device, will be used as necessary and on a regular basis to identify any sources of fugitive emissions of SF_6 from equipment at the proposed development.
5.6	AQ: Cumulative effects	• Regular liaison meetings are to be held with other construction sites within 500m of the site boundary to ensure plans are co-ordinated and dust and particulate matter emissions are minimised.
Chapter 6 Land, Soils and Hydrogeology		
6.1	Construction Phase	• A pre-construction verification survey of the below boreholes will be carried out to confirm whether they remain in use, and the nature of use. If at the time they are used for drinking water purposes, water quality testing of boreholes will be carried out to ensure no degradation of water quality as a result of the construction activities. – 1 x borehole (1707SWW035) 33.5m. Source Use: Unknown – Woodstock – 1 x borehole (1707SWW017) 44.2m. Source Use: Unknown – Longstown – 1 x borehole (1707SWW034) 4.9m. Source Use: Unknown – Woodstock – 1 x borehole (1707SWW036) 25m. Source Use: Unknown – Woodstock – 1 x Dug Well (1707SEW045) 3.7m. Source Use: Unknown – Caherultan – 1 x borehole (1707SEW043) 21.3m. Source Use Unknown. – Lissacrue • One borehole in close proximity to the proposed works is used for public water supply and another for agricultural and domestic use. These two boreholes will be subject to pre-construction verification survey to confirm whether they remain in use, and the nature of use. If at the time they are in use for drinking water purposes, water quality testing of the boreholes will be conducted to ensure no degradation of water quality as a result of the construction activities. – 1 x borehole (2007SWW089) 18.3m Source Use: Agri and domestic use. – Knocknacally. – 1 x borehole (2007SWW041) 44.8m. Source Use: Public supply – Kennel.
6.2	(Embedded mitigation)	The connection will be made by equipping an existing unused bay within the existing footprint and above ground.

Reference	Aspect	Mitigation and / or Monitoring Measure
	Connection Point	
6.3	(Embedded mitigation) HVAC Underground cable route	• The depth of the trench and cable installation will be balanced against the performance of the circuit itself. • Land and vegetation will be reinstated, where possible, following construction. • Cable route located predominantly along existing highway. • Trench crossings are proposed in dry works area isolated with an impermeable barrier from water courses/temporary concrete ducts. Site restoration post works provision such as riverbank stabilisation. • HDD trench using a comprehensive closed-loop drilling fluid mixing system to minimise volume of fluids required on site with constant monitoring of volume, pressure, pH and viscosity. • Land will be returned to original state following construction. • Temporary shelter erected over joint bays during construction to protect from moisture and contamination during jointing. • Before cable installation chamber will be backfilled with appropriate material. Manholes constructed to facilitate maintenance. • Joint chambers will be installed in a staggered approach to reduce width required for installation. • Traffic control measures will be in place as appropriate, including road diversions, closures and stop/go traffic management to reduce temporary disruptions to traffic in the surrounding area.
6.4	(Embedded mitigation) Converter Station Site	• The proposed internal road access for the Converter Station site has been developed to tie into the existing internal roads within the larger IDA owned Ballyadam site, independent of potential future development of access routes to the Ballyadam site, including a potential N25 interchange to the south west The design can however readily connect into such proposals in the future without affecting the conclusions of the EIAR. • Any contaminated ground identified during enabling works will be handled according to the CEMP. Any such ground will be characterised according to Waste Acceptance Criteria and dealt with via a bespoke remediation strategy or materials management plan ground. Any waste arising will be managed in accordance with the Waste Management Act 1996, and associated Regulations. • Any fill that is required will consist of engineered stone that will be brought to site. • The proposed storm water drainage/SuDS system will incorporate the following key features; – Traditional storm water collection and conveyance elements such as gutters, downpipes, gullies, channels and below ground pipework – Flow control devices (‘hydrobrake’ or equivalent) to restrict the rate of discharge from the site to pre-development runoff rates – Below ground attenuation tanks to balance incoming flows and prevent flooding in the event of an extreme storm event – Silt traps and hydrocarbon interceptors to remove any pollutants which may have become entrained in the runoff – Shut-off valve chambers to prevent discharge from the drainage network in the event of an emergency • An area of compensatory storage will be developed to replace this storage capacity as detailed in Section 2.3.3 Drainage Design and Wastewater Discharge. This ‘cut’ could potentially be used to ‘fill’ the depressions, subject to geotechnical and ground investigation studies. For the purposes of the assessments in the EIAR however it has been assumed that material will need to be imported as a worst-case scenario.

Reference	Aspect	Mitigation and / or Monitoring Measure
		• Although a single connection to the public main is proposed, separate connections and meters will be provided for control buildings located in the Converter Station and for those located in the reactor compound to facilitate separate billing. • A looped 'ring main' with hydrants for fire-fighting purposes is also proposed to be provided within the Converter Station and reactor compounds. • Area of compensatory storage developed to collect rainwater with impermeable membrane - material will need to be imported. All storm water drainage elements sealed to protect soluble karst rock. • All storm water drainage elements sealed to protect soluble karst rock. Wastewater storing facilities in fully sealed holding tanks.
6.5	(Embedded Mitigation) HVDC Underground Cable Route	• The scale of the installation design (depth of the trench and cable installation) will be balanced against the performance of the circuit. • Construction works will be conducted in two phases, to mitigate against disturbance to the public and the beach during the busy summer works: • Phase 1 will be conducted in the winter months and will consist of the construction of the transition joint bay chambers, the installation of the cable ducts within open cut trenches up the beach and into the beach car park. The areas will then be reinstated to their original condition prior to completion of this Phase. • Phase 2 will be conducted in the summer months and will consist of the installation of the cables through the Phase 1 ducts. This is achieved by pulling the cables from the cable lay vessel through the ducts by means of a cable winch located within the transition joint bay chambers. • Land and vegetation will be reinstated, where possible following construction. • Cable route located predominantly along existing highway. • Trench crossings are proposed in dry works area isolated with an impermeable barrier from water courses/temporary concrete ducts. Site restoration post works provision such as riverbank stabilisation. • HDD trench using a comprehensive closed-loop drilling fluid mixing system to minimise volume of fluids required on site with constant monitoring of volume, pressure, pH and viscosity. • Land will be returned to original state following construction • Temporary shelter erected over joint bays during construction to protect from moisture and contamination during jointing. • Before cable installation chamber will be backfilled. Manholes constructed to facilitate maintenance. • Joint chambers will be installed in a staggered approach to reduce width required for installation. • Traffic control measures will be in place as appropriate, including road diversions, closures and stop/go traffic management to reduce temporary disruptions to traffic in the surrounding area.
6.6	(Embedded Mitigation) Landfall Area	• The platform and the trench excavation will be formed by a cofferdam (sheet piling). • Excavation works will be completed in winter months (Phase 1) to limit disruption to traffic accessing Claycastle Beach. • Steel piled cofferdams and a causeway for access will be constructed along Claycastle Beach in order to facilitate installation of the submarine cable and the beach and surrounding areas will be reinstated following construction.
6.7	Cumulative Effects	• Prior to commencement of construction and during the construction phase engagement with the proponents of these developments (including ESBN, Transport Infrastructure Ireland, the IDA, Cork County Council, Irish Water and the OPW) will

Reference	Aspect	Mitigation and / or Monitoring Measure
		continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised.
Chapter 7 Surface Water, including Flood Risk		
7.1	Embedded Mitigation Converter Station	• The converter station site will consist of a new engineered stone fill platform which will raise the proposed site level above its existing level. This will ensure that a sealed, below ground, gravity drainage system can be accommodated. • Rotary bored cast-in-place (socketed into rock) reinforced concrete piles will likely be adopted for all foundations on this site. Specialist and experienced piling Contractors will be employed to carry out the works in accordance in line with acceptable industry practices and taking due consideration to environmental constraints all specific to the area where the drilling is to take place. The presence of voids would be recognised by an experienced piling operator during the boring of the piles, prior to concrete placement. In such cases, the piling Contractor will install a permanent casing (likely a thin steel sleeve) to retain concrete within the pile bore / shaft. This requirement will be clearly stated in the piling performance specification and contractual agreements. Measures including but not limited to those outlined below and the above will be outlined in the associated contracts: – A minimum of one Geotechnical Engineer and one Resident Engineer will supervise the piling works. Supervision of each piling rig will be required. – The piling operator will be experienced in successful piling within Karst regions. – Clear lines of communication with defined roles and responsibilities will be maintained between the site team, the Contractors and the Design Engineers throughout the works. – Monitoring of the concrete volumes poured into the pile against the estimated volume that the pile requires will be carried out, to ensure that concrete is not being lost into voids in the ground. – Monitoring of piles for potential vertical settlement of fresh concrete; an indicator of potential concrete loss. • Construction of the below ground drainage system will commence on completion of the proposed platform. The access road below ground drainage system will commence on completion of the access road enabling works. • The construction of the proposed site access road will commence at the same time as the piling works. This will consist of removing all poor ground and any material from areas to be cut and removing this material from site. All fill for embankments will consist of engineered stone that will be brought to site. • A Contractors compound will be located within the site boundary and will be located on an area of ground that will be temporarily surfaced with engineered stone and levelled. The compound will house the Contractors cabins and areas for temporary storage of construction materials (excluding cut/fill ground, which will be brought directly to and from site with no need for temporary storage). • Construction of the reinforced concrete piled raft for all of the buildings and structures can commence once the piling is complete. The structures and building will then progress commensurate. • The site contains two depressions which act to reduce flood levels in the wider IDA site. These will be infilled during construction and replaced with a compensation storage area.

