Planning and Environmental Consultants

Remedial Environmental Impact Assessment Report (rEIAR)

Crory Wind Farm Group Grid Connection

DOCUMENT DETAILS

Client:	**ESB Networks Ltd**
Project Title:	**Crory Wind Farm Group Grid Connection**
Project Number:	**190806**
Document Title:	**Remedial Environmental Impact Assessment Report (rEIAR)**
Document File Name:	**rEIAR – F – 2020.03.09 - 190806**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

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Rev	Status	Date	Author(s)	Approved By
01	Final	09.03.2020	TB	MH

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NON-TECHNICAL SUMMARY

1. Introduction

This remedial Environmental Impact Assessment Report (rEIAR) has been prepared by McCarthy Keville O'Sullivan Ltd. (MKO) on behalf of ESB Networks, Designated Activity Company (DAC) (referred to hereafter as ESBN), which intends to apply to An Bord Pleanála (the Board) for substitute consent under Section 177E of the Planning and Development Act, 2000, as amended for the Crory Wind Farm Group (CWFG) grid connection. The grid connection consists primarily of medium voltage 20kV underground cable (UGC) and a short section of 20kV overhead line (OHL) that connects four separate, permitted operational wind farms to the existing Crory 110kV substation.

The Subject Development consists of an approximately 28 kilometre long 20 kV grid connection that facilitates the connection of the existing consented Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour windfarms to the national electricity grid. The cable connects to the existing Crory 110 kV Substation in townland of Tincurry, Co. Wexford. Approximately 26 km of the grid connection route consists of underground cable, predominantly in the public roadway. Approximately 2km of the route is overhead line, between the Knocknalour and Ballynancoran wind farms.

The applicant for the development is ESBN, a subsidiary within the ESB Group. ESBN are the licensed operators of the electricity distribution system in the Republic of Ireland and are responsible for building, operating, maintaining and developing the electricity network and serving all electricity customers across the country.

Need for the Development

Ireland faces significant challenges through efforts to meet its 2020 renewable energy targets, EU targets for renewable energy by 2030, and its commitment to transition to a low carbon economy by 2050. It is clear that Ireland is falling behind meetings its 2020 target for renewable energy as well as the longer-term movement away from fossil fuels, with the SEAI reporting in May 2019 that 13 per cent of Ireland's energy will come from renewable sources by 2020, three per cent short of our European target of 16 per cent (SEAI, May 2019).

In March 2019, the Government announced a renewable electricity target of 70% by 2030. The Subject Development is currently operational and is therefore contributing to this target. More recently, the EPA reported that Ireland is set to fall far short of all of its carbon emissions reduction targets for both 2020 and 2030 despite climate action measures in the National Development Plan (EPA, June 2019). The subject development is critical to helping Ireland address these challenges as well as addressing the country's over-dependence on imported fossil fuels as it connects four existing and operational windfarms to the National Grid.

Purpose and Structure of this rEIAR

This remedial Environmental Impact Assessment Report (rEIAR) will compare historical conditions of the site prior to site activity taking place with its post-activity current condition and will document any impacts the grid connection may have had on the surrounding environment during the construction and operational phases. Any mitigation measures that were put in place to ensure that the environment was protected are also discussed.

The grid connection and the consented, operational Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour windfarms have been cumulatively assessed as part of this rEIAR. The windfarms were developed independently with the Ballycadden, Gibbet Hill, and Knocknalour windfarms all being subject to separate EIA processes and the Ballynancoran windfarm, consisting two turbines, being below the threshold for EIA/EIS. The Board has acknowledged that the substitute consent process applies to the gird connection only. Therefore, the purpose of this rEIAR is to assess the environmental effects of the grid connection as the subject development for the substitute consent process. The rEIAR also assesses the cumulative effects associated with the grid connection and the windfarms as pertaining to the various EIA requirements.

The rEIAR project team comprises a multidisciplinary team of experts with extensive experience in the assessment of similar developments and in their relevant area of expertise. Each chapter of this rEIAR has been prepared by a competent expert in the subject matter. The chapters of this rEIAR are as follows:

1. *Introduction*
2. *Background to the Proposed Development*
3. *Description of the Proposed Development*
4. *Population & Human Health*
5. *Biodiversity. Flora & Fauna*
6. *Land, Soils and Geology*
7. *Hydrology and Hydrogeology*
8. *Air and Climate*
9. *Noise and Vibration*
10. *Landscape and Visual*
11. *Archaeology & Cultural Heritage*
12. *Material Assets (including Traffic and Transport)*
13. *Interactions of the Foregoing*

A remedial Natura Impact Statement has also been prepared in line with the requirements of the Habitats Directive, and will be submitted to the Planning Authority as part of the planning application documentation.

2. Background to the Project

This section provides information on renewable energy and climate change policy and targets, the strategic planning context for the subject development, a description of the proposed development site and planning history, scoping and consultation and the cumulative impact assessment process undertaken as part of this rEIAR.

Planning History

The subject development has been operation since 2013 and currently forms part of the national grid. An application was lodged by a third party in August 2015 (Pl Ref. EXD00574) under Section 5 of the Planning and Development Act 2000 (as amended) to the Planning Authority requesting that the Authority make a determination on whether the provision of grid connections from the Crory 110 kV/Lodgewood 220 kV substation to the Ballycadden, Gibbet Hill, Knocknalour and Ballynancoran wind farms is or is not development and is or is not exempted development. The Planning Authority, in its consideration of the matters raised by the Applicant, decided to refer the Section 5 request to An Bord Pleanála (RL3408/09/10/11) in the interest of clarity under Section 5(4), Planning and Development Act 2000 (as amended).

The Planning Inspector, within their report dated 17 June 2016, recommended that the subject grid connection was development and is not exempted development. This recommendation was based on the following key points:

- *The said grid connections come within the scope of Sections 2(1) and 3(1) of the Act and constitute development;*

- *The said grid connections come within the scope of article 9(1)(a)(i), Planning and Development Regulations, 2001, as amended, as their construction contravened Conditions 7, 7, 8 and 10 of planning permissions PA Ref.s 2009/1730; 2009/0266; 2011/0504; and 2003/3444 respectively, being the planning permissions for the relevant wind farms (Ballycadden; Gibbet Hill; Knocknalour; Ballynancoran).*

The Board upheld the Inspector's recommendation on the 28th of June, 2016. Subsequent to this decision, ESB International Ltd. lodged an application to An Bord Pleanála (ABP-301989-18) for Leave to Apply for Substitute Consent for the subject grid connection on the 29th June 2018. The Board granted ESB International Ltd. leave to apply for substitute consent under Section 177D of the Planning and Development Act 2000 (as amended) on the 23rd of June, 2019. The Board's decision to grant leave was based on the conclusion that an environmental impact assessment and appropriate assessment are required and that exceptional circumstances exist such that it is appropriate to permit the opportunity for the regularisation of the subject grid connection.

Scoping and Consultation

A scoping letter providing details of the application site and the subject development, was prepared by MKO and circulated in November 2019to statutory agencies, NGOs and other relevant parties. A summary table of all scoping responses received is included in the chapter and copies of the scoping responses are included in Appendix 2-1 of this rEIAR. The recommendations of the consultees have informed the rEIAR preparation process and the contents of the same

This rEIAR also considers the potential for cumulative effects from the proposed development with other key existing, permitted or proposed projects with are identified in this chapter.

3. Description of the Subject Development

The subject development is located approximately 3 kilometres west of Ferns in County Wexford at its nearest point.. The route extends from the existing Crory 110 kV substation in the south to the Knocknalour and Ballynancoran windfarms in the north, a straight line distance of approximately 12 kms. A spur to the east extends to the Ballycadden Wind Farm, and a spur to the west extends to the Gibbet Hill Wind Farm.

The majority of the subject Grid Connection are underground cables (UGC) laid in the public roads. The main exceptions are; the initial connection to the Crory substation, which comprise an underground cable which is located adjacent to a private access driveway (a distance of approximately 500 metres); the final connection to Ballycadden Wind Farm which is an underground cable installed in a private road, a track and fields (a distance of approximately 1,000 metres); the final connection to Gibbet Hill Wind Farm – an underground cable routed across a private road, a track and fields (a distance of approximately 800 metres); and the link section between the Knocknalour and Ballynancoran Wind Farms that comprises an overhead power line (OHL) across fields (a distance of approximately 2 kms). Overall, the Grid Connections comprises approximately 26 kms of 20 kV underground cable (the route of which is marked by road and bridge markers) and approximately 2 kms of 20 kV overhead powerline.

The area surrounding the Grid Connection route is characterised by good quality arable land with a substantial amount of one-off housing.

The as-constructed elements of the subject development consist of the following:

- c. 2km of 20 kV overhead line (OHL). The as-constructed OHL consists of c. 26 wood poles (ranging from 9m to 12.5m above ground) supporting electrical conductor lines and ancillary structures and equipment.

- c. 26km of 20 kV underground cables (UGC) The as-constructed UGC generally consists of cables within the public road with some minor deviations off the public road. The UCG also includes joint bays and other ancillary structures/equipment and is marked by road and bridge markers".

The development is complete and currently forms an integral part of the national grid.

4. Population & Human Health

One of the principle concerns in the development process is that people, as individuals or communities, should experience no diminution in their quality of life from the direct or indirect impacts arising from the construction and operation of a development.

Information regarding human beings, population, and employment and general socio-economic data were sourced from the Central Statistics Office (CSO), the Wexford County Development Plan 2007 - 2013, Fáilte Ireland and any other literature pertinent to the area. The study includes an examination of the population and employment characteristics of the area. This information was sourced from the results of the Censuses of Ireland 2011 and 2016 which are available on the CSO website, www.cso.ie. Census information is divided into State, Provincial, County, Major Town and District Electoral Division (DED) level, but may not be available for all levels. For the purposes of this section of the rEIAR, a 100m buffer was applied to both sides of the cable route.

The nearest large settlement to the development is the town of Bunclody, which, at its nearest point, is located approximately 3 kilometres west of the Gibbet Hill end of the underground cable. The southern end of the cable route terminates approximately 2.3 kilometres southwest of the village of Ferns. Most of the local available amenities and community facilities, such a golf club, other sports clubs and recreational areas, and a Library are located in Bunclody, which is the nearest town to the grid connection site. Kilrush Askamore GAA club is located directly adjacent to the cable route near Ballyroebuck. St. Aidan's GAA Club and the Wexford GAA Centre of Excellence are both located in close proximity to the site. Numerous churches are located close to the cable route, with the nearest being located in the village of Ferns which is approximately 3 kilometres south east of the cable route. St. John's Community Hospital is in Enniscorthy approximately 10 kilometres from the cable route

There are two primary schools located immediately adjacent to the cable route. Ballyroebuck National School is located in the townland of Ballyroebuck, approximately 6.5 kilometres east of Bunclody, towards the northern end of the cable route. Tombrack National School is located in the townland of Tombrack, approximately 3 kilometres west of Ferns. The secondary school located closest to cable route is F.C.J. Bunclody, located in the town of Bunclody approximately 3 kilometres east of the cable route, at its nearest point. Bunclody Vocational College is also located in the town of Bunclody, approximately 3.5 kilometers east of the cable route. The nearest third-level institution is Institute of Technology Carlow located approximately 29 kilometres northwest of the cable route

There are no tourist attractions pertaining specifically to the site of the cable route. Key attractions in the area are the village of Ferns with its castle and cathedral which is located approximately 3 kilometres southeast of the cable route. The construction of the grid connection has had no effect on the tourist attractions in the area.

While there were likely, temporary, slight negative impacts on human health in terms of health and safety and noise, there were no significant effects on population and human health during the construction phase of the project. Furthermore, there are no effects on population and human health as a result of the operational phase of the grid connection.

5. Biodiversity

The habitats, flora and fauna of the site were assessed by means of a desk study of literature pertinent to the site and surrounding area, and field surveys including a survey of habitats and flora and walkover faunal surveys along with general observation work.

Dedicated ecological surveys of the proposed development were undertaken on the 14th and 15th of November 2019. Habitats within the site were classified based on vegetation present and management history. During the multi-disciplinary ecological walkover surveys, the potential for the study area to support protected birds, mammals, amphibians and additional fauna was assessed.

The majority of the grid connection route is located in the curtilage of the existing road. At the southern end of the route the underground cable runs west from the substation through *Improved Agricultural Grassland (GA1)* and adjacent to the access road within *Dry Meadows and Grassy Verge (GS2).* The overhead section of the grid connection traverses fields categorised as *Improved Agricultural Grassland (GA1)* and *Arable Crops (BC1).* These habitats were categorized as Local Importance (lower value) and have been reinstated as part of the completed works. Therefore, it was determined that no significant impacts with regard to habitat loss have occurred

There are 10 No. watercourse crossing within the subject development site, however no instream works took place as part of the development. The key mitigation measure during the construction phase was the avoidance of sensitive aquatic areas. The majority of the grid route is located within the paved area of existing roads and therefore resulted in no direct impacts to surface waters. Stream crossings were achieved though the placement of cable ducts above culverts and in bridge decks. Two stream crossings were achieved using a horizontal directional bore technique as the bridge deck was determined to be unsuitable to accommodate the cable ducts. No in-stream work occurred during the construction of the grid connection. The use of best practice measures ensured that sediment release and potential for pollution during the construction phase was minimised and reduced to insignificance.

Third Schedule invasive species, Bohemian Knotweed (*Fallopia bohemica*), was recorded in one area along the grid connection route on both sides of the road in the townland of Boolnadrum. All works in this area were confined to the existing road and did not impact on this invasive species.

Any potential for disturbance of fauna would have been minimal based on the nature of the habitats along the route, i.e. the road corridor and agricultural lands. Species including Otter, Badger and Bat were recorded during the site investigation which emphasise that any construction related impacts were short term and no significant long-term effect has occurred.

Effects upon European Sites are discussed within the Natura Impact Statement which accompanies this report. The NIS concluded that the subject development, by itself or in combination with other plans and projects, in light of best scientific knowledge in the field, did not adversely affect the integrity of any European sites.

No impacts upon receptors of ecological significance are anticipated during the operational phase of the proposed development. No significant effects upon biodiversity, flora and fauna have occurred as a result of the subject development.

6. Land, Soils and Geology

A desk study of the Grid Connection route and the surrounding study area was completed in October 2019. The desk study involved collecting all the relevant geological data for the Grid Connection route and study area. A visual inspection of the cable route and surrounding area was undertaken by MKO on 22nd November 2019. The purpose of the site investigation was to investigate the site for any surface indications of residual impacts to land, soils, and geology resulting from the construction of the Grid Connection cable route. Particular attention was paid to identifying any potential areas of soil erosion that might be the result of incorrect backfilling of the Grid Connection trench. No evidence of any residual impacts to land, soils, and geology was observed.

The grid connection cable route is a total of approximately 28 kilometres in length and passes through 18 no. townlands to the north and west of Ferns, Co. Wexford. The cable route is located primarily in public roads with short sections located in farm tracks and crossing farm fields. The elevation of the site ranges between approximately 40m and 220m OD (metres above Ordnance Datum). The overall local topography generally slopes from north to south with an undulating topography. The dominant land use on the bordering land is agricultural with scattered one-off housing and small settlements.

Based on the GSI bedrock map of the region, the cable route is underlain by the Oaklands Formation, Ballylane Shale Formation, and Maulin Formation. GSI soils mapping indicated that the subject development site is dominated by deep, well drained mineral soils, mainly derived from acidic parent materials (AminDW). There are also smaller areas of shallow, well drained mineral soils (AminSW), shallow, reasonably drained mineral soil derived from mainly acidic parent materials (AminSRPT), deep, poorly drained mineral soils, derived mainly from non-calcareous parent material (AminPD), and mineral alluvium (AlluvMIN) mapped along the cable route. Since the Grid Connection was constructed predominantly within existing public roadway, the majority of the soils within the cable route had been previously disturbed as a result of road construction. The soils and subsoil resource at and adjacent the subject development is considered of Low value.

There are no known areas of soil or ground contamination on the site. During the site walkovers, no areas of particular contamination concern were identified. There are no recorded Geological Heritage sites within the proposed development area.

An assessment of the construction and operational phases of the development have been completed, along with a cumulative assessment for the development. Based on the above, and with implementation of the outlined mitigation measures, no significant impacts the soils and geology environment have occurred or are predicted to occur during the construction or operational phases of the development.

7. Hydrology and Hydrogeology

The hydrology and hydrogeology aspects of the site has been characterised using desk study information and a site walkover completed in November 2019.

The overall elevation along the grid connection ranges between approximately 40 to 220m OD (Ordnance Datum) with a gradual increase in elevation from the area around the Crory substation in the south to the wind farms in the north. areas around The grid connection is located entirely within the South Eastern River Basin District. With respect to regional hydrology, under the Water Framework Directive (WFD) the development is located entirely within the River Slaney (12) surface water catchment. The development is located in 3 no. regional surface water sub-catchments. The large majority of the grid connection is located within the Slaney_SC_060 sub-catchment with a short section in the north, around the Ballynancoran and Knocknalour wind farms, located in the Slaney_SC_040 sub-catchment. A short section of the grid connection (approximately 980 metres) at the extreme south of the cable route is located within the Bann sub-catchment (Bann [Wexford]_SC_010).

There are five main streams within the 3 no. subcatchments which drain the area along the grid connection route. The Ballycarney Stream, the Ballingale Stream, the Borris Stream, the Mine River, and the River Bann. There are a total of 10 no. natural watercourses crossings along the length of the grid connection route. The route crosses the Ballycarney Stream at Corah Bridge. The route also crosses two unnamed tributaries to the Ballycarney Stream. The grid connection crosses the Ballingale Stream at just south of Curraduff Crossroads. The route also crosses three unnamed tributaries to the

Ballycarney Stream. The grid connection route crosses the Borris Stream Stream at just south of Curraduff Crossroads, and also crosses an unnamed tributary to the Borris Stream. The overhead powerline section of the grid connection crosses an unnamed tributary of the Mine River between the Knocknalour and Ballynancoran Wind Farms. All watercourse crossings were accomplished in the dry using the existing bridge and culvert infrastructure, or through the use of directional boring. There was no disturbance of any stream channel and no negative impacts on surface waters.

Based on the GSI bedrock map of the region, the grid connection is underlain by the Oaklands Formation, Ballylane Shale Formation, and Maulin Formation. The Ballylane Shale Formation is classified by the GSI as a Poor Aquifer -Bedrock which is Generally Unproductive except for Local Zones (Pl). Both the Maulin Formation and the Oaklands Formation are classified by the GSI as Locally Important Aquifers - Bedrock which is Moderately Productive only in Local Zones (LI). Groundwater Vulnerability is generally mapped as High to Extreme across the area of the proposed grid route, with extensive areas also mapped as having bedrock at or near the surface.

The primary risk to groundwater at the site would be from cementitious materials, hydrocarbon spillage and leakages during the construction phase. These are common potential impacts on all construction sites. All potential contamination sources were carefully managed at the site during the phase and there is not evidence of any impacts to groundwater as a result of the construction and operation of the grid connection.

Surface water drainage measures, pollution control and other preventative measures were implemented to minimise significant adverse impacts on water quality and downstream designated sites.

Overall the grid connection resulted in no negative impacts to surface water and groundwater quality during the construction phase and has no potential for negative water quality effects during the operational phase.

8. Air and Climate

Due to the non-industrial nature of the proposed development and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for preparing this Remedial Environmental Impact Assessment Report (rEIAR). It is expected that air quality in the existing environment is good, since there are no major sources of air pollution (e.g. heavy industry) in the vicinity of the site.

The Environmental Protection Agency (EPA) has designated four Air Quality Zones for Ireland:

Zone A: Dublin City and environs

Zone B: Cork City and environs

Zone C: 16 urban areas with population greater than 15,000

Zone D: Remainder of the country.

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the Framework Directive and Daughter Directives. The site of the proposed development lies within Zone D, which represents rural areas located away from large population centres.

There was potential for dust emissions from the grid connection construction works related to excavations and vehicle movements. These emissions are considered negligible given the small scale of the works areas and the temporary and transient nature of the work. Mitigation measures were put in place to minimise the potential for dust emissions.

Due to the nature of the construction work there was no significant impact on air and climate as a result of the construction of the grid connection. During the operation phase the grid connection will have a slight positive impact on air and climate by facilitating the transmission of renewable energy to the National Grid.

9. Noise and Vibration

There are a number of existing residential noise sensitive locations within 100m of the subject development. In addition to the residential receptors discussed above, there are two primary schools located adjacent to the grid connection route.

A variety of items of plant were used during the Construction Phase. These included dump trucks, Heavy Goods Vehicles (HGV's), tracked excavators and generators, in addition to other general construction equipment. Due to the nature of the activities undertaken, there was potential for noise impacts at nearby noise sensitive properties.

The associated construction works occurred for short durations at varying distances from Noise Sensitive Locations (NSLs), at various locations along the route. Typical road maintenance type construction equipment was used in the construction of the subject development. Based on the type of construction equipment used, and the nature of the works undertaken, the likely worst-case associated effects at the nearest NSLs associated with the grid connection route construction phase were likely to have been Negative, Not Significant, and Temporary.

Best practice measures for noise and vibration control were adhered to onsite during the construction phase of the development in order to mitigate temporary, negative effect associated with the construction phase of the project.

The likely residual impact was slight, of negative and temporary effect on sensitive noise receptors as a result of the construction phase of the project. Although the construction works of the grid connection likely gave rise to noise effects on sensitive receptors in the area, these effects were temporary in nature as the works moved along the underground cable route. Due to the limited nature of the construction activities that were undertaken in the construction of the subject development significant vibration effects did not occur

There is no noise or vibration generated by the grid connection during the operation phase. Therefore, there are no noise or vibration impacts associated with this phase of the project.

10. Landscape and Visual

As part of Landscape & Visual assessment an initial desk study was undertaken which identified relevant policies and guidelines, both at national and local level. The site and study area are described in terms of landscape character types as identified in 'Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities' (DoELHG, 2000), while the surrounding landscape within 100 meters of the site is described with reference to landscape character as well as other landscape designations contained in the Wexford County Council Development Plan. In addition, a field visit was undertaken to assess the landscape character and elements both on the site itself and in the wider landscape.

Landscape Effects

The subject development is not routed within or in proximity to any 'Landscapes of Greater Sensitivity' (LGS), *landscapes and seascapes which have the most visual interest and prominence, and which are generally more sensitive to development*. The closest LGS is Carrigroe Hill, which is approx. 9 km from the 110 kV Crory substation.

The landscape effects during the construction phase of the subject underground and over ground cabling is likely to have been imperceptible, temporary, and transient in nature. The works took place within a landscape which is not considered sensitive. This combined with the small scale of the works means that there is no significant effect associated with the construction phase.

There has been no impact on landscape associated with the underground section of the subject development. The landscape effect of the overhead line is minimal, with the effect being mainly visual. The over-ground pole sets and wires are not of sufficient scale or uniqueness to impact on the wider landscape. There are no significant residual landscape effects associated with the operational phase of the subject development.

Visual Effects

The visual effects during the construction phase of the permitted underground and overhead cabling is likely to have been imperceptible, temporary, and transient in nature. The works took place predominantly within the road corridor and so the visual receptors are not considered to be sensitive to change. This combined with the small scale of the works means that there are no significant effects associated with the construction phase. There is no evidence that the construction of the subject grid connection has interfered with any protected landscape character, views or prospects as the majority of the development is located underground. Based on the assessment above it is considered that the construction phase had a temporary, imperceptible visual effect.

The underground cabling is located within the existing road corridor and there are no operational effects associated with this. The overhead line component is similar in nature to the common electricity connections found across the Irish countryside and is not incongruous or dominant in its current position. The sensitivity of the receiving environment and receptors is considered low and so the effect is considered to be a long term, imperceptible effect. There is no evidence that the overhead grid connection has interfered with any protected landscape character, views or prospects.