Reference	Aspect	Mitigation and / or Monitoring Measure
7.2	Embedded Mitigation HVAC/HVDC Cable routes	• Works associated with passing bays, laydown areas, construction compounds and utility crossings will be carried out along the HVAC / HVDC cable route. Water crossings will be by either open cut trenching or HDD, as detailed hereunder. Existing utility services, including public water supply pipes, will also need to be crossed. • The cable route will be designed to not be vulnerable to flooding; this includes the avoidance of Flood Zones A and B where possible. In any case all joint bays and link boxes are designed with watertight connections as standard (as these installations are typically underground). Where it is impossible to avoid Flood Zones A and B the scheme includes embedded mitigation against flood risk.
7.3	Embedded Mitigation Water Crossings by Open Cut	• Open cut water crossings have the potential to generate silt and suspended solids. In order to reduce the risk of discharging sediment it is proposed to carry out these works in a dry works area. • Unless otherwise agreed with IFI, instream works in watercourses with fisheries value will be restricted to the fisheries open season (i.e. July to September inclusive). • At a number of specific river crossing locations instream works may be required. At these locations electrofishing may be carried out to remove fish under licence from IFI. These locations will be agreed with IFI prior to works commencing. • Where open trenching is proposed, site restoration works will be carried out following completion of the crossing, in agreement with IFI. These works may include riverbank stabilization, gravel replacements etc. In all cases, the site will be restored post installation.
7.4	Embedded Mitigation Water Crossings by HDD	• Pumping of trenches and HDD could result in increased flow to surrounding watercourses if not managed correctly. This could then affect hydrological discharges and dilution, whilst the works could also release contaminants or sediment into the watercourse. • Competent specialist contractors with proven successful drilling experience working on projects within ground conditions similar to those expected within this proposed development will be appointed to undertake the work. • As with all construction works proposed, no drilling works will be allowed to commence until the relevant RAMS and pertinent Health and Safety documents are received from the specialist Contractor and are reviewed and agreed by the Client's representative. These Contractor documents will include method statements, drilling risk assessments and environmental management plans specific to the area where the drilling is to take place. • These plans will be submitted by the Contractor to the Employers Representative on site for review and comment prior to commencing drilling operations.
7.5	Embedded Mitigation Construction Compounds and Laydown Area	• All temporary construction compounds will be secured with hoarding/fencing around the compound perimeters as appropriate. Where temporary construction areas are required and existing hardstanding is not available, engineering stone fill will be laid and compacted and maintained as required for the duration of the works. Once the works are completed, the engineered stone fill will be removed and the land will be reinstated to its original condition. • Temporary facilities will be provided at the construction compounds including construction phase car parking and welfare facilities and temporary material storage areas as necessary. Any discharges from temporary welfare facilities will be connected to a sealed holding tank to be emptied and disposed of off-site by a licensed contractor to an approved licenced facility. • Storage of fuel and refuelling will be undertaken within bunded hardstanding areas. Water will be brought to site via tankers as required.

Reference	Aspect	Mitigation and / or Monitoring Measure
7.6	Embedded Mitigation Connection point - Operational Phase	• The proposed oil filled transformers at the converter station site and at Knockraha substation will be bunded. The bunds will have the capacity to hold 110% of the volume of oil in each transformer.
7.7	Embedded Mitigation Converter Station Site – operational phase	• Foul water will be collected in proprietary holding tanks which will be periodically emptied by a licensed waste disposal contractor. The holding tanks will be fully sealed to prevent discharge to ground and will include a high-level alarm and telemetry link to the converter station's control system such that they can be monitored remotely and emptied when necessary. • A storm water drainage system incorporating SuDS (sustainable drainage systems) features will be constructed to manage the quantity and quality of runoff during rainfall events. The system will operate by gravity and be sized to ensure that no internal property flooding occurs for the critical storm with a 1 in 100-year return period including a +20% allowance for climate change. All proposed surfaces and storm water drainage elements will be sealed. • A flood risk assessment has been undertaken for the converter station (refer to Appendix 7.1) which shows that the converter station is not in Flood Zones A or B as defined by the OPW's Flood Risk Guidelines. The proposed converter station will also be elevated above the surrounding ground and is not therefore at risk from overland flow, as demonstrated in the flood risk assessment. Two existing depressions will be infilled during construction and this has the potential to increase flood risk elsewhere unless mitigation measures are implemented. Therefore, it is proposed to develop an area of 'compensation storage' adjacent to the compound. The compensation storage area will be specifically designed to accept and store water during rainfall events and it will be sized to ensure that there is no significant increase in flood risk in the 'post-development' case when compared to the 'pre-development' case. This compensation storage area will consist of a below ground and covered storage tank, which will be emptied at a controlled rate via a pumped connection to the storm water drainage system which will serve the proposed converter station access road. Discharge from the compensation storage area will be restricted to 'greenfield' runoff rates to ensure that there is no significant increase in flood risk elsewhere. Flood water routing in the form of open channel drains and culverts will be installed around the perimeter of the proposed converter station to divert overland flow towards the dedicated compensation storage area, rather than towards the location of the infilled depressions. • Discharge from the converter station site and the associated access roads is proposed to be restricted to greenfield runoff rates in line with the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS Vol. 2 – New Development) which have generally been adopted by Local Authorities across the country.
7.8	Surface Water - General	• The following mitigation measures will be implemented prior to commencement and throughout the duration of the proposed works. – A full-time on-site Environmental Clerk of Works (EnCoW) will be appointed prior to commencement of works. – Confirmatory pre-construction surveys will be carried out and seasonal constraints will be confirmed in agreement with IFI and National Parks and Wildlife Service (NPWS) and Cork County Council, as appropriate. – Works will be carried out in accordance with the guidelines set out by IFI in *'Guidelines on Protecting Fisheries During Construction Works in and Adjacent to Waters'* (IFI, 2016). – The IFI Biosecurity Protocol for Field Survey Works[4] will be complied with.

[4] file.html (fisheriesireland.ie)

Reference	Aspect	Mitigation and / or Monitoring Measure
7.9	Construction Phase	• Activities will be planned in advance and machinery will be managed to ensure that the number of trips is limited to the minimum required at each location i.e. the more times a piece of ground is tracked, the more likely it is that vegetative cover will be removed and ruts will be created that will act as miniature rivers where dirty water will flow. • Tracking beside streams and tracks will be avoided to avoid damage to the bankside. • Geotextile or timber matting will be used on soft ground, and in all protected areas • A buffer zone of 10m will be maintained between storage and working areas and watercourses, taking account of the minimum working area required to facilitate the works. • The time period over which areas of clearance are left open will be reduced insofar as is reasonably practicable. • Re-instatement method statements will be subject to approval by the EnCOW within the Employer's Representative Team • Concrete will be brought to site by covered truck. Wet concrete operations adjacent to watercourses will be avoided where possible. • The Contractor will ensure that all concrete truck wash watering / cleaning is undertaken offsite where possible and remote from watercourses. • In order to reduce the risk of contamination arising as a result of spills or leakages, measures including, but not limited to, the following will be employed. – All collected waste will be managed in accordance with the Waste Management Act 1996, and associated Regulations: – Fuels, chemicals, liquid and solid waste will be stored on impermeable surfaces; – Refuelling of plant, equipment and vehicles will be carried out on impermeable surfaces; – All tanks and drums will be bunded in accordance with established best practice guidelines; and – Spill kits will be provided at all compound locations and carried by all crews during underground cable installation works. • Works will not be carried out during extreme rainfall or high flow events. • Silt fences (to Hy-Tex Premium specification or similar) and silt traps will be installed prior to commencement of works and will be inspected daily to inform adaptive management as required. The locations of same will be determined by the EnCoW. • Site restoration post works will be carried out, in agreement with IFI. These works may include riverbank stabilization, gravel replacements etc. In all cases, the site will be restored post installation.
7.10	Construction Phase Silt Control Measures	• Silt control measures will be used to control silt generated from activities on site and prevent it gaining access to surface drainage which could convey silt to larger streams and watercourses. • Silt control measures include silt traps which can be located in small drains where flow is small and silt fences where runoff from large areas needs to be controlled. • Silt fences must be installed in the working areas and not at the watercourse. • Access routes will be delineated such that an appropriate set back distance from watercourses is maintained. Where works are to be undertaken adjacent to watercourses the setback distance will be delineated by the EnCoW on site. • Where distances between the works and watercourse allow, a minimum setback distance of 30m from the watercourse will be maintained. • Where the site is constrained, the best available set back distance will be employed taking account of the minimum working area required to facilitate the works.

Reference	Aspect	Mitigation and / or Monitoring Measure
		• Silt Fences – Silt fences will be installed downslope of the area where silt is being generated on disturbed ground. – To be effective the silt curtain must contain the area where silt is generated and must terminate on high ground (i.e. an elevated area not in the watercourse). – Silt fences will be constructed using a permeable filter fabric (e.g. Hy Tex Terrastop Premium silt fence or similar) and not a mesh. – The base of the silt fence will be bedded at least 15-30 cm into the ground at 2 metre intervals. – Once installed the silt fence will be inspected regularly, daily during the proposed works, weekly on completion of the works for at least one month, but particularly after heavy rains. – The integrity of the silt fencing will be checked daily by the ENCoW and after poor weather conditions (rain or wind) and any failures rectified immediately. – Two lines of silt curtain / fence will be installed, where considered necessary, by the EnCoW. – Any build-up of sediment along the fence boundary will be removed daily. – Silt fences will be maintained until vegetation on the disturbed ground has re-established. Re-instatement method statements will be subject to approval by the EnCoW within the Employer's Representative Team. – The silt fencing must be left in place until the works are completed (which includes removal of any temporary ground treatment). – Silt fences will not be removed during heavy rainfall. – The silt fence will not be pulled from the ground but cutaway at ground level and posts removed. – A record of when it was installed, inspected and removed will be maintained by the EnCoW. • Silt Traps – Silt traps will only be placed in drains downstream of working areas where the volume of water flow is expected to be low. – Silt traps will be made of terram or similar material, not mesh. – The trap will be staked into the banks of the drain / watercourse such that no water can flow around the sides. – The material will be bedded into the drain bed/watercourse to prevent water flowing beneath it. – The height of the trap will be lower than the bank heights. The upper edge will be fixed to a timber cross piece. This will allow water to overtop the silt trap and not burst through or around it. – Inspections will be carried out daily; during the proposed works, weekly on completion of the works for at least one month, and after heavy rains, and monthly thereafter until bare areas have developed new growth. – Any build-up of solids will be carefully removed without removing any vegetation growing on the bottom. – In sensitive areas a series of silt traps will be placed in the drain. – The silt trap will not be pulled from the ground but cutaway at ground level and posts removed. – A record of when it was installed, inspected and removed will be maintained by the EnCoW.
7.11	Operational Phase	• In terms of mitigation and monitoring, the on-site drainage systems will include the following features;