11. Archaeological & Cultural Heritage

The existing grid connection route extends from the consented wind farms primarily along public roads before terminating at the existing Crory 110kV substation. The grid connection extends through eighteen townlands as follows (from north to south): Knocknalour, Ballynancoran, Kiltilly, Graiguemore, Bolinahaney/Borris, Ballyroebuck, Curraduff, Ballaman, Curralane Oldtown, Boolnadrum, Ballyandrew, Moneydurtlow. Bolacaheer, Tombrack, Corah, Ballycarney, Tincurry.

No national monuments in State Care or those subject to a Preservation Order are located along the existing grid connection route. The nearest National Monuments are those in the town of Ferns including Ferns Castle (NM No. 521) and Ferns Cathedral, church and high crosses (NM No. 133) over 3km to the east of the southern end of the route, and Clone Church (NM No. 665) which is c. 2.5km to the south-east of the existing Crory substation (**Error! Reference source not found.**). No recorded archaeological monuments are located within 100m of the existing grid connection route. The nearest monuments are shown in **Error! Reference source not found.**.

One structure listed in the NIAH for County Wexford (Reg. 15701005), a farm house, is located within 100m of the existing grid connection. It is also listed in the Record of Protected Structures in Vol. 2 of the CDP (RPS No. WCC1046). The house comprises a structure which would have been at a remove from the ground works associated with the grid connection.

The construction phase of the development consisted of the excavation of a trench for the cable and/or pits for polesets. No direct impacts to the recorded archaeological or cultural heritage resource as a result of the proposed development have been identified therefore no mitigation measures are required.

The nature of the development (i.e. primarily underground cable) is such that no indirect effects on the setting of any cultural heritage constraints will have occurred. A short section of overhead line connects the underground cable to Crory 110 kV substation. No archaeological or cultural heritage constraints are located in the immediate vicinity of the OHL therefore impacts to the immediate setting of such constraints are not identified.

All archaeological, architectural and cultural heritage constraints within 100m of either side of the grid connection route were assessed. No National Monuments or recorded monuments are located within 100m of the route therefore no impacts to such assets were identified. One NIAH/Protected Structure is located within 100m of the grid connection route, however, no direct impacts to this structure were identifiied. Bridge crossings involved burying the cables within the deck of the bridge, except at Corah bridge where directional drilling beneath the streambed was utilised.

Given the primarily underground nature of the grid connection no impacts to the setting (indirect impacts) of any cultural heritage assets were identified.

An assessment of cumulative impacts was also undertaken taking into consideration projects in the vicinity, particularly the Crory Wind Farm Group. No residual direct impacts or direct cumulative impacts as a result of the existing grid connection have been identified.

12. Material Assets

Traffic and Transport

The majority of grid connection route is located within the existing road network. Within the public road network the cable route is located entirely within local routes (predominantly local secondary roads) with the exception of a single crossing of a regional road (R745).

During the construction phase of the project there was likely some short term nuisance to local road users and residents along the grid connection cable route. Mitigation measures were put in place to minimise the nuisance to road users and residents. A road opening licence was issued by Wexford County Council for the works within the public road network. All works were conducted in compliance with the traffic management measures required as a condition of the license. This ensured that access to homes and properties was maintained throughout the duration of the construction phase. It is concluded that the likely effects of the construction phase of the development on traffic and transport were temporary, slight, and of negative effect.

The grid connection will not generate any additional traffic under normal conditions during the operational phase. In the unlikely event that maintenance or repair work on the cable are required, this could result in an unlikely, brief, imperceptible, neutral effect on local traffic.

Other Material Assets

There are a number of services located in the area surrounding the site including electricity, water, storm drainage, and telecommunications networks. Prior to works, the area where excavations were planned was surveyed and all existing services were identified. All relevant bodies i.e. ESB, Bord Gáis, Eir, Wexford County Council etc. were contacted and all drawings for all existing services sought.

Any underground services encountered along the cable routes were surveyed for level and the ducting was designed to pass over the service provided adequate cover was available. A minimum clearance of 300 mm was required between the bottom of the ducts and the service in question. Where the clearance could be achieved the ducting was designed to pass under the service and again 300 mm clearance between the top of the ducts and bottom of the service was achieved. All works were in compliance with the Eirgrid/ESB Networks specifications current at the time of construction

The construction methodology for the cable installation ensured that the residual impact of the grid connection construction on telecoms and other services were at worst brief, imperceptible, and of neutral effect.

13. Interaction of the Foregoing

The preceding Chapters 4 to 12 of this rEIAR identify the potential environmental impacts that may occur as a result of the proposed development in terms of Population and Human Health, Biodiversity, Flora and Fauna, Land, Geology and Soils, Hydrology and Hydrogeology, Air and Climate, Noise and Vibration, Landscape and Visual, Archaeological and Cultural Heritage and Material Assets. All of the likely significant effects of the development and the measures implemented to mitigate them were outlined in the relevant sections of this report. However, for any development with the potential for significant environmental effects there is also the potential for interaction amongst these potential significant effects. The result of interactive effects may exacerbate the magnitude of the effects or ameliorate them or have a neutral effect.

A matrix is presented in Table 13.1 to identify interactions between the various aspects of the environment already discussed in this rEIAR. The matrix highlights the occurrence of potential positive or negative effects of the proposed development. The matrix is symmetric, with each environmental component addressed in the previous sections of this rEIAR being placed on both axes of a matrix, and therefore, each potential interaction is identified twice.

Potential interactions have been identified between effects on Population and Human Health and effects on Noise and Vibration, Air and Climate, Hydrology and Hydrogeology, Traffic, and Landscape. Interactions have been identified between effects on Biodiversity, Flora and Fauna with effects on Hydrology and Hydrogeology, and Noise and Vibration. Interactions have been identified between effects on Hydrology and Hydrogeology and effects on Land, Soils, and Geology. Interactions have been identified between effects on Air and Climate with effects on Land, Soils, and Geology, and Material Assets.

Where any potential interactive effects have been identified, appropriate mitigation is included in the relevant sections (Sections 4-12) of the EIAR.

In general, there are no significant negative effects or potential interactions associated with the grid connection.

1. INTRODUCTION

1.1 Introduction

This remedial Environmental Impact Assessment Report (rEIAR) has been prepared by McCarthy Keville O'Sullivan Ltd. (MKO) on behalf of ESB Networks, Designated Activity Company (DAC) (referred to hereafter as ESBN), which intends to apply to An Bord Pleanála (the Board) for substitute consent under Section 177E of the Planning and Development Act, 2000, as amended for the Crory Wind Farm Group (CWFG) grid connection. The grid connection consists primarily of medium voltage 20kV underground cable (UGC) and a short section of 20kV overhead line (OHL) that connects four separate, permitted operational wind farms to the existing Crory 110kV substation.

MKO was appointed as Environmental Consultants on this project and commissioned to prepare an rEIAR that fulfils the requirements set out by the Environmental Protection Agency (EPA) in the *'Guidelines on the Information to be contained in Environmental Impact Statements'*, Schedule 6 of the Planning and Development Regulations 2001, as amended, and Directive 2014/52/EU relating to the information to be contained in an EIAR.

This rEIAR will accompany the substitute consent application for the development to be submitted to the Board.

1.2 Legislative Context

The consolidated European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive'), has been transposed into Irish planning legislation by the Planning and Development Acts 2000 to 2019 and the Planning and Development Regulations 2001 to 2019. The EIA Directive was amended by Directive 2014/52/EU which has been transposed into Irish law with the recent European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018). Most of the provisions of the new regulations came into operation on the 1st of September 2018 with a number of other provisions coming into operation on the 1st of January 2019.

Accordingly, this rEIAR complies with the EIA Directive as amended by Directive 2014/52/EU. To the extent relevant and necessary, regard has been had to the existing provisions of the Planning and Development Act 2000 to 2019 and the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

The Environmental Impact Assessment (EIA) of the project will be undertaken by An Bord Pleanála, as the competent authority.

Article 5 of the EIA Directive as amended by Directive 2014/52/EU provides where an EIA is required, the developer shall prepare and submit an environmental impact assessment report (EIAR). The information to be provided by the developer shall include at least:

a) a description of the project comprising information on the site, design, size and other relevant features of the project;
b) a description of the likely significant effects of the project on the environment;
c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;

e) *a non-technical summary of the information referred to in points (a) to (d); and (f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.*

In addition, Schedule 6 to the Planning and Development Act 2000 to 2019 sets out the information to be contained in an EIAR, with which this rEIAR complies.

MKO was appointed as environmental consultant on the project and commissioned to prepare this rEIAR in accordance with the requirements of the EIA Directive as amended by Directive 2014/52/EU.

This rEIAR provides information on the receiving environment and assesses the likely significant effects of the project on it, and describes mitigation measures implemented to avoid or reduce these effects. The function of the rEIAR is to provide information to allow the competent authority to conduct the Environmental Impact Assessment (EIA) of the project.

1.2.1 EIAR Guidance

The Environmental Protection Agency (EPA) published its *'Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports'* (EPA, August 2017), which is intended to guide practitioners preparing an EIAR in line with the requirements set out in the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

In preparing this rEIAR regard has also been taken of the provisions of the '*Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment*', published by the Department of Housing, Planning and Local Government (DHPLG) in August 2018 to the extent these guidelines are relevant having regard to the enactment of the revised EIA Directive.

The European Commission also published a number of guidance documents in December 2017 in relation to Environmental Impact Assessment of Projects (Directive 2011/92/EU as amended by 2014/52/EU) including '*Guidance on Screening*', '*Guidance on Scoping*' and '*Guidance on the preparation of the Environmental Impact Assessment Report*'. MKO has prepared the rEIAR with regard to these guidelines also.

1.2.2 Planning Background

This section summarises the planning history associated with the CWFG and the grid connection. The grid connection connects Ballycadden Wind Farm (permitted under Pl Ref. 2009/1730), Ballynancoran Wind Farm (permitted under Pl Ref. 2003/3444), Gibbet Hill Wind Farm (permitted under Pl Ref. 2009/0266) and Knocknalour Wind Farm (permitted under Pl Ref. 2011/0504), which constitute the Crory Wind Farm Group, to the national electricity grid at the existing Crory 110 kV substation.

The four separate wind farms, consisting of a total of 21 turbines became operational at different times in 2012 and 2013. The wind farms are connected to the national electricity grid by a medium voltage 20 kV underground grid connection cable (with a short section of OHL), which runs from the wind farms to Crory 110 kV substation. The grid connection works were undertaken by the wind farm developers, ESBN and/or their agents, under the supervision of ESBN. The grid connection infrastructure is now under the operational control of ESBN. The construction and operation of the wind farms and grid connection were approved by the Commission for Energy Regulation (CER) through the issuing of Authorisation to Construct Consents and Generating Licenses.

An application for leave to apply for substitute consent for the grid connection was made following a determination by ABP in July 2016 (ABP Refs: RL 3408/09/10/11) that the provision of grid connections from the Crory 110 kV substation to the Ballycadden, Gibbet Hill, Knocknalour and Ballynancoran wind farms is not exempted development. The Board granted leave to apply for substitute consent on the 26th of June, 2019 (ABP-301989-18) and directed that a remedial Environmental Impact Assessment and a remedial Natural Impact Statement be prepared and included with the application.

1.3 The Applicant

The applicant for the development is ESBN, a subsidiary within the ESB Group. ESBN are the licensed operators of the electricity distribution system in the Republic of Ireland and are responsible for building, operating, maintaining and developing the electricity network and serving all electricity customers across the country.

1.4 Brief Description of the Development

The Subject Development consists of an approximately 28 kilometre long 20 kV grid connection that facilitates the connection of the existing consented Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour windfarms to the national electricity grid. The cable connects to the existing Crory 110 kV Substation in townland of Tincurry, Co. Wexford. Approximately 26 km of the grid connection route consists of underground cable, predominantly in the public roadway. Approximately 2km of the route is overhead line, between the Knocknalour and Ballynancoran wind farms.

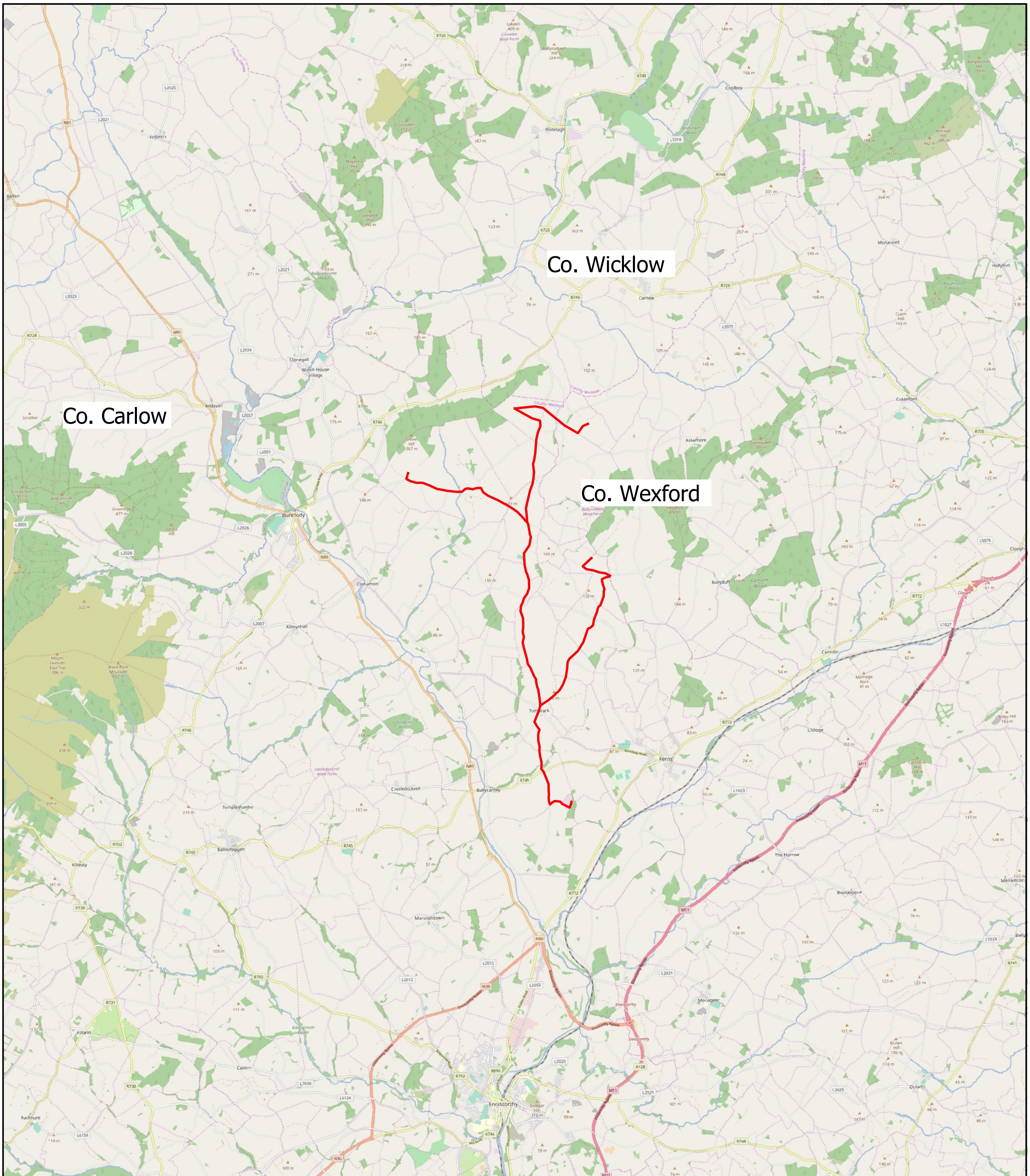
The grid connection works involved excavation of a trench to the minimum depth required to safely accommodate insulated 20 kV power cables; approximately 1.3 metres. The cable ducting was laid in the trench according to the construction methodologies outlined in Section 3.3 of this rEIAR, then backfilled and re-surfaced. The subject works were restricted primarily to existing road and farm track infrastructure and grass margins throughout its entire length.

A full description of the subject development is provided in Section 3 of this rEIAR.

The total length of the grid connection is 28 kilometres of which 26 kilometres are underground, predominantly located within the curtilage of the public road, and 2 kilometres are overhead line.

1.4.1 Site Location and Description

The subject grid connection route is located approximately 3 - 12 kilometres west / northwest of Ferns in County Wexford (Figure 1.1). The subject grid connection is a linear site which extends from the Crory 110 kV substation in the south to the Knocknalour and Ballynancoran windfarms in the north, a straight line distance of approximately 12km. A spur to the east extends to the Ballycadden Wind Farm and a spur to the west extends to the Gibbet Hill Wind Farm. The grid connection and all ancillary works are located in the townlands of Ballyroebuck, Ballyandrew, Tincurry, Ballaman, Ballynancoran, Corah, Kiltilly, Curralane Oldtown, Knocknalour, Moneydurtlow, Bolinahaney, Bolacaheer, Graigue More, Tombrack, Boris, Ballycarney, Curraduff and Boolnadrum, Co. Wexford.



Map Legend

Grid Connection Route

N

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Drawing Title: Site Location Map	
Project Title: Crory Wind Farm Group Grid Connection	
Drawn By: TJB	Checked By: MH
Project No.: 190806	Drawing No.: Figure 1.1
Scale: 1:150000	Date: 04.01.2020

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1.4.1.1 Land Use

The majority of the subject grid connection are underground cables laid in the public roads. The main exceptions to this being;

- The initial connection to the Crory 110 kV substation comprises an underground cable along a private access road corridor (c. 500 metres);
- The final connection to Ballycadden Wind Farm is an underground cable installed in a private road, a track and fields (c. 1,000 metres);
- The final connection to Gibbet Hill Wind Farm is an underground cable routed across a private road, a track and fields (c. 800 metres); and
- An overhead power line (wooden pole set) connects the two turbines of the Ballynancoran Wind Farm located in the townland of Ballynancoran to the Knocknalour Wind Farm substation located in the townland of Knocknalour (a distance of approximately 2km).

As indicated above, the majority of the grid connection is situated within developed road / access track infrastructure with only limited sections of the route located within greenfield / agricultural land. In this regard, it should be noted that surrounding environment is characterised by good quality arable land which supports a large quantity of ancillary agricultural infrastructure. The surrounding area is also characterised by a substantial amount of one-off rural dwelling houses and supporting community infrastructure.

1.5 Need for the Development

Ireland faces significant challenges through efforts to meet its 2020 renewable energy targets, EU targets for renewable energy by 2030, and its commitment to transition to a low carbon economy by 2050. It is clear that Ireland is falling behind meetings its 2020 target for renewable energy as well as the longer-term movement away from fossil fuels, with the SEAI reporting in May 2019 that 13 per cent of Ireland's energy will come from renewable sources by 2020, three per cent short of our European target of 16 per cent (SEAI, May 2019). Further detail can be found in Chapter 2 Section 2.1.

In March 2019, the Government announced a renewable electricity target of 70% by 2030. The Subject Development is currently operational and is therefore contributing to this target. More recently, the EPA reported that Ireland is set to fall far short of all of its carbon emissions reduction targets for both 2020 and 2030 despite climate action measures in the National Development Plan (EPA, June 2019). The development is critical to helping Ireland address these challenges as well as addressing the country's over-dependence on imported fossil fuels as it connects four existing and operational windfarms to the National Grid.

The need for the proposed project is driven by the following factors:

1. A legal commitment from Ireland to limit greenhouse gas emissions under the Kyoto protocol to reduce global warming;
2. A requirement to increase Ireland's national energy security as set out in the Energy White Paper;
3. A requirement to diversify Irelands energy sources, with a view to achievement of national renewable energy targets and an avoidance of significant fines from the EU (the EU Renewables Directive);
4. Provision of cost-effective power production for Ireland which would deliver local benefits; and
5. Increasing energy price stability in Ireland through reducing an over reliance on imported gas.

The Climate Action Plan 2019 (CAP) was published on the 1st of August 2019 by the Department of Communications, Climate Action and Environment. The CAP sets out an ambitious course of action over the coming years to address the impacts which climate may have on Irelands environment, society, economic and natural resources. This Plan clearly recognises that Ireland must significantly step up its commitments to tackle climate disruption. The CAP identifies a need for 8.2GW of onshore wind generation. Only 3.66GW is in place as of 2019 therefore Ireland needs to more than double its installed capacity of wind generation. The CAP presents clear and unequivocal support for the provision of additional renewable energy generation and presents yet further policy support for increased wind energy. Further information relating to the Climate Action Plan can be found in Chapter 2, Section 2.1.2.4.

These factors are addressed in further detail below. Section 2.1 in Chapter 2 of this rEIAR on Background to the Proposed Development, presents a full description of the international and national renewable energy policy context for the project. Section 2.2 addresses climate change, including Ireland's current status with regard to meeting greenhouse gas emission reduction targets.

1.6 Purpose and Scope of the rEIAR

This remedial Environmental Impact Assessment Report (rEIAR) will compare historical conditions of the site prior to site activity taking place with its post-activity current condition and will document any impacts the grid connection may have had on the surrounding environment during the construction and operational phases. Any mitigation measures that were put in place to ensure that the environment was protected are also discussed.

The grid connection and the consented, operational Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour windfarms have been cumulatively assessed as part of this rEIAR. The windfarms were developed independently with the Ballycadden, Gibbet Hill, and Knocknalour windfarms all being subject to separate EIA processes and the Ballynancoran windfarm, consisting two turbines, being below the threshold for EIA/EIS. The Board has acknowledged that the substitute consent process applies to the gird connection only. Therefore, the purpose of this rEIAR is to assess the environmental effects of the grid connection as the subject development for the substitute consent process. The rEIAR also assesses the cumulative effects associated with the grid connection and the windfarms as pertaining to the various EIA requirements.

1.7 Structure and Content of the rEIAR

1.7.1 General Structure

This rEIAR uses the grouped structure method to describe the existing environment, the potential impacts of the grid connection development thereon and the implemented mitigation measures. The grouped format sections describe the impacts of the optimised development in terms of human beings, flora and fauna, soils and geology, water, air and climate, noise and vibration, landscape and visual, cultural heritage and material assets such as traffic and transportation, together with the interaction of the foregoing.

The chapters of this rEIAR are as follows:

1. *Introduction*
2. *Background and Alternatives*
3. *Description of the Proposed Development*
4. *Population and Human Health*
5. *Biodiversity. Flora and Fauna*
6. *Land, Soils and Geology*
7. *Water*

8. *Air and Climate*
9. *Noise and Vibration*
10. *Landscape and Visual*
11. *Cultural Heritage*
12. *Material Assets (including Traffic and Transport, Telecommunications and Aviation)*
13. *Interactions of the Foregoing*

The rEIAR also includes a Non-Technical Summary, which is a condensed and easily comprehensible version of the rEIAR document. The non-technical summary is laid out in a similar format to the main rEIAR document and comprises a description of the optimised development followed by the existing environment, impacts and mitigation measures presented in the grouped format.

1.7.2 Description of Likely Significant Effects and Impacts

As stated in the '*Guidelines on the Information to be contained in Environmental Impact Statements'* (EPA, 2002), an assessment of the likely impacts of a development is a statutory requirement of the EIA process. The statutory criteria for the presentation of the characteristics of potential impacts requires that potential significant impacts are described with reference to the extent, magnitude, complexity, probability, duration, frequency, reversibility and trans-frontier nature (if applicable) of the impact.

The classification of impacts in this rEIAR follows the definitions provided in the Glossary of Impacts contained in the following guidance documents produced by the Environmental Protection Agency (EPA):

- *Guidelines on the Information to be contained in Environmental Impact Assessment Reports – Draft August 2017 '(EPA 2017).*
- *'Advice Notes on Current Practice in the Preparation of Environmental Impact Statements' (EPA, 2003)*
- *'Guidelines on the Information to be contained in Environmental Impact Statements' (EPA, 2002)*
- *Revised Guidelines on the Information to be contained in Environmental Impact Statements – Draft September 2015 '(EPA 2015)*
- *'Advice Notes for Preparing Environmental Impact Statements – Draft September 2015' (EPA 2015).*

The European Commission also published a number of guidance documents in December 2017 in relation to Environmental Impact Assessment of Projects (Directive 2011/92/EU as amended by 2014/52/EU) including '*Guidance on Screening*', '*Guidance on Scoping*' and '*Guidance on the preparation of the Environmental Impact Assessment Report*'. MKO has prepared the EIAR with regard to these guidelines also.