Reference	Aspect	Mitigation and / or Monitoring Measure
		– Emergency shut-off valves will be included near the downstream end of all storm water drainage networks such that discharge from the site can be prevented during an emergency situation (e.g. a fire or a significant oil / fuel spill). – Silt trap chambers will be included near the downstream end of all storm water drainage networks to remove silt, soil and any other settleable material that may become entrained in site runoff. – All external transformers will be bunded and drained via sump pumps fitted with oil-detection sensors. Stormwater from these sumps will only be pumped into the main collection system when the sensors confirm that the stored rainwater is not contaminated by an oil spill or leak. Storm water from these areas will also pass through a Class 1 'full retention' separator before entering the main site drainage network. – The compensation storage tank will require a pump set to empty and control its rate of discharge to the main site drainage network. This pump set will include a secondary back-up ('stand by') pump in case of failure of the primary ('duty') pump. The storage tank will also include a high-level alarm, SCADA control system and a telemetry link to the converter station's main control system such that it can be monitored and operated remotely. • In addition to the above features, a regular inspection and maintenance regime will be implemented for the drainage systems as part of the overall operational procedures of the site. • This will involve periodic inspection of key elements to confirm that these are operating as intended and whether any cleaning or remedial maintenance works are required.
7.12	Monitoring Converter Station	• The piling operator will be experienced in successful piling within Karst regions and clear lines of communication with defined roles and responsibilities will be maintained between the site team, the Contractors and the Design Engineers throughout the works. • A minimum of one Geotechnical Engineer and one Resident Engineer will supervise the piling works. Supervision of each piling rig may be required. • Monitoring of the concrete volumes poured into the pile against the estimated volume that the pile requires will be carried out, to ensure that concrete is not being lost into voids in the ground. • Piles will be monitored for potential vertical settlement of fresh concrete, an indicator of potential concrete loss.
7.13	Monitoring HDD Water Crossings	• Constant monitoring by the specialist drilling team of fluid volume pressure, pH, weight and viscosity will be carried out during the proposed works. The volume of cuttings produced will also be monitored to ensure that no over cutting takes place and that hole cleaning is maintained. The mud returns will be pumped to the circulation system trailer by means of a bunded centrifugal pump. The nature of the cuttings will also be monitored to understand the ground conditions as the drilling progresses. • After the initial pilot hole is completed, it will be reamed in a number of passes to reach the required bore size to enable the duct lining to be pulled. To ensure that the prevailing geological conditions have suitable cohesion that can maintain the bore during the drilling and reaming process, close attention will be paid by the specialist drilling team to modelled drag forces during pullback with constant monitoring of load stress undertaken to ensure that modelled tensile stress, collapse pressures, hoop stress and buckling stress are not exceeded. In addition to the above measures, the rate of drilling progress will be monitored to assist with the identification of any voids or changes in strata. • Where directional drilling takes place within limestone bedrock beneath a watercourse, settlement will be monitored at the surface to provide an early warning of any unexpected stability issues. If visible settlement occurs the directional drilling

Reference	Aspect	Mitigation and / or Monitoring Measure
		contractor will cease boring, although drilling fluid may still be circulated if required to maintain the stability of the drilled hole, until remedial measures can be put in place to stabilise the ground. • In addition, the Contractor will monitor river/stream flows upstream and downstream of any directional drilling watercourse crossings. The flow monitoring will be undertaken on a daily basis for five working days prior to the directional drilling, during the directional drilling and for five working days following completion of the directional drilling. If a measurable increase in losses from the watercourse to ground is observed in the reach where the directional drilling took, place bed lining will be undertaken if required by IFI.
Chapter 8 Biodiversity		
8.1	Construction phase – confirmatory surveys	• In advance of enabling works, the Contractor will commission pre-construction confirmatory surveys of Sensitive Ecological Receptors outlined in the EIAR.
8.2	Construction phase – Ecological Clerk of Works	• An ECoW will be employed by the Contractor to oversee implementation of mitigation. This will include monitoring and auditing the works and contractor programmes and works method statements, to ensure mitigation is correctly implemented. The Contractor's EcOW will also ensure any disturbance licenses are arranged based on relevant details outlined in this EIAR and any significant findings of further confirmatory pre-construction surveys outlined above. The Contractor's ECoW will advise on mitigation measures implementation including the scheduling of works and will be included in regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts are minimised. • An independent Environmental Clerk of Works (EnCoW) will be employed on behalf of the Employers Representative team, who will review and comment on the monitoring and compliance reports generated by the Contractor's ECoW.
8.3	Construction phase – Ballyadam, Claycastle, Ballyvergan	• Specific approaches to protection/translocation/reinstatement are provided for – Reedbeds at Ballyvergan Marsh pNHA; and, – Notable habitats: Fixed sand dune habitat at Claycastle (including *2130); Orchid-rich grassland at Ballyadam (including *6210). • Prior to works commencing, the Contractor will provide and agree written method statements for all proposed translocation methods to NPWS. All methods will adopt the specific approach to planning, timing, implementation, aftercare and monitoring recommended in CIRIA best practice guidance on habitat translocation (Anderson, 2003). • Following Anderson (2003), The Contractor's ECoW will embed these standards into all method statements, without all of which translocation/reinstatement may fail, thereby triggering compensation [Refer to Section 8.11 of Volume 3C2). – Adequate time must be assigned for effective planning including prior survey and data analysis (having regard for indicative durations in Figure 1.2 in Anderson (2003)]; – Adequate resources must be assigned; – EirGrid's commitment to success of habitat translocation/ reinstatement; – An ecologist with suitable experience in habitat translocation is required on the project; – A suitably experienced and equipped Contractor is required; – A receptor site matching the donor site is required [applicable to Ballyadam only] – A robust monitoring schedule and investigatory programme (pre and post translocation)

Reference	Aspect	Mitigation and / or Monitoring Measure
8.4	Construction phase – Ballyvergan pNHA	• Works are required within the Ballyvergan Marsh pNHA to facilitate crossing the consented greenway. • Prior to works commencing, the Contractor will provide and agree a written method statement for the proposed reinstatement measures to Cork County Council. • Prior to works commencing, the works area within the marsh will be fenced under supervision of the ECoW to keep the footprint of the works within the wetland habitat to the bare minimum required to achieve the works. Fencing will include noise attenuating hoarding to mitigate noise effects out with the works areas. Details in relation to this are discussed in section 8.9.1.9 of Volume 3C Part 2. • Rubber bog mats (ethylene propylene diene monomer; to specification of Dura-base Terrafirma or similar specification) and wide-tracked low ground pressure machinery will be utilised to reduce rutting and direct damage on saturated ground within Ballyvergan Marsh. These lighter mats have been shown to minimise damage to saturated ground in Ireland on EirGrid projects, relative to timber bog mats (EirGrid, 2020). Timber bog mats may be used on dry grassland habitats. • Where excavation is required, any turves of common reed/reed canary grass will be removed to a temporary storage area immediately adjacent to the works area. Turves will be stored on bogmats, such that they can be reinstated following completion of works. Removal of turves will be carried out during dry weather conditions and monitored by the Contractor's ECoW to ensure they are kept watered. Works will be conducted between April and September subject to mitigation for protection of breeding birds, refer to Section 8.9.1.10 of Volume 3C Part 2. • The turves will be stored in a single layer, on bog mats, to retain integrity of turves. The duration of storage will be kept to the minimum time (works are anticipated to take a maximum of 8 weeks between site set up and full site reinstatement) necessary to allow for the works to complete. • Where bare earth remains these will be planted during reinstatement with reed shoots. These shoots will be no less than 20cm in length and will be planted at densities of 10-15 cuttings per square metre. Within the area to be reinstated, subject to agreement with Irish Rail and Cork County Council, the overall objective will be to achieve around 25-30% open pools, 40-50% wet reed, 15-25% dryer reed and 5% scrub (RSPB, 2004). • Following the completion of the works, turves will be reinstated, and all matting removed from the works area. Reinstatement will be to the satisfaction of the NPWS and Local Authority. • Any additional requirements as outlined by the NPWS or Local Authority relating to the reinstatement of Ballyvergan Marsh will be incorporated, in agreement with the Client's Representative Team.
8.5	Construction phase – Protection / Translocation / Restoration of Sand Dune Habitat	• Works are required on the margin of and partially within fixed dune habitat at Claycastle. • Prior to works commencing, under supervision of the Contractor's ECoW, the Contractor will set out the fencing for the works, to exclude the less disturbed habitat parcels with greater affinity to Priority Annex 1 fixed dune habitat, in the extreme northwestern corner of the proposed development site. • Where works encroach on the sand dune habitat temporarily (i.e. less than a week), bog mats will be utilised to reduce rutting and direct damage to the grassland habitat. Where works will take place over a longer period, turves of grassland will be removed and stored such that they can be reinstated following completion of works. The turves will be stored in a temporary storage area / laydown area. • The vegetation will be cut as short as possible prior to removal of turves. • Removal of the turves will be carried out during dry weather conditions.

Reference	Aspect	Mitigation and / or Monitoring Measure
		• The turves will not be stored on top of each other as this will result in compaction of the soil. The duration of storage will be kept to the minimum time necessary to allow for the translocation works to complete. This will be monitored by the Contractor's ECoW with input from a suitably experienced botanist t if required. • Prior to reinstatement of the habitat, the ground will be prepared such that impacts due to possible compaction by the construction plant will be ameliorated through rotavation of the ground surface. The reinstated sand dune turves will be temporarily fenced off to minimise disturbance and monitored to ensure effective reestablishment of sand dune habitat and identify if further prescriptive measures such as more permanent sand fencing are appropriate.
8.6	Construction phase – Protection / Translocation / Restoration at Ballyadam	• As previously noted, calcareous grassland which qualifies as Annex I grassland has been identified within the footprint of the works at the Ballyadam site. Moreover, the habitat will be lost due to scrub succession in the long-term in the absence of a change to management. In order to prevent the permanent loss of this SER, it is proposed that translocation be carried out to remove them from the footprint of the works. • Translocation will be carried out prior to the commencement of the construction of the Converter station site to the suitable temporary storage area identified (Drawing 229100428-MMD-00-XX-DR-E-2998)., where it will be stored until the receptor site is available and prepared. • The approach to translocation will be informed by precedent examples of calcareous grassland translocation, such as that reported for Thrislington Plantation in the UK by Box (2003), have regard to Ashwood (2014) or as otherwise advised by NPWS grassland specialists during consultation. • A strip of land along the western edge of the proposed converter station site has been identified as the temporary receptor site for the calcareous grassland and greater knapweed. The area of calcareous grassland comprises approximately 2,000m^2 while the temporary translocation site is approximately 2000 m^2 in size. The location of the temporary translocation site is provided in drawing 229100428-MMD-00-XX-DR-E-2998. • Temporary fencing will be established at both the temporary receptor and donor site to clearly mark out these areas. This will prevent accidental damage to either of the sites. The fencing will remain in place following translocation and during the construction of the converter station. • The underlying bedrock is the same across the site and given that the donor site has already been stripped back and hardcore placed, there is limited work required in terms of preparation of the site. • Within the area of calcareous grassland undesirable negative indicator species (listed in O'Neill et al., 2013) will be removed by hand prior to translocation. • Given that the donor site consists of sparsely vegetated bare ground, there will not be a requirement to strip topsoil. The potential benefit of rotavation will be discussed and agreed with the NPWS, given the soil depth and conditions prior to works. • The top c. 15cm of soil will be used to include the rooting zone. Turf size will follow Box (2003) (i.e. 4.75 m x 1.75 m). • The vegetation will be cut as short as possible prior to translocation. • Translocation will be carried out during dry weather conditions, between October and March. • The turves will be placed close to the donor site, on timber bog mats, in a single row. The turves will not be placed on top of each other as this will result in compaction of the soil. The duration of storage will be kept to the minimum time necessary (estimated 12-24 months). • Dependant on weather conditions, watering of the turves may be necessary to prevent them from drying out.