Table 1.1 presents the glossary of impacts as published in the EPA guidance documents. Standard definitions are provided in this glossary, which permit the evaluation and classification of the quality, significance, duration and type of impacts associated with a proposed development on the receiving environment. The use of pre-existing standardised terms for the classification of impacts ensures that the EIA employs a systematic approach, which can be replicated across all disciplines covered in the rEIAR. The consistent application of terminology throughout the rEIAR facilitates the assessment of the optimised development on the receiving environment.

Table 1.1 Impact Classification Terminology (EPA, 2017)

Impact Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative	A change which reduces the quality of the environment
Significance	Imperceptible	An effect capable of measurement but without significant consequences
	Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends
	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
	Very significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
	Profound	An effect which obliterates sensitive characteristics
Extent & Context	Extent	Describe the size of the area, number of sites and the proportion of a population affected by an effect
	Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions
Probability	Likely	Effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented

	Unlikely	Effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented
Duration and Frequency	Momentary	Effects lasting from seconds to minutes
	Brief	Effects lasting less than a day
	Temporary	Effects lasting less than a year
	Short-term	Effects lasting one to seven years
	Medium-term	Effects lasting seven to fifteen years
	Long-term	Effects lasting fifteen to sixty years
	Permanent	Effect lasting over sixty years
	Reversible	Effects that can be undone, for example through remediation or restoration
	Frequency	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
Type	Indirect	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	'Do Nothing'	The environment as it would be in the future should the subject project not be carried out
	Worst Case'	The effects arising from a project in the case where mitigation measures substantially fail
	Indeterminable	When the full consequences of a change in the environment cannot be described
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents

Each impact is described in terms of its quality, significance, duration and type, where possible. A 'Do-Nothing' impact is also predicted in respect of each environmental theme in the rEIAR. Residual impacts are also presented following any impact for which mitigation measures are prescribed. The remaining impact types are presented as required or applicable throughout the rEIAR.

1.8 Project Team

1.8.1 Project Team Responsibilities

The companies and staff listed in Table 1.2 were responsible for completion of the rEIAR subject development. Further details regarding project team members are provided below.

The rEIAR project team comprises a multidisciplinary team of experts with extensive experience in the assessment of wind energy developments and in their relevant area of expertise. The qualifications and experience of the principal staff from each company involved in the preparation of this rEIAR are summarised in Section 1.5.2 below. Each chapter of this rEIAR has been prepared by a competent expert in the subject matter.

Table 1.2 Project Team

Consultants	Principal Staff Involved in Project	rEIAR Input
MKO Tuam Road, Galway, H91 VW84	Brian Keville Michael Watson Jimmy Green Thomas Blackwell Pat Roberts John Hynes Joanna Mole Jordan Baxter Laoise Kelly James Newell Joe O'Brien	Project Managers, Scoping and Consultation, Preparation of Natura Impact Statement, rEIAR Report Sections: 1. Introduction 2. Background to the Development 3. Description of the Proposed Development 4. Population & Human Health 5. Biodiversity. Flora & Fauna. 6. Land, Soils & Geology 7. Water 8. Air & Climate 9. Noise and Vibration 10. Landscape & Visual 12. Material Assets 13. Interaction of the Foregoing 14. Schedule of Mitigation
Tobar Archaeological Services Saleen Midleton Co. Cork	Annette Quinn Miriam Carroll	Preparation of Report Section: 11. Cultural Heritage

1.8.2 Project Team Members

1.8.3 MKO

Brian Keville B.Sc. (Env.)

Brian Keville has over 17 years' professional experience as an environmental consultant having graduated from the National University of Ireland, Galway with a first class honours degree in Environmental Science. Brian was one of the founding directors of environmental consultancy, Keville & O'Sullivan Associates Ltd., prior to the company merging in 2008 to form McCarthy Keville O'Sullivan Ltd., and whom recently rebranded as MKO (March 2019). Brian's professional experience has focused on project and environmental management, and environmental impact assessments. Brian has acted as project manager and lead-consultant on numerous environmental impact assessments, across various Irish counties and planning authority areas. These projects have included large infrastructural projects such as roads, ports and municipal services projects, through to commercial, mixed-use, industrial and renewable energy projects. The majority of this work has required liaison and co-ordination with government agencies and bodies, technical project teams, sub-consultants and clients.

Michael Watson, MA; Miema CEnv PGeo

Michael Watson is Project Director and head of the Environment Team in MKO. Michael has over 18 years' experience in the environmental sector. Following the completion of his Master's Degree in Environmental Resource Management, Geography, from National University of Ireland, Maynooth he worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael's professional experience includes managing Environmental Impact Assessments, EPA License applications, hydrogeological assessments, environmental due diligence and general environmental assessment on behalf of clients in the wind farm, waste management, public sector, commercial and industrial sectors nationally. Michaels key strengths include project strategy advice for a wide range and scale of projects, project management and liaising with the relevant local authorities, Environmental Protection Agency (EPA) and statutory consultees as well as coordinating the project teams and sub-contractors. Michael is a key member of the MKO senior management team and as head of the Environment Team has responsibilities to mentor various grades of team members, foster a positive and promote continuous professional development for employees. Michael also has a Bachelor of Arts Degree in Geography and Economics from NUI Maynooth, is a Member of IEMA, a Chartered Environmentalist (CEnv) and Professional Geologist (PGeo).

Thomas Blackwell – Senior Environmental Consultant

Thomas is a Senior Environmentalist with MKO with over 15 years of progressive experience in environmental consulting. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin. Prior to taking up his position with MKO in August 2019, Thomas worked as a Senior Environmental Scientist with HDR, Inc. in the United States and held previous posts with private consulting firms in both the USA and Ireland. Thomas is a registered Professional Wetland Scientist with the Society of Wetland Scientists with specialist knowledge in wetland assessment and delineation, mitigation planning and design, stream geomorphic assessment, and stream and wetland restoration design. Thomas' professional experience includes managing Environmental Impact Assessments, environmental permitting, environmental due diligence and compliance, and general environmental assessment on behalf of clients in the solar farm, mining, solid waste management, residential and commercial development, and public sectors. Thomas' key strengths and areas of expertise are in project management and strategy development, environmental permitting and assessment for renewable energy projects, fluvial geomorphology and stream restoration design. Since joining MKO, Thomas has been involved as an Environmental Consultant on a range of energy infrastructure, and residential projects.

Jimmy Green BA, MRUP; MIPI

Jimmy Green holds the position of Senior Planner in MKO and has a wide range of experience in project management and coordination, planning research, analysis, and retail planning. Jimmy has extensive planning experience in both the public and private sectors having worked as an Assistant Planner in Donegal County Council and subsequently as both an Executive and Senior Executive Planner in Galway County Council prior to joining private practice in October 2004. Since moving into the private sector he has provided consulting services to a wide range of private and public sector clients, and his experience includes planning application project management, environmental impact assessment preparation, retail impact assessment, development potential reporting, preparation of linguistic impact statements and submissions to Development Plans/Local Area Plans. Jimmy has a Bachelor of Arts Degree in Human and Physical Geography from National University Ireland Galway and a Masters in Regional and Urban Planning from University College Dublin. Jimmy is also a corporate member of the Irish Planning Institute.

Pat Roberts B.Sc. (Env.)

Pat Roberts is a Senior Ecologist and director of the Ecology team with McCarthy O'Sullivan Ltd. with over 12 years post graduate experience of providing ecological services in relation to a wide range of developments at the planning, construction and monitoring stages. Pat holds B.Sc.(Hons) in Environmental Science. Pat has extensive experience of providing ecological consultancy on large scale industrial and civil engineering projects. He is highly experienced in the completion of ecological baseline surveys and impact assessment at the planning stage. He has worked closely with construction personnel at the set-up stage of numerous construction sites to implement and monitor any prescribed best practice measures. He has designed numerous Environmental Operating Plans and prepared many environmental method statements in close conjunction with project teams and contractors. He has worked extensively on the identification, control and management of invasive species on numerous construction sites. Prior to taking up his position with MKO in June 2005, Pat worked in Ireland, USA and UK as a Tree Surgeon and as a nature conservation warden with the National Trust (UK) and the US National Park Service. Pats key strengths include his depth of knowledge and experience of a wide range of ecological and biodiversity topics and also in his ability to understand the requirements of the client in a wide range of situations. He currently manages the ecological team within MKO and ensures that the outputs from that team are of a very high standard and meet the requirements of the clients and relevant legislation and guidelines. He is a full member of the Chartered Institute of Ecologists and Environmental Managers (CIEEM)

John Hynes M.Sc. (Ecology), B.Sc.

John Hynes is a Senior Ecologist with McCarthy O'Sullivan Ltd. with over 7 years of experience in both private practice and local authorities. John holds a B.SC in Environmental Science and a M.Sc. in Applied Ecology. Prior to taking up his position with MKO in March 2014, John worked as an Ecologist with Ryan Hanley Consulting Ltd. and Galway County Council. John has specialist knowledge in Flora and Fauna field surveys. Geographic Information Systems, data analysis, Appropriate Assessment, Ecological Impact Assessment and Environmental Impact Assessment. John's key strengths and areas of expertise are in project management. GIS and impact assessment. Since joining MKO John has been involved as a Senior Ecologist on a significant range of energy infrastructure, commercial, national roads and private/public development projects. Within MKO John plays a large role in the management and confidence building of junior members of staff and works as part of a large multi-disciplinary team to produce EIS Reports. John has project managed a range of strategy and development projects across the Ireland and holds CIEEM membership.

Laoise Kelly B.Sc.

Laoise Kelly is a qualified Ecologist with a B.Sc. in Environmental Science from NUI Galway (2010) with over six years' post-graduate experience in both private practice and the public sector. Laoise has highly developed skills in both aquatic and terrestrial survey techniques and is proficient at habitat mapping. Laoise regularly carries out the role of Ecological Clerk of Works for the construction stage of a project and competently manages projects in relation to the management of Third Schedule invasive species. Currently, Laoise plays a large role in carrying out Stage 1 and Stage 2 Appropriate Assessment Reports and contributing to Environmental Impact Assessment Reports. Laoise has a variety of field survey skills for species such as bat, badger and otter has been involved in a number of projects on a nationwide scale. Laoise holds membership with the Chartered Institute of Ecology and Environmental Management as well as Bat Conservation Ireland and the Irish Wildlife Trust.

Joanna Mole BSc PGDipLA MSc CMLI

Joanna Mole is a Landscape and Visual Impact Assessment Specialist and Chartered Landscape Architect with McCarthy O'Sullivan Ltd. with over 16 years of experience in both private practice and local authorities. Joanna holds a BSc (Hons) in Landscape Design & Plant Science from Sheffield University, a Postgraduate Diploma in Landscape Architecture from Leeds Beckett University, and a MSc in Renewable Energy Systems Technology from Loughborough University. Prior to taking up her position with MKO in October 2017, Joanna worked as a Landscape Architect with Kav-Banof in Israel and held previous posts with CSR in Cork, LMK in Limerick, Geo Architects in Israel and Groundwork Bridgend in South Wales. Joanna is a Chartered Landscape Architect with specialist knowledge in Landscape and Visual Impact assessments for projects ranging from individual houses to large windfarms, cycle route design and landscape contract management. Since joining MKO Joanna has been involved in projects such as energy infrastructure, extraction industry and residential projects. Joanna holds chartered membership of the British Landscape Institute since 1998 and has been an examiner for British Landscape Institute professional practice exam.

Jordan Baxter BA. MSc.

Jordan Baxter is a Graduate Planner with MKO with over 2 years of experience in private consultancy practice. Jordan holds a BA in Psychology and a Master's in Planning and Development from Queen's University Belfast. Jordan is a Licentiate Member of the RTPI with specialist knowledge in national, regional and local planning policy and guidance, development management and strategic planning analysis for energy infrastructure. Within MKO, Jordan works as part of a larger multi-disciplinary team to coordinate the development of planning applications for renewable energy infrastructure for submission to both local and national Planning Authorities. Jordan has both managed and contributed on a range of infrastructure projects across Ireland and the UK and is currently progressing towards chartered membership with the RTPI.