Reference	Aspect	Mitigation and / or Monitoring Measure
		• Following removal of turves the earth embankment upon which the grassland has established will be translocated to the temporary donor site. • Once the earth bank has been re-created (i.e. mirrored depth of soil to the original bank) the turves will be placed on the bank. • Following the completion of the translocation, permanent stock proof fencing will be placed surrounding the donor site. • Ashwood[5] outlines that grassland establishment can take between 3 and 5 years. Mowing may be required for the ongoing maintenance of the grassland. This will likely be required on a yearly basis to keep the sward fellow 10cm. • Mowing will take place on a yearly basis in the second and third years and will take place after grasses have set seed. All cuttings will be removed from the site to avoid nutrient enrichment of the sward and shading of seedlings (Croft & Jefferson, 1994; Ashwood, 2014). • A final translocation will take place of the grassland from the temporary translocation site between 3 and 5 years after the initial translocation (to the temporary site). The final translocation site is within the converter station site. The final translocation and establishment methods will follow the approaches outlined above and as follows. • Long-term management through cutting is essential for maintaining species richness. In line with JNCC (2014) guidance: – The extent of grassland establishment, including details on percentage ground cover, areas where establishment has failed, and the presence of leaf litter. – Sward composition including grass to herb ratio, presence of positive indicator species, establishment of greater knapweed, and any negative indicator species present. • A regular evaluation of the management of the habitat will be undertaken, and where issues regarding the establishment are encountered, proposals will be made as to steps to be taken to improve the chances of re-establishment. • Engagement with the IDA will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated, and impacts are minimised. • The Developer will provide mapping and species lists for habitats of Local importance (higher) value including; other recolonizing bare ground (ED3) transitioning to calcareous and neutral grassland (GS1), wet grassland and scrub to the IDA for consideration in a wider biodiversity plan for the overall site once the site has been developed.
8.7	Construction phase – Wet grassland along cable route	• Wet grassland impacted during construction will be reinstated immediately post works i.e. topsoil will be removed, and stored separately to subsoil, wetted during dry periods, and re-instated following completion of works. Where re-instatement fails, as determined by monitoring, habitat will be re-created using species-rich, 100% native and Irish provenance seed, to the specification of 'Meadow Mixture MM06' (or similar).
8.8	Construction phase – Oak Ash Hazel Woodland	• Where clearance is required of oak ash hazel woodland this will be kept to the absolute minimum area necessary to facilitate the works. Reinstatement will be carried out where woodland is removed to facilitate passing bays. Reinstatement will be carried out using suitable tree species which are being removed from the habitat.
8.9	Construction phase – Hedgerows, Treelines and	• This measure applies to verges along public roadways. All passing bays will be removed on completion of the proposed development. The passing bay will be in place for a period of up to 24 months. However, they will be removed sooner if

[5] Ashwood, F (2014) Lowland Calcareous Grassland Creation and Management in Land Generation. Best Practice Guidance for Land Regeneration Note 18.

Reference	Aspect	Mitigation and / or Monitoring Measure
	Grassland Verges at Passing Bays	possible. The contractor will be obliged both by the Client's Representative to reinstate all hedges and roadside verges, where practicable. • Unless otherwise agreed with the Client's Representative, the local authority, the landowner and TII, the Contractor will re-instate hedgerows, and treelines, to a species-rich condition (i.e. five woody species per 30 m), comprising only native species suited to the locality.. • Unless otherwise agreed with the Client's Representative and the local authority, the landowner and TII, the Contractor the Contractor will seed all grassland verges with a native wildflower mix (to specification of EC12 Wild Flora for Earth Banks, Bunds and Ditches; http://www.wildflowers.ie/mixes/ec/ec12.htm or similar. • All other sites will be returned as close as possible to their pre-existing condition, using the same woody species removed, or similar verge seed mixes, under the supervision and direction of the ECoW. • The Contractor will commit to a five year after-care plan for hedging, grassland, and agricultural reinstatement, or as otherwise agreed with the local authority. • The Contractor's agronomist will inspect, photograph and report in writing to the Employer's Representative on the establishment-phase of all vegetation. • The Contractor's agronomist will review, and advise on any corrective measures required to ensure good condition, immediately after reinstatement, and at least twice yearly thereafter for a five year period.
8.10	Construction phase – Orange Foxtail	• Prior to works commencing a confirmatory survey for the species within suitable habitat (refer to Table 8.17 of Volume 3C2) where direct impacts will arise, will be carried out by an experienced botanist during its flowering season (optimal survey season for grass is between June and August). The botanist, to be appointed by the Contractor, will coordinate with the Contractors ECoW and, report findings to the EnCoW within the Client's Representative Team. The botanist will be contracted for a period lasting at least one year following the cessation of potentially damaging construction works at the plant location(s) (see monitoring below). The surveys will focus on possible habitat within the proposed works area in the vicinity and up to 500m either side of Loughs Aderry and Ballybutler and Clasharinka Pond pNHA's. • In the event where one or more plants are identified at risk of impact, an assessment of risk of impact will be carried out by the appointed botanist, in consultation with a NPWS grassland. The assessment will be specific to the species which identify any additional measures required to protect the species by either avoiding and protecting the plant species *in situ*, or (only as a last resort) through the translocation of the plant species to new receptor locations nearby, under licence from the NPWS. Any additional measures as outlined under the terms of the license will also be included. • For a period lasting at least one year following the cessation of potentially damaging construction works at the plant location(s), the appointed botanist will undertake quarterly site visits to photograph and document the success of the mitigation measures, and discharge any conditions associated with any license(s). Where issues regarding the establishment are encountered, the botanist will consult with the NPWS, in agreement with the Contractor and the Ecologist within the Employer's Representative Team, to identify reasonable steps to improve the chances of re-establishment.
8.11	Construction phase – Pennyroyal	• Prior to works commencing a further confirmatory survey of suitable habitat (the sand dune habitat at Claycastle) for the species will be carried out by an experienced botanist during its flowering season (August to September). • In the event where one or more plants are identified at risk of impact, an assessment will be carried out by the appointed botanist specific to the species which identify any additional measures to protect the species in the first instance by either

Reference	Aspect	Mitigation and / or Monitoring Measure
		avoiding and protecting the plant species *in situ* or (only as a last resort) through the translocation of the plant species to new receptor locations nearby, under licence from the NPWS. • Should the plant be identified within the footprint of the works the temporary removal, storage and reinstatement of the turves of grass as outlined for the protection of the sand dune habitat will allow for the reinstatement of the plant species also. Any additional measures as outlined under the terms of the license will also be included. • Following completion of the works a regular evaluation of the success of the mitigation measures will be undertaken, and where issues regarding the establishment are encountered, proposals will be made as to steps to be taken to improve the chances of re-establishment.
8.12	Construction phase – Tufted Feather Moss	• Tufted feather moss is known to be associated with lowland streams and rivers and can be found on roots of trees and on rocks, boulders, silt, also on tarmac. • Prior to works commencing a further confirmatory survey of suitable habitat for the species will be carried out by an experienced bryologist. • Where the species is confirmed within the red line boundary, an assessment will be carried out specific to the species which will outline the measures to protect the species by either avoiding or protecting the plant species *in situ*, or through the translocation of the plant species to new receptor locations nearby. • Following completion of the works a regular evaluation of the success of the mitigation measures will be undertaken, and where issues regarding the establishment are encountered, proposals will be made as to steps to be taken to improve the chances of re-establishment.
8.13	Construction phase – Wild Clary	• Prior to works commencing a further confirmatory survey of suitable habitat (the sand dune habitat at Claycastle) for wild clary will be carried out by an experienced botanist during its flowering season (August to September). • Where the plant is located within the footprint of the works the removal and reinstatement of the turves of grass as outlined for the protection of the sand dune habitat will allow for the reinstatement of the plant species also. Reinstatement will have regard for the specific ecological requirements of the species, which is a perennial of open grassland on sunny banks, sand dunes and roadsides; usually on well-drained, base-rich soils, and which at Claycastle, has historically been found on the margins of the carpark (Smiddy, 2001). • Following completion of the works monitoring of the success of the mitigation measures will be undertaken (refer to Section 8.8 of Volume 3C2) and where plant establishment has failed, compensation will be provided within the footprint of the Proposed Development (refer to Section 8.11 of Volume 3C2).
8.14	Construction phase – Greater Knapweed	• Prior to works commencing a further confirmatory survey of the proposed Converter Station site will be carried out by an experienced botanist during its flowering season (July to September). This will allow for the identification of any additional populations within the ZoI. • A short term donor site has been identified within the site compound at the proposed Converter Station site, refer to drawing 229100428-MMD-00-XX-DR-E-2998. This will allow for storage and protection of greater knapweed plants while the construction phase progresses. • A strip of land along the eastern edge of the proposed converter station site has been identified as a long-term donor site for the calcareous grassland. This will also be used to facilitate the translocation of greater knapweed. The donor site is approximately 2000 m^2 in size. The underlying bedrock is the same across both areas within the site and given that the donor site has already been stripped back and hardcore placed, there is limited work required in terms of preparation of the site.