James Newell

James holds the position of CAD and Information Technology Technician with MKO since joining the Company in May 2006. Prior to joining MKO, he worked as a graphic designer and illustrator for over eight years. In recent years James' role has extended to include all wind farm visual modelling completed by the company. He is proficient in the use of MapInfo GIS software in addition to AutoCAD and other design and graphics packages.

Joseph O'Brien

Joseph O'Brien holds the position of CAD Technician. Joseph holds a BA Honours Level 8 Modelmaking, Design and Digital Effect, Institute of Art Design and Technology (IADT), Dun Laoghaire & City & Guilds Level 3 2D &3D AutoCAD certificates. Joseph's role entails various wind and solar farm projects which require various skills such as mapping, aerial registration and detailed design drawings for projects. Prior to joining us, Joseph worked as a free-lance Modelmaker and CAD Technician. His previous experience included designing various models and props through CAD and then making them for various conventions such as Dublin Comic Con and Arcade Con.

Tobar Archaeological Services

Tobar Archaeological Services is a Cork-based company n its 16th year in business. They offer professional nationwide services ranging from pre-planning assessments to archaeological excavation, and cater for clients in state agencies, private and public sectors.

Tobar's Directors, Annette Quinn and Miriam Carroll, are licensed by the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs to carry out excavations in Ireland and have carried out work directly for the National Monuments Services of the Department of the Environment, Heritage and Local Government. Tobar Archaeological Services has a proven track record and extensive experience in the wind farm industry from EIS stage through to construction stage when archaeological monitoring is frequently required.

2. BACKGROUND TO THE PROJECT

This section of the remedial Environmental Impact Assessment Report (rEIAR) presents information on renewable energy and climate change policy and targets, the strategic planning context for the subject development, a description of the subject development site and planning history, scoping and consultation and the cumulative impact assessment process undertaken as part of this rEIAR.

As further discussed in the relevant chapters of this rEIAR, there have been no environmental / ecological impacts arising from the Crory Wind Farm Group (CWFG) and its grid connection works over and above those impacts properly evaluated in the historic Environmental Impact Statements for Ballycadden Wind Farm, Gibbet Hill Wind Farm, Knocknalour Wind Farm and Ballynancoran Wind Farm. Specifically, the development has not caused significant impacts on the environment or the integrity of a European site. As such, the continued operation of the CWFG, consequent to the grant of permission for its grid connection, will allow the development to continue contributing towards the achievement of relevant climate change / renewable energy policies at all levels of governance without penalty to the environment or Natura 2000 network.

2.1 Climate Change Policy and Targets

2.1.1 International Policy

2.1.1.1 United Nations Framework Convention on Climate Change

In 1992, countries joined an international treaty, the United Nations Framework Convention on Climate Change (UNFCCC), as a framework for international efforts to combat the challenge posed by climate change. The UNFCCC seeks to limit average global temperature increases and the resulting climate change. In addition, the UNFCCC seeks to cope with impacts that are already inevitable. It recognises that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases. The framework set no binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms. Instead, the framework outlines how specific international treaties (called "protocols" or "Agreements") may be negotiated to set binding limits on greenhouse gases.

2.1.1.2 Kyoto Protocol Targets

Ireland is a Party to the Kyoto Protocol, which is a protocol to the UNFCCC. The Kyoto Protocol is an international agreement that sets limitations and reduction targets for greenhouse gases for developed countries. It came into effect in 2005, as a result of which, emission reduction targets agreed by developed countries, including Ireland, are now binding.

Under the Kyoto Protocol, the EU agreed to achieve a significant reduction in total greenhouse gas emissions of 8% below 1990 levels in the period 2008 to 2012. Ireland's contribution to the EU commitment for the period 2008 – 2012 was to limit its greenhouse gas emissions to no more than 13% above 1990 levels.

Doha Amendment to the Kyoto Protocol

In Doha, Qatar, on 8th December 2012, the "Doha Amendment to the Kyoto Protocol" was adopted. The amendment includes:

- New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from 1 January 2013 to 31 December 2020;
- A revised list of greenhouse gases (GHG) to be reported on by Parties in the second commitment period; and
- Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period.

During the first commitment period, 37no. industrialised countries and the European Community committed to reduce GHG emissions to an average of 5% against 1990 levels. During the second commitment period, Parties committed to reduce GHG emissions by at least 18% below 1990 levels in the eight-year period from 2013 to 2020; however, the composition of Parties in the second commitment period is different from the first.

Under the protocol, countries must meet their targets primarily through national measures, although market based mechanisms (such as international emissions trading) can also be utilised.

2.1.1.3 COP21 Paris Agreement

COP21 was the 21st session of the Conference of the Parties (COP) to the UNFCCC. Every year since 1995, the COP has gathered the 196 Parties (195 countries and the European Union) that have ratified the Convention in a different country, to evaluate its implementation and negotiate new commitments. COP21 was organised by the United Nations in Paris and held from 30th November to 12th December 2015. COP21 closed with the adoption of the first international climate agreement (concluded by 195 countries and applicable to all). The 12-page text, made up of a preamble and 29 articles, provides for a limitation of the global average temperature rise to well below 2˚C above pre-industrial levels and to limit the increase to 1.5˚C. It is flexible and takes into account the needs and capacities of each country. It is balanced as regards adaptation and mitigation, and durable, with a periodical ratcheting-up of ambitions.

An article published by the IPCC (Intergovernmental Panel on Climate Change) on the 6th October 2018 titled '*Global Warming of 1.5oC*', notes the impacts of global warming of 1.5˚C above pre-industrial levels and related global greenhouse gas emission pathways; in the context of mitigation pathways, strengthening of the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. This special report is part of an invitation contained in the Decision of the 21st Conference of Parties of the United Nations Framework Convention on Climate Change to adopt the Paris Agreement, and provides an update on the impact of climate change if emissions are not reduced.

2.1.1.4 COP25 Madrid– Current Progress

COP25, the 25th session of the COP, was held between the 2nd and 13th of December 2019 in Madrid. The conference was characterised by repeated warnings from civil society (NGOs and corporates) on emerging evidence and scientific consensus on climate change risk. Specifically, it is noted that there are only '*10 years left*' before the opportunity of limiting global warming to 1.5˚C is no long feasible. As such, the only scenario that makes it possible is a '*7.6% reduction of global GHG emissions every year between 2020 and 2030, and to reach net zero emissions by 2050*'. However, there was no consensus achieved between States to finalise the operating rules of the Paris Agreement and ensure that it became operational by 2020. Three issues which emerged between States from the COP25 are summarised below:

- There was no uniform consensus between States to raise countries' climate ambitions, e.g. to make increased commitments in light of growing climate change data. Some States were opposed to imposing any obligation on countries to submit enhanced pledges next

year, arguing it should be each country's own decision. All states must submit a review of their commitments for COP 26 in 2020. At the current level of climate targets, within a decade, the objective of the Paris Agreement will no longer be achievable;
- There was no agreement on finalising Article 6, the foundations for international cooperation to combat climate change. The aim was to establish the rules for new international mechanisms for financing and transferring GHG emission reductions; and
- There was no agreement on financing (Green Climate Fund); specifically, relating to both loss and damage caused by climate change.

Despite the lack of consensus to the above challenges, the COP25 did achieve more limited success in the introduction of the "*San Jose Principles for High Ambition and Integrity of International Carbon Markets*", which sets out the framework on which a robust carbon market should be built. These principles include, but are not limited to:

- Ensures environmental integrity and enables the highest possible mitigation ambition;
- Delivers an overall mitigation in global emissions, moving beyond zero-sum offsetting approaches to help accelerate the reduction of global greenhouse gas emissions;
- Prohibits the use of pre-2020 units, Kyoto units and allowances, and any underlying reductions toward Paris Agreement and other international goals; and
- Ensures that double counting is avoided and that all use of markets toward international climate goals is subject to corresponding adjustments.

These principles were supported by 23 EU, including Ireland, and Latin American countries, 5 no. pacific islands and 2 no. countries in the Caribbean.

In addition, the European Union's *Green Pact* was introduced on the 11th of December with agreement of the European Council and all Member States (except Poland)on the ambition of climate neutrality in 2050, supported by a financing plan of €1,000 billion over 10 years.

2.1.1.5 Emissions Projections for Ireland

In June 2019, the EPA published an update on Ireland's Greenhouse Gas Emission Projections 2018-2040. The report provides an assessment of Ireland's progress towards achieving its emission reduction targets set under the EU Effort Sharing Decision (Decision No 406/2009/EU) – i.e. to achieve a 20% reduction of non-Emission Trading Scheme (non-ETS) sector emissions, i.e. agriculture, transport, residential, commercial, non-energy intensive industry and waste, on 2005 levels with annual binding limits set for each year over the 2013-2020 period.

Greenhouse gas emissions are projected to 2020 using two scenarios; 'With Existing Measures' and 'With Additional Measures'. The 'With Existing Measures' scenario assumes that no additional policies and measures, beyond those already in place by the end of 2017 are implemented. The 'With Additional Measures' scenario assumes implementation of the 'With Existing Measures' scenario in addition to further implementation of Government renewable and energy efficiency policies and measures, as set out in the National Renewable Energy Action Plan (NREAP) and the National Energy Efficiency Action Plan (NEEAP).

The EPA Emission Projections Update notes the following key trends:

- 2019 greenhouse gas emission projections show total emission increasing from current levels by 1% and 6% by 2020 and 2030, respectively, under the 'With Existing Measures' scenario. Under 'With Additional Measures', emissions are estimated to decrease by 0.4% and 10% by 2020 and 2030, respectively;
- Under the 'With Existing Measures', emissions from Energy Industries are projected to increase by 31% between 2018 and 2030 to 15.4 Mt CO2eq. Under the 'With Additional

Measures', emissions between 2018 and 2030 are predicted to decrease by 27% to 8.6 Mt CO2eq;
- Under 'With Existing Measures', approximately 41% of electricity generation is projected to come from renewable energy sources by 2030. In the 'With Additional Measures' scenario, it is estimated that renewable energy generation increases to approximately 54% of electricity consumption; and
- In 2020, the sectors with the largest contribution of emissions are Agriculture, Transport and Energy Industries with 34%, 21% and 20% share in total emissions, respectively, under the 'With Additional Measures' scenario. In 2030 this is projected to change to 38%, 22% and 16% for these sectors, respectively, which reflects the growth in emissions from agriculture and reduction of emissions from power generation

Ireland has exceeded its annual binding limits in 2016 and 2017. Over the period 2013 – 2020, Ireland is projected to cumulatively exceed its compliance obligations by approximately 10.3 Mt CO2 (metric tonnes of Carbon Dioxide) under the "With Existing Measures" scenario and 9.2 Mt CO2 under the "With Additional Measures" scenario.

Notwithstanding, the EPA report acknowledges that *"A significant reduction in emissions over the longer term is projected as a result of the expansion of renewables (e.g. wind), assumed to reach 41-54% by 2030, with a move away from coal and peat"*. As such, there is a strong precedent for granting the CWFG's grid connection in order to facilitate the continued operation of the wind farms.

2.1.2 National Policy

2.1.2.1 National Policy Position on Climate Action and Low Carbon Development (2014)

The National Policy Position on Climate Action and Low Carbon Development, published by the Department of Environment, Community and Local Government in April 2014, provides a high-level policy direction for the adoption and implementation by Government of plans to enable the State to move to a low-carbon economy by 2050. The position paper acknowledges that the evolution of climate policy in Ireland will be an iterative process, based on the adoption by Government of a series of national plans over the period to 2050. Statutory authority for the plans is set out in the Climate Action and Low Carbon Development Act 2015.

2.1.2.2 Climate Action and Low Carbon Development Act (2015)

The Climate Action and Low Carbon Development Act 2015 was signed into law on 10th December 2015. The Act provides for the establishment of a national framework with the aim of achieving a low carbon, climate resilient, and environmentally sustainable economy by 2050, referred to in the Act as the "national transition objective".