Reference	Aspect	Mitigation and / or Monitoring Measure
		• Following the establishment of the long-term donor site the greater knapweed plants will be translocated once more from the short-term location. • Following completion of the works a regular evaluation of the success of the mitigation measures will be undertaken, and where issues regarding the establishment are encountered, proposals will be made as to steps to be taken to improve the chances of re-establishment. This will take place regularly in advance of any mowing of the calcareous grassland so as to protect plants from further damage associated with the management of the site.
8.15	Construction phase – Otter	• The Contractor will ensure an initial confirmatory otter survey is undertaken in advance of the commencement of any works within 150m of the works areas as per Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes. This will allow for the identification of any holts have been established prior to commencement of works. • The further confirmatory pre-construction survey will be conducted no more than 10-12 months prior to construction commencing. • Should holts be identified within 150m of the proposed development the following will, at a minimum, be employed, unless otherwise agreed with the NPWS: – No works will be undertaken within 150m of holts where breeding females or cubs are present. – Works within 150m of such a holt can only take place following consultation and in agreement with the NPWS – No wheeled or tracked vehicles of any kind will be used within 20m of active but non breeding holts – No light work such as digging by hand or scrub will take place within 15m of such holts except under license from NPWS – The identified exclusion zones will be fenced and clearly marked on site prior to any invasive works. – All contractors on site will be made fully aware or the procedures in relation to the holts by the ECoW
8.16	Construction phase – Badger	• Prior to any works commencing a preconstruction badger survey will be carried out. Surveys will be conducted having regard to *Surveying Badgers* (Harris et al.1989) and record signs of badgers including tracks, hair, latrines and setts. The extent of survey area will be defined with regard to Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA, 2006) as 150m beyond the all works areas within suitable habitat. • Prior to works commencing, sett activity at all identified setts within 150m will be confirmed. This may be confirmed through the use of camera monitoring, setting of footprint traps, soft blocking of the sett entrance or similar. Any risk of disturbance to badger will be subject to disturbance license requirements. • A description of the setts i.e. main sett, annex sett, or outlier sett will be provided by the ECoW along with the level of activity at the sett. This will allow for an understanding of the importance of the setts in the wider context of the local population. • As per the Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA, 2006), where setts have been confirmed, no heavy machinery will be used within 30m of badger setts (unless carried out under licence from the NPWS). 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. • Unless otherwise agreed, and under license from the NPWS, during the breeding season (December to June inclusive), none of the above works will be undertaken within 50m of active setts nor blasting or pile driving within 150m of active setts. An assumption that the sett is active will apply unless proven otherwise during the course of investigation. • All identified exclusion zones as outlined above will be clearly marked out on site and communicated to all site staff prior to works commencing.

Reference	Aspect	Mitigation and / or Monitoring Measure
		• Where works may interfere with the badger sett directly exclusion will take place as per NRA (2006) guidelines.
8.17	Construction phase – Bats	• The design and construction of bat mitigation measures herein has had regard for relevant documents including the NRA's "Guidelines for the Treatment of Bats During the Construction of National Road Schemes"[6], the NPWS Bat Mitigation Guidelines for Ireland[7], and (with specific regard to roosts in trees), the Bat Tree Habitat Key [8]. • Trees with suitability for roosting bats will not be felled in advance of surveying for bats, unless in agreement with the ECoW, and NPWS as relevant. Prior to felling of any trees, an initial bat survey of trees to be felled will be undertaken, by a licensed qualified specialist, to assess the suitability of the tree to contain bat roosts as per the documents cited. • Prior to construction, trees identified with potential roost features of a Moderate to High value will be thoroughly re-examined during confirmatory surveys, to ascertain the presence or absence of roosting bats. A licence will be sought from the NPWS, as required. Surveys will be conducted by an experienced bat ecologist. The trees will be examined for the presence or absence of bats / bat roosts immediately prior to felling. Features in trees identified from ground level as of medium or high suitability for, will be climbed and/or accessed by a Mobile Elevated Working Platform; and inspected using a digital endoscope to confirm the ground-level rating, and where possible identify presence of roosting bats. Where timing facilitates it (i.e. when felling is being undertaken during the active season for bats from May to September inclusive), emergence surveys may additionally be carried out to confirm presence or absence of roosting bats, subject to the advice of the bat ecologist, and any licence conditions. Where felling does not occur within one day of the examination, the trees will be re-assessed, unless otherwise agreed with the NPWS. • Where evidence of a roost, or roosting bats has been determined, a license for destruction of a roost and/or exclusion of bats will be required from the NPWS. The procedures for the exclusion of bats and destruction of roost as detailed in the license document will be obeyed, at all times, by the Contractor. • Where bat exclusions are required, they will be undertaken in accordance with the requirements of the bat specialist. They will not be carried out during the breeding season, between the months of June to August inclusive, or during hibernation in the months of November to March inclusive, unless under license from the NPWS. Where the felling of trees found to be suitable as bat roosts cannot be avoided, any mitigation conditioned by the NPWS (e.g. replacement bat roost features on public lands following consultation with the NPWS, and the local authority) will be and put in place at least one month in advance of any felling or disturbance.
8.18	Construction phase – Red Squirrel	• Prior to works commencing in areas of suitable habitat (i.e. hazel woodland) a targeted survey for the species will be carried out prior to any works taking place. Surveys may include observation surveys, drey counts and feeding remain searches. • Any dreys not confirmed or likely (given sightings) to be those of grey squirrel will be removed under license from NPWS. These dreys will be replaced using artificial dreys. Any additional measures outlined by the NPWS under the terms of their license will also be incorporated. • Reinstatement of habitat for the species will take place as outlined for Oak Ash Hazel Woodland in Section 8.9.1.5 of Volume 3C2.

[6] https://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Bats-during-the-Construction-of-National-Road-Schemes.pdf

[7] http://battreehabitatkey.co.uk/

[8] Kelleher, Conor & Marnell, Ferdia. (2006). Bat Mitigation Guidelines for Ireland.

Reference	Aspect	Mitigation and / or Monitoring Measure
8.19	Construction phase – Pygmy Shrew, Hedgehog and Stoat	• Implementation of mitigation for breeding birds as outlined below will avoid vegetation removal during March-August inclusive. This existing mitigation will simultaneously avoid the majority of the main breeding season for pygmy shrew and hedgehog which run from April-October, and stoat, which breeds in May-June (Hayden and Harrington, 2001).
8.20	Construction phase – Watercourses	• Mitigation specifically in relation to instream works and protection of fisheries will be conducted in agreement with IFI and follow appropriate guidelines including IFI (2016)[9]. The Contractor will prepare a detailed method statement for instream works specific to each river crossing under supervision and direction of the ECoW. This will be finalised and agreed with IFI, in agreement with the Employer's Representative. • As the river water bodies hold fish species protected under the Wildlife Act and/or the EU Habitats Directive (e.g. Atlantic salmon, lamprey, brown trout, European eel) agreement will be required with IFI for dewatering of the water body reach as part of the instream works required for open trench crossing at stream locations as outlined in Table 7.8. A fish salvage operation will be undertaken. The fish salvage operation will be authorised and licensed by the IFI and carried out by either the IFI or by fully qualified, licensed and authorised freshwater ecologists. Instream works will only take place during the period July to September, unless otherwise agreed with IFI. All instream works, silt control measures, sanitising of equipment (to avoid spread of aquatic invasive species), fish salvage operations and habitat protection measures will be monitored by an appropriately experienced ECoW. All instream substrates (gravels, rocks and sand) will be retained during construction and reinstated post works. Bankside turves will also be retained and reinstated post works. Vegetation regrowth on banksides will be monitored for at least three years post works to ensure appropriate development of native semi natural riparian plant growth and where required replanting or control of invasive species will be carried out by the Contractor under the supervision and direction of the ECoW and in agreement with relevant authorities. **Concrete** • The pouring of concrete will be required during the construction phase. Changes in pH associated with cement fines has the potential to cause impact to aquatic species. To prevent the runoff of concrete into nearby watercourses and drains, the following will be implemented. – No on-site batching will be permitted at the proposed works areas. Concrete will instead be transported to the site within a concrete truck. – Quick setting concrete mixes will be used to reduce the risk of contaminated run-off to the nearby watercourses. – Concrete trucks will be washed down in a sealed mortar bin / skip which has been examined in advance for any defects. This requirement will be communicated to each concrete truck driver prior to entering into the works area. – Where concrete pours are to take place instream they will only take place within an isolated, dry, works area. – Where the isolated working area requires constant pumping to maintain a dry works area, pumps shall be turned off during the pour, and remain off until it can be ensured that the discharge will not result in a change in pH of +/-0.5 units. – Where concrete pours are required within a watercourse, the EnCoW will regularly monitor the pH of the watercourse during concrete works, using a pH meter with a minimum accuracy of 0.1 pH units. Should any change in pH +/-0.5 be detected concrete works will immediately cease. The entry point to the watercourse will then be identified and appropriate measures implemented to prevent further escape to the environment. – It will be ensured that covers are available for freshly poured concrete to avoid wash off in the event of rain.

[9] Inland Fisheries Ireland (2016). Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.