The Act provides the tools and structures to transition towards a low carbon economy and it anticipates that it will be achieved through a combination of:

- A National Mitigation Plan (to lower Ireland's greenhouse gas emissions levels); - see below
- A National Adaptation Framework (to provide for responses to changes caused by climate change);
- Tailored sectoral plans (to specify the adaptation measures to be taken by each Government ministry); and
- Establishment of the Climate Change Advisory Council to advise Ministers and the Government on climate change matters.

2.1.2.1 National Mitigation Plan (2017)

Ireland's first statutory National Mitigation Plan (NMP), published in July 2017, gives effect to the provisions of the Climate Action and Low Carbon Development Act 2015, and represents a landmark national milestone in the evolution of climate change policy in Ireland and provides for the statutory basis for the transition to a low carbon, climate resilient and environmentally sustainable economy by 2050.

The NMP reaffirms Ireland's commitment to concerted and multilateral action to tackle climate change following Ireland's adoption of the legally-binding Paris Agreement. Under the Paris Agreement, and as noted previously, the EU is committed to reducing greenhouse gas emissions by at least 40% by 2030, compared with 1990 levels. The Paris Agreement represents a landmark accord in tackling climate change, which is recognised by all parties as the defining global issue of this generation.

The NMP outlines a range of measures to lay the foundations for transitioning Ireland to a low-carbon, climate-resilient and environmentally sustainable economy by 2050. The NMP reiterates that the objective of a low-carbon future will involve radically changing our behaviour as citizens, industry and Government and becoming significantly more energy-efficient. In this regard, the NMP is clear that Ireland has abundant, diverse and indigenous renewable energy resources, which will be critical to decarbonising our energy system, including electricity generation. The NMP confirms that *"Onshore wind has, to date, been the most cost-competitive renewable electricity technology in Ireland, accounting for 22.8% of overall electricity generation in 2015."*. Specifically, in relation to wind energy, the NMP notes the following:

> *"To date, wind energy has been the largest driver of growth in renewable electricity. The total amount of renewable generation connected to the grid at December 2016 was 3,120MW, of which wind generation was approximately 2,796MW, hydro was 238MW and biomass was 86MW19. EirGrid estimates that a total of between 3,900MW and 4,300MW of onshore renewable generation capacity will be required to allow Ireland to achieve 40% renewable electricity by 2020. This leaves a further requirement of between 780MW and 1,180MW to be installed by 2020 if the 2020 electricity target is to be reached, requiring an increased rate of installation."*

As discussed further below, Ireland is not projected to meet its 2020 electricity target, however, renewable energy generation projects as exemplified by the CWFG will continue to support the realisation of 2030 targets in the context of the NMP. Relevant to the grid connection for CWFG, the NMP notes that the transition towards a low-carbon economy requires engagement from stakeholders at all levels of Government, including those decisions made at the higher levels of planning governance.

2.1.2.2 National Adaptation Framework - Planning for a Climate Resilient Ireland (2018)

Ireland's first statutory National Adaptation Framework (NAF) was published on 19th January 2018. The NAF sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts. The NAF was developed under the Climate Action and Low Carbon Development Act 2015. The NAF builds on the work already carried out under the National Climate Change Adaptation Framework (NCCAF, 2012). It is detailed under the NAF that a number of Government Departments will be required to prepare sectoral adaptation plans in relation to the priority area that they are responsible for.

The Framework details that, as per the Intergovernmental Panel on Climate Change (IPCC, 2013), it was concluded that 95% probability that the global warming of the last 50 years is a result of human activities. It is acknowledged within the Framework that the main contribution to this warming has come from the burning of fossil fuels.

- Climate change will have diverse and wide-ranging impacts on Ireland's environment, society, economic development, including managed and natural ecosystems, water resources, agriculture and food security, human health and coastal infrastructures and zones;
- Sufficient robust information exists nationally to further progress the process of implementing adaptation actions and increasing social, economic and environmental resilience to climate change;
- Uncertainties exist in relation to the extent and rate of future climate change. Addressing uncertainties is a challenge, but should not be read as an excuse for inaction as there is overall agreement on the robustness of trends and projections; and
- The impacts and risks of climate change can be reduced and managed through mitigation and adaptation actions

The Framework provides a number of guiding principles for adaptation at national level, regardless of how successful efforts to mitigate greenhouse gas emissions (GHG) emissions prove to be, as the impact of climate change will continue over the coming decades due to the delayed impacts of past and current emissions. The Framework concludes that there is limited choice in the context of climate change other than to implement adaptation measures simultaneously with on-going mitigation measures (e.g. the continued development and integration of renewable energy infrastructure) to deal with the unavoidable climate change impacts and associated economic, environmental and social costs. It is detailed that:

> *"Adaptation not only depends on action by all levels of government but also on the active and sustained engagement of all stakeholders, including sectoral interests, the private sector, communities and individuals. Everybody has a role to play in making sure Ireland is taking appropriate adaptation action to achieve a climate resilient future. This is a joint responsibility where "climate proofing" our country is an undertaking for which all of society is responsible and everyone has a role to play.*"

This policy ethos is broadly recognised at all levels of governance as indicated by varied and comprehensive climate change / renewable energy policies and objectives.

2.1.2.3 Report of the Joint Committee on Climate Action Climate Change: A Cross-Party Consensus for Action (2019)

In March 2019, the Joint Committee on Climate Action Change released a report detailing a cross party consensus for action. The report in its introduction notes that *"Irelands performance in meeting international obligations has to date been poor"* (Refer to Section 2.1.1.5). The Report highlights on-going concern regarding emission projections and growing evidence that Ireland, who is not projected to meet its 2020 targets, is also off track in meeting its 2030 targets under the Kyoto protocol and the EU Directives.

The committee recommended that new climate change legislation be enacted by the Oireachtas in 2019. The following recommendations have been listed:

1. *A target of net zero economy-wide GHG emissions by 2050;*
2. *A provision for a 2030 target, consistent with the GHG emissions reduction pathway to 2050 to be set by 2020 by Statutory Instrument requiring the formal approval of both Houses of the Oireachtas following receipt of advice from the Climate Action Council;*
3. *Provision for five-yearly carbon budgets, consistent with the emissions reduction pathway to 2030 and 2050 targets, to be set by Statutory Instrument requiring the formal approval of both Houses of the Oireachtas following receipt of advice from the Climate Action Council; and*
4. *A target for the renewable share of electricity generation of 70% by 2030.*

Further to this, the Committee acknowledged that the measures which are currently in place, in addition to those suggested within the Report, remain insufficient in meeting Ireland's targets and further action is required. The report states that the transformation of Ireland's energy system will be required for the country to meet its future 2030 and 2050 GHG emission targets; specifically, to reach net zero emissions by 2050, Ireland will be required to fully decarbonise electricity generation. Therefore, there is a clear incentive for developing Ireland's capacity in renewable energies and renewable electricity in particular.

The Report details that onshore wind energy is currently the primary source of renewable electricity within Ireland, accounting for 84% of renewable power generated in 2017. While acknowledging that there are challenges in relation to securing additional on-shore wind energy, the Committee emphasises its support for the increased provision of on-shore wind farm development at appropriate locations as wind energy has a pivotal role to play in achieving climate action targets. As the operation of CWFG and its grid connection works have not resulted in significant environmental / ecological impacts, it is considered that he subject grid connection are appropriately located and should, in the context of the need for development, be granted permission for their continued use.

2.1.2.4 Climate Action Plan 2019

The Climate Action Plan 2019 (CAP) was published on the 1st of August 2019 by the Department of Communications, Climate Action and Environment. The CAP sets out an ambitious course of action over the coming years to address the impacts which climate may have on Ireland's environment, society, economic and natural resources. Similar to Joint Committee on Climate Action Change's Report, the Plan clearly states that Ireland must significantly step up its commitments to tackle climate disruption.

Chapter 1 of the CAP sets out the nature of the challenge which Ireland faces over the coming years. The CAP notes that the evidence for the warming of the climate system is beyond dispute with emerging evidence indicating that global average temperatures having increased by more than 1 °C since pre-industrial times. These changes are predicted to result in extensive direct and indirect harm to Ireland and its people, as well as to other countries more exposed and less able to withstand the associated impacts, which are predicted to include:

- Rising sea-levels threatening habitable land and particularly coastal infrastructure;
- Extreme weather, including more intense storms and rainfall affecting our land, coastline and seas;
- Further pressure on our water resources and food production systems with associated impacts on fluvial and coastal ecosystems;
- Increased chance and scale of river and coastal flooding;
- Greater political and security instability;
- Displacement of population and climate refugees;
- Heightened risk of the arrival of new pests and diseases;
- Poorer water quality;
- Changes in the distribution and time of lifecycle events of plant and animal species on land and in the oceans; and
- Acknowledgement that the pollutants associated with climate change are also damaging to human health.

In the context of the above challenges, the overall aim of the CAP is to deliver a step-change in Ireland's emissions performance over the coming decade such that EU targets for 2030 are met and the country will in a position to successfully achieve its mid-century decarbonisation objectives. Figure 2.1 below depicts Ireland's decarbonisation pathway up to the year 2030. The below will be used to manage Ireland's decarbonisation pathway and details the path for the various sectors:

Sector	Technology	NDP 2030	Uptake to meet 2030 targets (Based on MACC analysis) 2025	Uptake to meet 2030 targets (Based on MACC analysis) 2030
Electricity	**Total RES in Generation mix[4], %**	**55**	**52**	**70**
	• Onshore wind, GW	~7	~6.5	~8.2
	• Offshore wind, GW	1.8	~1.0	~3.5
	• Solar PV, GW	1.5	~0.2	~0.4
Transport	**Electric Vehicles, #**	**498,000**	**181,500**	**936,000**
	• Passenger EVs, #	355,000	57,000	550,000
	• Passenger PHEVs, #	118,000	94,000	290,000
	• Electric delivery vans, #	19,000	30,000	61,000
	• Electric trucks, #	n.a	0	34,000
	• Electric buses, #	1,250	500-600	1,000-1,200
	Bioethanol blend, Volume	**E10**	**E10**	**E10**
	Biodiesel blend, Volume	**B12**	**B12**	**B12**
Built Environment	**Retrofitted homes[1], cumulative 2021-30, #**	**450,000**	**300,000**	**500,000**
	Electric heating sources, total residential, #	**370,000**	**350,000**	**600,000**
	• New buildings, #	200,000	50,000	200,000
	• Existing buildings, #	170,000	300,000	400,000
	Electric heating sources, total commercial, #	**15,000[3]**	**15,000**	**25,000**
Enterprise	**Emissions, $MtCO_2eq.$**	**9**	**8**	**8**
	• Alternative fuels in cement fuel mix, %	N/A	65%	80%
	• CO2-neutral heat generation in food industry[2], %	N/A	~70%	~80%
Agriculture	**Emissions, $MtCO_2eq.$**	**21**	**19**	**18**
	• Fertilizers CAN replacement, %	N/A	40%	50%
	• Trailing-shoe slurry spreading, %	N/A	30%	50%
Other (e.g. waste)	**Emissions, $MtCO_2eq.$**	**3.2**	**3.2**	**3.2**

"Solar PV, some electrification of busses, and biofuel blending are identified in 2030 the NDP scenario but are not showing as cost-effective in MACC. Despite MACC analysis these technologies may remain in plan given other factors (e.g., exchequer cost, ease of implementation, need for public sector leadership)

1 Retrofit to B2 BER fabric equivalent
2 Includes biomass and electricity
3 Not specified in NDP, estimated based on residential ratio
4 RESS competitive auction determines the final mix

Figure 2.1. Irelands Decarbonisation Pathway Dashboard to 2030

Relevant to the current development, Chapter 7 of the CAP details the plans views surrounding electricity. Within Ireland, electricity accounted for 19.3% of Ireland's greenhouse gases in 2017. The CAP notes the following in this regard:

> *"It is important that we decarbonise the electricity that we consume by harnessing our significant renewable energy resources by doing this we will also become less dependent on imported fossil fuels."*

In 2017, a total of 30.1% of electricity produced in Ireland came from renewable sources whilst the target to be achieved by 2020 is set at 40%. The CAP goes on to note that *'given our 40% target is based on a percentage of total energy demand, rising demand makes meeting our 2020 target even more challenging and latest forecasts indicate we may miss this target by 3 to 4 percentage points'.* Specifically, the rapid growth of electricity demand in the country is projected to increase by 50% above existing capacity in the next decade. As Ireland will likely miss its 2020 targets, the continued decarbonisation of the energy network remains an essential component of this strategy in the context of 2030 and 2050 targets.