Reference	Aspect	Mitigation and / or Monitoring Measure
		– Waste concrete slurry will be allowed to dry and taken to a licensed waste depot for disposal. – Concrete works will be scheduled during dry weather conditions to reduce the elevated risk of runoff. – NPWS and IFI will be notified immediately of any concrete spills into watercourses.
8.21	Construction phase – Waterfowl	• The potential for impact through noise disturbance has been identified for birds at Claycastle, at Loughs Aderry and Ballybutler pNHA and within Ballyvergan Marsh pNHA. There is potential for works to take place during the wintering season for birds. • Prior to the commencement of the works, a sound reducing hoarding will be placed along work areas adjacent to Ballyvergan Marsh (and moved to follow the cable trenching crews within the marsh itself), at Claycastle beach and along the roadside adjacent to Loughs Aderry and Ballybutler (000446). • This will help to reduce the noise impacts associated with the construction phase of the works and also reduce visibility of personnel and machinery. • All plant used during the construction phase will be the quietest of its type practical for achieving the works. • All plant will be operated and maintained in accordance with the manufacturer's recommendations including the use and maintenance of any specific noise reduction measures. • At a minimum the following will be incorporated to reduce the impact further: – The use of mufflers on pneumatic tools. – Effective exhaust silencers. – Sound reducing enclosures. – Pumps and static mechanical plant will be enclosed by acoustic sheds or screens. – Machines in intermittent use will be shut down during periods where they are not required.
8.22	Construction phase – Winter Raptor Roosts	• The potential for disturbance to hen harriers has been identified for works at Claycastle, within Ballyvergan Marsh, and at the road alongside the marsh where works proceed at early morning or late afternoon between November and March inclusive. • Restrictions of high-noise level operations, (e.g. rock breaking and piling) to outside of arrival and departure times of hen harrier as outlined by O'Donoghue (20210 i.e. commencing work no earlier than 50 minutes after sunrise and concluding 90 minutes before sunset. • During the works monitoring for hen harrier will take place by an experienced ornithologist. Should hen harrier be observed returning to a roost, works will cease until the bird has left. Details pertaining to hen harrier activities and subsequent requirements for work stoppage will be recorded daily and provided to EirGrid's Ecologist and Local Authority on a weekly basis.
8.23	Construction phase – Breeding Birds	• As outlined in the description of the development the clearance of all vegetation (except for improved grassland, recolonising bare ground, or other vegetation with no nesting potential as determined by the ECoW), will take place outside of the breeding season for birds where possible or as determined by risk of disturbance to a nest site. The ECoW or other suitably qualified ecologist will conduct further confirmatory pre-construction surveys to assess risk of disturbance to nesting birds to inform vegetation clearance activity. In the event where confirmatory pre-construction surveys confirm or presume nesting birds are present, an exclusion zone will be established around the nesting bird (to include the risk of abandonment due to indirect disturbance), and no vegetation clearance may proceed until young are presumed to have fledged, or nesting has failed. Confirmatory pre-construction surveys have a shelf life of 72 hours, after which repeat surveys will be required if vegetation has not been cleared.

Reference	Aspect	Mitigation and / or Monitoring Measure
		• The reinstatement of habitat for breeding birds will take place outside of the breeding bird season, and as outlined in section 8.9.1 of Volume 3C2 in relation to the reed swamp at Ballyvergan Marsh, and in section 8.9.3 of Volume 3C Part 2 in relation to hedgerows, treelines and woodland reinstatement. Habitat reinstatement will be monitored by the ECoW. • Pre-construction confirmatory surveys for all riparian bird species including kingfisher at all 15 no. open cut crossings. These will incorporate a survey area of approximately 100m upstream and downstream of the works where suitable habitat exists, which is a sufficient survey area to include the possible zone of influence of the project. Subject to the risk of individual water crossings overlapping with the breeding bird season, a suitably qualified ecologist will advise on the appropriate number of surveys to be carried out between March and July. Features likely to be of note to kingfisher and other breeding riparian bird species will be recorded and watches of suitable nest areas undertaken. If actual nest sites (i.e. confirmed or presumed) are present at open trench crossing sites, or HDD sites (where works are programmed during the breeding season), the NPWS will be consulted regarding the potential requirement to stop works. The loss of any potentially suitable nesting sites will be compensated through the addition of artificial nesting sites or suitable nest features within the reinstated river bank. The provision of any new nesting sites (if required) for kingfisher or other riparian bird species will be undertaken in line with NPWS and IFI consultation.
8.24	Construction phase – Amphibians	• A pre-construction confirmatory survey for smooth newt and frog will be undertaken prior to works commencing during the common frog breeding season (February and March), and the smooth newt breeding season (March to June) at potential suitable breeding habitat (ditches ponds and drains impacted). Potential suitable breeding habitat for amphibians (drainage ditches and ponds) are outlined in Habitats maps • When surveying for the species biosecurity measures will be followed to ensure that there is no incidental spread of vector borne diseases between waterbodies. This includes the cleaning, disinfection and drying of all equipment and will have regard to guidelines from Inland Fisheries Ireland[10]. • Should either species be recorded, translocation of the species to suitable receptor sites will be undertaken, in consultation with the NPWS, and local authority where relevant. Any translocation of these species will be under licence by the NPWS. • Where common frog is recorded within the footprint of the works, spawn o will be captured and removed from affected habitat by hand net and translocated to the nearest area of available suitable habitat. Adult and young frogs are likely to flee disturbance and will not require translocation. • Where smooth newt are recorded, juveniles or adults will be captured and translocated to suitable receptor sites in consultation with the NPWS, and the local authority where appropriate.
8.25	Construction phase – Viviparous Lizard	• Prior to the commencement of works within suitable habitat a dedicated survey to ascertain the presence or absence of viviparous lizard within the works areas will be undertaken. Key areas include fixed sand dune habitat, and Ballyadam. Should their presence be confirmed viviparous lizard within the works area will be translocated under license by NPWS to prevent direct impact on the species. Any translocation will be to suitable habitat. • Measures for the reduction of habitat loss are as outlined previously.
8.26	Construction phase – Invasive Species	• Japanese knotweed, Himalayan balsam, three cornered leek, Spanish bluebell, and sea buckthorn have all been recorded in proximity to the development. There is potential for additional stands of scheduled invasive species to be present within or

[10] Inland Fisheries Ireland (2016) Guidelines on protection of Fisheries During Construction Works in and Adjacent to Waters.

Reference	Aspect	Mitigation and / or Monitoring Measure
		adjacent to the works areas in accessible areas, or if populations establish between the completion of date of EIA surveys, and the commencement of construction. • Prior to works commencing a full confirmatory invasive species survey will be carried out by the contractor's ECoW. The pre-construction confirmatory invasive species surveys will be carried out within the works areas, including compound locations and laydown areas, and along proposed access routes to identify the presence of all invasive species within and adjacent to works areas. • Any additional findings of this invasive species survey will be incorporated into the final CEMP for the works. • The following measures will be reviewed and updated as required prior to commencement of construction, in the event that additional invasive species are identified in the pre-construction confirmatory verification surveys: – All machinery will be steam-cleaned prior to entering site – Any stands of invasive species that are recorded within the site will be clearly marked out as restricted areas. This exclusion zone will incorporate a buffer such that below ground growth is accounted for, noting the reduced extents for Japanese knotweed based on recent research. No works will be carried out within the exclusion zones unless fully supervised by the ECoW. – The appointed ECoW will carry out a toolbox talk for all construction personnel which will provide information on how to identify and manage invasive species. – A Check, Clean, Dry protocol will be undertaken with all equipment, machinery and vehicles entering and leaving the Proposed development site boundary. – Where works are carried out within watercourses, all machinery will be inspected by the ECoW and will be completely dry prior to works commencing to prevent the risk of pathogen translocation. All machinery will be cleaned following completion of the works. – Any fill that is required as part of the proposed development will be from a licensed facility located in the wider Cork area identified by the contractor.
8.27	Operational Phase Bat lighting at Ballyadam	• For the operational phase it is confirmed here that unless incompatible with asset security / operational requirements the detailed design of outdoor lighting will incorporate in full design recommendations[11] from Bat Conservation Trust as follows: – LED lights only where practicable, and no Ultra Violet (UV) elements; – External security lighting on motion sensors and short (1 min) timers; – Lighting with peak wavelengths of 550nm; and – Lighting to avoid blue colour, and ideally to be warm white (<2700 Kelvin). • The lighting proposals will be reviewed at detailed design stage with the input of an experienced bat ecologist to ensure lighting levels are minimised for the site and excessive light spill to vegetated features is avoided.
8.28	Operational Phase Habitat Management	• The orchid-rich grassland at Ballyadam will be managed long-term by EirGrid and the landscape contractor for the operational facility. Following establishment, under direction of EirGrid's ecologist, and informed by annual monitoring results the habitat will be mown annually, with arisings removed off site. The first cut will not occur until after mid-April to allow early flowering

[11] Bat Conservation Ireland (December 2010). Bats and Lighting Guidance for; Planners, engineers, architects and developers.

Reference	Aspect	Mitigation and / or Monitoring Measure
		species to set seed, and to favour pollinators. When required a second cut will be in September. Negative indicator species will be removed by hand annually under direction of EirGrid's ecologist.
8.29	Operational Phase Enhancement of Hedgerows, Treelines and Grassland Verges	• This measure applies to verges along public roadways. All passing bays will be removed on completion of the project. The passing bay will be in place for a period of up to 24 months. However, they will be removed sooner if possible. The contractor will be obliged both by the Client's Representative and by the local authority to reinstate all hedges and roadside verges, where practicable. • Unless otherwise agreed with the Client's Representative, TII, and/or the local authority, the Contractor will re-instate hedgerows, and treelines, to a species-rich condition (i.e. five woody species per 30 m), comprising only native species. • Unless otherwise agreed with the Client's Representative, the local authority, and the landowner, the Contractor will seed all grassland verges with a 100% native and 100% Irish provenance wildflower mix (e.g. to specification of EC12 Wild Flora for Earth Banks, Bunds and Ditches; http://www.wildflowers.ie/mixes/ec/ec12.htm or similar). • Where third party or other constraints prevent the enhancement of hedges or verges as described, such sites will be returned as close as possible to their pre-existing condition, using the same woody species removed, or similar verge seed mixes, under the supervision and direction of the ECoW.
8.30	Operational Phase Off-Road Cable Routes: Enhancement of Grassland Verges	• Along the off-road cable routes, reinstated agricultural areas will be seeded to grass or left ready for sowing with tillage crops as agreed with the landowner. Normal farm cropping practices can resume thereafter. • Permanent access will be required along the full route of the cable which also restricts land uses (e.g. development and tree planting) to ensure the safety and security of the cable and to provide adequate space for any future repair or maintenance. As such, enhancement opportunities are limited in these areas. • However, unless otherwise agreed with the landowner, where such areas are not farmed, the contractor will be obliged by EirGrid and by the local authority to reinstate earth banks to a species-rich native wildflower or hedgerow mix (EC12 Wild Flora for Earth Banks, Bunds and Ditches; http://www.wildflowers.ie/mixes/ec/ec12.htm or similar).
8.31	Compensatory Reedbed at Ballyvergan Marsh	If monitoring of reinstated reedbeds identifies failure, replacement native sourced reed stock will be planted following the guidance in RSPB (2004)[12]. Unless otherwise agreed with the NPWS and/or local authority, the technique will be either: • Planting out native grown pot seedling of common reed if compensation requirements are localized over small areas and/or; • Transplanting rhizomes (and the associated soil medium)
8.32	Compensatory Hedgerow and Calcareous Grassland at Ballyadam	If monitoring of translocated calcareous grassland, including greater knapweed (Section 8.10 of the EIAR) indicates failure, new habitat will be created at the permanent receptor site in consultation with the NPWS (grassland specialist unit). This would require preparation of the receptor site, including removal of negative indicator species (or use of herbicide if deemed absolutely necessary by a suitably qualified ecologist) and then seeding of the receptor site with relevant 6210* indicator species (informed by baseline quadrat data), from: • Locally collected seed within similar calcareous grassland habitats in the wider IDA/Ballyadam site, other calcareous grasslands in the wider Cork area; and/or, • Commercial suppliers of native Irish seed.

[12] RPS (2004). Reedbed design and establishment. https://www.rspb.org.uk/globalassets/downloads/documents/conservation--sustainability/lm-advice/reedbed_design_and_establishment.pdf

Reference	Aspect	Mitigation and / or Monitoring Measure
		To partially compensate for lost hedgerow, a hedgerow (c. 250 m long) will be planted directly south of the perimeter fence of the Converter Station site. The hedgerow will be planted with at least five native woody species, (excluding ash due to dieback), suited to the limestone soils (spindle (*Euonymus europeaus*), hawthorn, hazel, elder, bird cherry (*Prunus padus*), crab apple (Malus sylvestris) in addition to a species-rich understory species [dog rose, sweet-briar (*Rosa rubiginosa*)]. The hedgerow will be planted immediately north of the proposed permanent receptor site for orchid-rich grassland, and as such will provide minimal shading impact, as the hedgerow will be kept trimmed. • The Contractor will commit to a five year after-care plan for the new hedgerow at Ballyadam, or as otherwise agreed with the local authority. • The Contractor's EnCoW will inspect, photograph and report in writing to the Employer's Representative on the establishment-phase of the hedgerow • The Contractor's EnCoW will review, and advise on any corrective measures required to ensure good condition, immediately after reinstatement, and at least twice yearly thereafter for a five year period.
8.33	Compensatory Fixed Dune Grassland at Claycastle	• If monitoring of reinstated dune grassland including wild clary at Claycastle (Section 8.10 of the EIAR), identifies failure, EirGrid will oversee compensatory habitat creation of fixed dune habitat. Any failed areas will be replanted with a combination of plug plants, seedlings, and/or species-specific native seed (from the list of positive indicator species in O'Neill et al., 2013). The lands in question are under the ownership of the local authority in an area subject to intensive recreation, and as such the measures above are proposed, unless otherwise agreed with Cork County Council, having regard for public access to the area.
8.34	Monitoring	• During construction, monitoring will be carried out, and reported by the Contractors' ECoW, in agreement with the Client' Representative Team, and having regard for relevant conditions and licenses where required. • Following completion of construction, the obligation for monitoring (e.g. of translocation and enhancement areas) will pass to EirGrid, overseen by EirGrid's Ecologist, having regard for relevant conditions and licenses. • Monitoring will take place of all instances of translocation within the converter station, any areas where turves were reinstated between DC12 and the HWM and at Ballyvergan Marsh. The monitoring of these sites will be carried out by a suitably qualified ecologist(s), and those with experience in successful translocation/restoration of relevant habitats and species. • Where establishment has been found to fail, remedial steps will be taken, in the form of compensation. • The specific intervals at which the monitoring will take place will be determined by the relevant ecologist, having regard for licenses, and planning conditions. However, unless otherwise agreed, it is expected that following establishment of the habitat monthly monitoring will take place during the first year's growing season (April – September). Following this bi-annual monitoring focused on the growing season will take place for the next four years following reinstatement/translocation. Following the overall five-years of monitoring it may be reviewed to determine whether the monitoring period requires extension. There may be no requirement for extension should the habitats fully establish by that time. Monitoring reports will be provided to the Ecologist within the Employer's Representative Team. • Monitoring will also be conducted at river crossings where instream works, and river bankside disturbance works took place.

Reference	Aspect	Mitigation and / or Monitoring Measure
Chapter 9 The Landscape		
9.1	Construction Phase	• The main focus of mitigation for landscape and visual impacts is in respect of the main buildings of the converter station, which are large in scale and prominently visible from some receptors within the surrounding landscape, particularly from the north. Two methods of mitigation will be utilised, which will work in combination. • The first mitigation measure is a dispersed colour pattern for the facades of the buildings that graduates from darker earthy / vegetation tones at the base of the buildings to lighter sky coloured tones towards the upper sections. The purpose of the colour scheme is to; – Break down the perceived scale and massing of the proposed converter station buildings – Provide a dark plinth to the base of the buildings to reduce the perceived vertical height – To provide earthy / vegetation tones through the base and mid sections of buildings to tie into surrounding existing and proposed vegetation patterns. This has been done in a blocky geometric manner that balances the obvious industrial nature of the development without appearing as an overt attempt to camouflage it. – To provide a light-tone recessive colour scheme for upper sections of buildings likely to be viewed against a backdrop of sky.
9.2	Construction Phase	• The second mitigation measure is the provision of a band of screen planting along the northern and western sides of the main converter station building and a more formal treeline along the southern boundary of the site. It is intended that this reach a height of around 8-10m over the course of approximately 5-7 growing seasons and will consist of some advanced nursery stock (semi-mature trees) at planting stage in combination with a majority of whip transplants. Optimisation of the ecological function of this planting will also be a consideration though the use of pollinator species insofar as possible.
Chapter 10 Archaeology and Cultural Heritage		
10.1	Construction Phase	• As part of an advance works programme prior to construction, an underwater archaeological survey will be undertaken for all watercourses along the route of the proposed development with particular regard to the Disour River (CH120), Kiltha River and associated demesne landscape (CH122), Dungourney River (CH123) and Owenacurra River (CH137) and its tributary (CH124). This survey and evaluation will – Be carried out by a suitably qualified and suitably experienced underwater archaeologist under licence – Incorporate appropriate dive and wade survey as well as metal detection survey – Result in a detailed report setting out any findings and outlining any further measures, within the parameters assessed in this EIAR that should be employed in relation to the proposed development. This report should be submitted to the National Monuments Service (DHLGH). Note, where a HDD methodology is proposed to facilitate a crossing, this will avoid any direct impact on the subject river or water course at that location. • As part of an advance works programme prior to construction, a combination of advance geophysical survey and advance archaeological test trenching will be carried out for all off-road sections of the cable routes as well as the proposed Laydown Areas and compounds. This advance prospection will: – Be carried out by a suitably qualified archaeologist under licence

Reference	Aspect	Mitigation and / or Monitoring Measure
		– Result in a detailed report setting out any findings and outlining any further measures, within the parameters assessed in this EIAR, that should be employed in relation to the proposed development. This report will be submitted to the National Monuments Service (DHLGH). • Where a section of an upstanding townland boundary must be removed then: – A representative cross-section of the townland boundary will be investigated and recorded by a suitably qualified archaeologist prior to removal. • A suitably qualified and experienced Project Environmental Specialist will be appointed to develop a Project Environmental Remains Strategy in relation to the investigation and sampling of the submerged landscape and peat deposits along the cable route at Claycastle Beach (CH138). It will be prepared in accordance with the *TII Palaeo-environmental Sampling Guidelines*. • As part of an advance works programme prior to construction archaeological test trenching will be carried out at the proposed landfall site at Claycastle Beach (CH138). This advance prospection will: – Be carried out by a suitably qualified archaeologist under licence – Include targeted trenches to assess the metal object (CA3001) and the character of the peat deposits – Result in a detailed report setting out any findings and outlining any further measures, within the parameters assessed in this EIAR, that should be employed in relation to the proposed development. This report should be submitted to the National Monuments Service (DHLGH). • A suitably qualified and experienced archaeologist will monitor all ground-breaking works at the proposed landfall site at Claycastle Beach (CH138). This monitoring will: – Be carried out by a suitably qualified archaeologist under licence. – Include all works associated with cable installation (Options 1 or 2) at this location. – Result in a detailed report setting out any findings and outlining any further measures, within the parameters assessed in this EIAR, that should be employed in relation to the proposed development. This report should be submitted to the National Monuments Service (DHLGH). • Exposed peat deposits to the SW of the cable route at Claycastle Beach (CH138) which include the site of a possible *fulacht fiadh* trough (CA3007) will be fenced off from the construction works for their duration with a minimum exclusion zone of 15m. • The site of the metal object (CA3001) and any related archaeological remains identified during testing will be fenced off from the construction works for their duration with a minimum exclusion zone of 15m. However, if this is not possible to protect the site then a full archaeological excavation of this feature will be carried out to preserve this feature by record and to establish its relationship to the peat deposits further to the SW. • All sub-surface groundworks associated with the proposed development works will be subject to a programme of archaeological monitoring. – This will be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2004. – If significant archaeological material is encountered during the course of archaeological monitoring, then resolution of any such significant material will be determined in consultation with the National Monuments Service (DHLGH). – Where possible, every reasonable effort will be made to preserve in situ or reduce the impact on any identified archaeological material. Where preservation in situ cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be implemented to ensure the preservation by record of the portion of the site that will

Reference	Aspect	Mitigation and / or Monitoring Measure
		be directly impacted upon. This work will be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2004. – A written report will be prepared detailing the results of all archaeological work undertaken.
Chapter 11 Roads and Traffic		
11.1	Traffic Management Plan	• The temporary effects of construction (none of which have been assessed as 'significant') or otherwise) will be mitigated through adoption of the TMP. • The assessment of post mitigation effects has been undertaken on the assumption that key measures set out in the TMP will be developed as appropriate by the appointed contractor and be implemented during the proposed development construction phase. • The appointed contractor will agree temporary traffic management measures then adopt and monitor an appropriate way of working in consultation with Cork County Council, the appointed contractor, TII and/or their Agents and An Garda Síochána as appropriate. Construction activity generated vehicles (with the exception of site personnel in cars and vans) will travel on pre-defined routes to and from the relevant sites to reduce effects on existing local traffic. • The TMP has been developed for the purposes of this assessment and will be further developed as necessary in consultation with Cork County Council and the Gardai prior to construction commencing. The TMP documents measures to promote the efficient transportation of components and materials to site, whilst reducing congestion and disruption which might impact negatively on local communities or general traffic and in particular the emergency services. The TMP will be considered a 'live' document and will be developed accordingly, within the parameters assessed in this EIAR. • Signed diversion routes will be provided to mitigate journey disruption. Where practically achievable, diversion routes will not apply outside of the worksite hours of operation. • During the construction phase, signage will be installed to warn road and recreational route users to the presence of the works access and the associated likely presence of large or slow-moving construction traffic. • To minimise inconvenience to the local community in terms of obstructive parking, adequate car parking for permanent site personnel, visitors and deliveries would be provided within the Ballyadam worksite compound. Adequate vehicle parking space will be provided on-site and car parking will not be permitted on any public road network adjacent to the site, so that sight lines will be maintained and to minimise potential for obstruction and delay for other road users. • Furthermore, only vehicles essentially required to facilitate construction will be allowed to attend cable route worksites. Car sharing will be promoted to construction personnel by the contractor during the induction process. • In order to reduce the potential for mud and other debris being deposited onto the local road network in the vicinity of the Ballyadam worksite access, the appointed contractor will ensure that all concrete truck wash watering / cleaning is undertaken offsite where practical and remote from watercourses. This will minimise the amount of deleterious material deposited on the road surface and the appointed contractor will ensure that the nearest public road (between the worksite and the N25) will be kept clear of debris by monitoring and then utilising a road sweeper where necessary. • The appointed contractor could employ a number of sub-contractors and all will fall under the umbrella of the TMP and will have an obligation to adhere to the Plan, this obligation will form part of the procurement process and will be written into any contract of employment.

Reference	Aspect	Mitigation and / or Monitoring Measure
		• Compliance will be monitored by the Project Manager, on behalf of the appointed contractor, via spot checks to ensure that vehicles follow the measures set out in the TMP and recording of any complaints. The appointed contractor will be required to stipulate that all contractors disseminate these rules to their sub-contractors. • In advance of undertaking abnormal load deliveries necessary permitting, approvals and infrastructure accommodation works will be agreed with An Garda Síochána and implemented accordingly. Delivery vehicles will only follow agreed routes and will be delivered overnight to minimise potential for delay and obstruction to general traffic. • In liaison with EirGrid, the appointed contractors will be required to maintain close liaison with local community representatives, landowners and statutory consultees throughout the construction period. This will include circulation of information about ongoing activities; particularly those that could potentially cause disturbance, including due to traffic. • The appointed contractor will nominate a person to be responsible for the co-ordination of all elements of traffic and transport during the construction process (Liaison Officer). This person will liaise with the local community so that the community has a direct point of contact within the developer organisation who they could contact for information purposes or to discuss matters pertaining to traffic management or site operation. • If the construction phase of any notably sized development(s) appears likely to overlap with the proposed development, the appointed contractor will seek to liaise with the appropriate developer organisation regarding the scheduling of deliveries to identify potential means of reducing the effects of combined construction.
11.2	Construction Access Arrangements	• Transportation, including deliveries to and from the construction areas will be taken from the existing public road network. Given the nature of construction of the cable route, there will be multiple work sites along the route throughout the construction programme. • The proposed programme of worksite locations will be confirmed by the appointed contractor as an integral part of their adopted TMP. All construction vehicle drivers will be instructed to access their destination worksite via an approved route; this is to be determined by the approved contractor in conjunction with the administering local authority.
11.3	Cumulative effects	• Prior to commencement of construction, and during the construction phase, engagement with the proponents of other developments (including ESBN, Transport Infrastructure Ireland, the IDA, Irish Water and Cork County Council) will continue and where there is potential for works to be carried out in parallel, appropriate mitigation measures will be implemented including the scheduling of works and regular liaison meetings between project teams to ensure that plans are co-ordinated and impacts on population and human health are minimised. The specific detail will be developed by the appointed contractor within the parameters assessed in this EIAR.
Chapter 12 Material Assets		
12.1	Construction phase - Utilities	• All reasonable measures will be taken to avoid unplanned disruptions to any services during the proposed works. This will include thorough investigations to identify and reconfirm the location of all utility infrastructure within the works areas. • Service disruptions impacting the surrounding residential, social and commercial properties will be kept to a minimum, only occurring where unavoidable. Prior notification of disruptions will be given to all impacted properties. This will include information on when disruptions are scheduled to occur and the duration of the disruption. Consultation with relevant neighbouring parties will be undertaken prior to any proposed disruptions.
12.2	Construction phase - Waste Management	• A Waste Management Plan is appended to the CEMP (Appendix 3.1 of Volume 3C2). The plan provides for the segregation of all construction wastes to facilitate optimum levels of re-use, recovery, and recycling operations.

Reference	Aspect	Mitigation and / or Monitoring Measure
		• All operations will be managed and programmed in such a manner as to prevent / minimise waste production and maximise upper tier waste management (i.e. re-use, recycle, and recovery) in line with the Waste Hierarchy where technically and economically feasible. • Waste arisings will be handled, stored, managed and re-used or recycled as close as practicable to the point of origin. • Wastes sent off site for recovery or disposal will only be conveyed by an authorised waste contractor and transported from the proposed development site to an authorised site of recovery / disposal in accordance with the Waste Management Act 1996 and associated amendments and regulations and in a manner which will not adversely affect the environment. All employees will be made aware of their obligations under the CEMP. • The CEMP will be available for inspection at all reasonable times for examination by the Local Authority.
12.3	Operational Phase - Waste	• All waste generated during the operational phase will be managed in accordance with the relevant provisions of the Waste Management Act 1996 and associated amendments and regulations, particularly with regard to the use of appropriately permitted waste contractors and appropriately authorised destinations for waste materials.
12.4	Cumulative effects	• There is a risk of cumulative construction phase impacts associated with the construction phases of the proposed development occurring at the same time as the construction phases of other . Consequently, there will be a need to ensure that where works are occurring in parallel that appropriate mitigation measures are considered within the parameters assessed in this EIAR, including the scheduling of works, regular liaison meetings between project teams to ensure plans are co-ordinated and impacts are minimised.
Chapter 13 Noise and Vibration		
13.1	Construction Phase	• The Contractor will be obliged to comply with Local Authority controls on noise and vibration during construction. The guidance given in BS 5228:2009+A1:2014 Part 1 and Part 2 describes appropriate measures and limits for the control of noise and vibration from construction activities. The contractor will seek to provide screening to ensure that there a barrier between the source and sensitive receptors. The location of the noise barrier will be set out and agreed in advance of the works. A comprehensive noise and vibration monitoring protocol will also be implemented. • The Contractor will also develop and implement a stakeholder communications plan which will facilitate community engagement prior to the commencement of construction. • The delivery of abnormal loads to the Connection Point and Converter Station Site may be required during the night-time on occasions over the period of construction. The number of vehicle movements and levels of noise are expected to be relatively low but have the potential to cause disturbance as being unusual, noise-emitting activity in a quiet, rural area. Vehicle movements will be managed: – to avoid the need to perform reverse manoeuvres and therefore use of audible reverse alarms. However, in the interest of safety, the use of adjustable or directional audible vehicle-reversing alarms or use alternative warning systems, e.g. white noise alarms are less disturbing than tonal alarms; – to avoid the need to queue or wait to gain access to the site; – to ensure vehicle engines are switched off when not in use; and – to ensure unloading activities are undertaken during the daytime.
13.2	Construction Phase - Connection point	• The Contractor will: – Manage the timing of activities so that noise-emitting works are conducted in the daytime and evening periods only; and

Reference	Aspect	Mitigation and / or Monitoring Measure
		– Where it is required that noise-emitting activities are undertaken at night, provide prior notification to the occupiers of nearby dwellings. • Separate measures on the western boundary to limit the spread of operational noise are expected to offer benefits in reducing the impact of construction works on site.
13.3	Construction Phase - HVAC/HVDC Onshore Cabling route	The Contractor will: • Provide prior notification to the occupiers of dwellings within 16m of the works and limit vibratory compaction works within 16m of these dwellings to the daytime period only; • Where vibratory compaction work is required within 3m of any light-framed structure (e.g. residential building), and subject to the consent of relevant landowners: – Conduct a structural condition survey before and after works – Undertake measurements of vibration close to the foundation of closest part of the building to the works – Consider the use of a dead-weight roller where feasible to avoid vibratory methods
13.4	Construction Phase - Converter Station	The Contractor will: • Manage the timing of activities so that noise-emitting works are conducted in the daytime and evening periods only • Where it is required that noise-emitting activities are undertaken at night, provide prior notification to the occupiers of nearby dwellings
13.5	Construction Phase - Landfall Area, Claycastle	The Contractor will: • Limit all noise-emitting works to the daytime and evening periods only (but note restriction on winter-time morning work at Ballyvergan Marsh in Chapter 8 Biodiversity of Volume 3C Part 2); • Where night works are required, provide prior notification to the occupiers of nearby dwellings; and • Provide prior notification to the occupiers of dwellings within 55m of the temporary cofferdams works and limit vibratory compaction works to the daytime period only.
13.6	Operational Phase – Connection point	The Contractor will: • Limit all noise-emitting works to the daytime and evening periods only; and • Where night works are required, provide prior notification to the occupiers of nearby dwellings. Separate measures on the western boundary to limit the spread of noise from the existing substation are expected to offer benefits in reducing the impact of construction works on site.
13.7	Operational Phase – Converter Station	Equipment will be selected so that the sound power levels stated in this assessment will not be exceeded. The measures include: • Acoustic enclosure of the power transformer; • Silencers applied to the power transformer cooling fans • Acoustic enclosure of the compensation reactors and top hat attenuators; • Sound shield fitted to the harmonic filter capacitors; • Sound shield and top hat attenuator fitted to the harmonic filter reactors; • Sound shield and top hat attenuator fitted to the DC smoothing reactors; and

Reference	Aspect	Mitigation and / or Monitoring Measure
		• Silencers applied to the power valve cooling fans and surrounding 4m acoustic barrier. Given the low-frequency tonal noise characteristics of electrical equipment, the selection and procurement process should prioritise low noise specification
Chapter 14 Major Accidents and / or Disasters		
Not applicable	Not Applicable	This chapter does not include any additional mitigation measures

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