With regard to policy measures to date, the CAP notes that current frameworks will not achieve the level of decarbonisation required in the electricity sector to meet the 2030 emissions reduction targets. As such, it is listed that *'we must 'reduce our electricity sector emissions to 4-5 Mt in 2030'.* In relation to emissions, the CAP states:

> *"In 2017, emissions from electricity were 12 Mt and in 2030, despite implementation of Project Ireland 2040 measures, emissions are projected to be 8 Mt. This clearly demonstrates the need for a significant step-up in ambition over existing policy, not only to meet our 2030 targets, but to set us on course to deliver substantive decarbonisation of our economy and society by 2050."*

Key Metrics	2017	2025 Based on MACC	2030 Based on NDP	2030 Based on MACC
Share of Renewable Electricity, %	~30%[20]	52%	55%	70%
Onshore Wind Capacity, GW	~3.3	6.5	N/A	8.2
Offshore Wind Capacity, GW	NA	1.0	N/A	3.5
Solar PV Capacity, GW	NA	0.2	N/A	0.4
CCGT Capacity, GW	~3.6	5.1	N/A	4.7

Figure 2.2. Potential Metrics to Deliver Abatement in Electricity

In the electricity sector, reaching a 70% share of renewable electricity would require 50-55% emissions reduction by 2030. Under Section 7.2 of the CAP, the following targets have been set out:

- Reduce CO_2 eq. emissions from the sector by 50–55% relative to 2030 Pre-NDP projections;
- Deliver an early and complete phase-out of coal- and peat-fired electricity generation;
- Increase electricity generated from renewable sources to 70%, indicatively comprised of:
  - at least 3.5 GW of offshore renewable energy
  - up to 1.5 GW of grid-scale solar energy
  - up to 82 GW total of increased onshore wind capacity
- Meet 15% of electricity demand by renewable sources contracted under Corporate PPAs

Achieving 70% renewable electricity by 2030 will involve increasing renewable electricity generation, reinforcing the existing grid network (including greater interconnection to allow electricity to flow between Ireland and other countries) and putting systems in place to manage intermittent sources of power, especially from wind. Ultimately, the measures needed to deliver the 2030 targets centre on the increased harnessing of renewable energy. As indicated above in Figure 2.2, CAP identifies a need for 8.2GW of onshore wind generation and states that in 2017 there was 3.3GW in place, therefore Ireland needs to more than double its installed capacity of wind generation. The loss of the CWFG from Ireland's deployable onshore wind farm fleet would result in a direct negative impact on current output, and furthermore, the continued progression towards future targets. Accordingly, the CAP presents clear and unequivocal support for the grant of permission for CWFG's grid connection in order to maintain Ireland's progress towards complete decarbonisation of its energy network.

2.2 Renewable Energy Policy and Targets

2.2.1 Renewable Energy Resources

Renewable energy resources include solar, wind, water (hydropower, wave and tidal), heat (geothermal) and biomass (wood, waste) energy. These sources are constantly replenished through the cycles of nature, unlike fossil fuels, which are finite resources that are becoming increasingly scarce and expensive to extract. Renewable energy resources offer sustainable alternatives to Ireland's dependency on fossil fuels as well as a means of reducing greenhouse gas emissions and opportunities to reduce our reliance on imported fuels. These resources are abundantly available in Ireland, yet only a fraction has been tapped so far[1]. A gradual shift towards increasing our use of renewable energy resources would result in:

- Reduced carbon dioxide emissions;
- Secure and stable energy for the long-term;
- Reduced reliance on fuel imports; and
- Investment and employment in our indigenous renewable energy projects; often in rural and underdeveloped areas.

As described above, renewable energy development is recognised as a vital component of Ireland's strategy to tackle the challenges of combating climate change and ensuring a secure supply of energy. Ireland is heavily dependent on the importation of fossil fuels to meet its energy needs, with imported fossil fuels accounting for 66% of Ireland's dependency in 2017 at an estimated cost of €4 billion. This high dependency on energy imports is highly risky and Ireland is currently extremely vulnerable both in terms of meeting future energy needs and ensuring price stability[2].

2.2.2 EU Legislation

The European Union (EU) Directive on the Promotion of the Use of Energy from Renewable Sources (Directive 2009/28/EC) was adopted on 23rd April 2009. The Directive establishes the "20-20-20" targets: a binding target of a minimum 20% reduction in greenhouse gas emissions based on 1990 levels, 20% of overall EU energy consumption to come from renewable sources by 2020, as well as a binding 10% minimum target for energy from renewable resources in the share of transportation fuels and 20% reduction in primary energy use compared with projected levels by improving energy efficiency.

Directive 2009/28/EC legally obliges each Member State to:

- Ensure that its 2020 target is met.
- Introduce "appropriate measures" and outline them in a National Renewable Energy Action Plan (NREAP). The "appropriate measures" include ensuring that grid-related measures and administrative and planning procedures are sufficient to achieve the 2020 target. The NREAP for Ireland was published in June 2010.

These targets represent an important first step towards building a low-carbon economy, and ultimately, a completely decarbonised system by 2050. They are also headline targets of the Europe 2020 strategy for smart, sustainable and inclusive growth. This recognises that tackling climate and energy challenge contributes to the creation of jobs, the generation of "green" growth and a strengthening of Europe's competitiveness.

Ireland's mandatory target under the Directive is for renewable resources to account for 16% of total energy consumption by 2020. This will be met by 40% from renewable electricity, 12% from renewable heat and 10% from the renewable transport sector. The Sustainable Energy Authority of Ireland (SEAI) has acknowledged that:

'Meeting Ireland's 2020 renewable energy and energy efficiency targets will put Ireland on a low-carbon pathway to meet future targets in 2030 and 2050. An EU-wide reduction of 40% by 2030 has already been agreed by Member States. The EU, along with several other Member States, have set out ambitions to reduce greenhouse gas emissions by 80% to 95% by 2050, compared with 1990 levels.'

Although Ireland will effectively miss its above '20-20-20' targets, the continued progression towards a '*safe, secure, sustainable and affordable energy*', will still benefit the country's overall transition to a low-carbon economy.

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[1] *Sustainable Energy Authority of Ireland (SEAI) website, www.seai.ie*
[2] *'Energy in Ireland 2018 Report', SEAI, December 2018*

2.2.2.1 2030 Climate and Energy Framework

The 2030 Climate and Energy Framework (adopted by EU leaders in October 2014) marks further development of EU renewable energy policy. The framework defines further EU wide targets and builds on the 2020 climate and energy package.

The Framework sets three key targets for the year 2030:

- A binding commitment at EU level of at least 40% domestic Green House Gas reduction by 2030 compared to 1990;
- An EU wide, binding target of at least 27% renewable energy by 2030; and
- An indicative EU level target of at least 27% energy efficiency by 2030.

The European Commission published its proposal for an effort sharing regulation on the allocation of national targets for greenhouse gas emissions for the period 2021-2030 in July 2016. The proposal implements EU commitments under the Paris agreement on climate change (COP21), discussed above in Section 2.1.1.3, and marks an important milestone in the allocation to Member States of a package of climate targets formally adopted as part of the 2030 Climate and Energy Framework.

On the 27th of June 2018 EU ambassadors endorsed the provisional agreement reached by the Bulgarian Presidency on the revision of the renewable energy directive. The new regulatory framework is expected to pave the way for Europe's transition towards clean energy sources such as wind, solar, hydro, tidal, geothermal, and biomass energy. The agreement sets a headline target of 32% energy from renewable sources at EU level for 2030. Other key elements of the agreement include:

- The design of support schemes will provide for a possibility of technology specific support, aligned with state aid guidelines. The opening of renewable support towards neighbouring member states will be voluntary, at an aspirational pace of at least 5% between 2023 and 2026 and 10% between 2027 and 2030. Except for certain cases, member states will be obliged to issue guarantees of origin.
- Permit granting procedures will be simplified and streamlined with a maximum of two years for regular projects and one year in case of repowering, both extendable for an additional year in case of specific circumstances and notwithstanding environmental and judicial procedures. For small-scale projects below 10.8kW simple notification procedures will apply. Each member state may choose to apply simple notification procedures also to projects up to 50kW.
- The annual increase of energy from renewable sources in heating and cooling will be 1.3 percentage points indicatively, or 1.1 percentage points if waste heat is not taken into account.
- Via obligations on fuel suppliers, renewables will reach a level of at least 14% in transport by 2030, supplemented by a set of facilitative multipliers to boost renewables in different sectors.

The grant of permission for the CWFG grid connection will ensure that the forward progression toward these above targets is not lost, but rather, ensures that the current deployment of renewable wind energy is maintained and built upon going into the future.

2.2.2.2 Energy Roadmap 2050

The Energy Roadmap 2050 was published by the European Commission in 2011 and analyses the transition of the contemporary energy system in ways that would be compatible with the greenhouse gas reductions targets as set out in the Renewable Energy Directive (Directive 2009/28/EC) while also increasing competitiveness and security of supply. To achieve these targets and objectives, the Roadmap states that significant investments will need to be made in new low-carbon technologies and renewable energy, e.g. wind energy infrastructure, energy efficiency and grid infrastructure. Five main routes are identified to achieving a more sustainable, competitive and secure energy system in 2050:

- High Energy Efficiency;
- Diversified Supply Technologies;
- High Renewable Energy Sources;
- Nuclear energy; and
- Carbon capture and storage.

The analysis found that decarbonising the energy system is technically and economically feasible. The Roadmap notes that all scenarios show the biggest share of energy supply technologies in 2050 comes from renewables. The share of renewable energy sources (RES) rises substantially in all scenarios; specifically, RES achieves at least 55% in gross final energy consumption in 2050, up 45 percentage points from 2011's level at around 10%. As such, a major prerequisite for a more sustainable and secure energy system is a higher share of renewable energy beyond 2020. Each of the scenarios assumes in the analysis that increasing the share of renewable energy and using energy more efficiently are crucial, irrespective of the particular energy mix chosen.

2.2.2.3 Progress on Targets

The overall share of renewables in primary energy generation stood at 9.3% in 2017, up from 7.9% in 2016. The target for Ireland is set at 16% share of renewable energy in gross final consumption (GFC) by 2020. As per SEAI National Energy Projections 2019, the contribution from renewables in 2005 was 2.8%, which, as of 2017, has risen to 10.6% of the GFC. Specifically, the share of electricity from renewable energy has increased fourfold between 2005 and 2017 – from 7.2% to 30.1% – an increase of 23 percentage points over 12 years. In absolute terms, there has been a fivefold increase in the volume of renewable electricity generated from 1,873 GWh in 2005 to 8,877 GWh in 2017. Of this, it was noted that wind energy accounted for 84% of the renewable electricity in 2017, which includes output from the CWFG.

The June 2018 *'Off Target Report'* published by the Climate Action Network (CAN) Europe, which ranks EU countries ambition and progress in fighting climate change, listed Ireland as the second worst performing EU member state in tackling climate change. It also stated that Ireland is set to miss its 2020 climate and renewable energy targets and is also off course for its 2030 emissions target. The report states:

> *"Ireland has failed to prepare effective policies to align near-term climate action with EU and Paris Agreement commitments. Without new, immediate and substantive efforts to cut emissions, Ireland faces annual non-compliance costs of around €500 million."*

The Department of Climate Change, Action & Environment (DCCAE) also reported in their '*Fourth Progress Report on the National Renewable Energy Action Plan'* December 2017 that Ireland will achieve 13% of its 16% RES target by 2020. SEAI in their report '*Ireland's Energy Targets – Progress, Ambition & Impacts'* (April 2016) estimated that Ireland's inability to achieve its 2020 renewable energy targets will result in fines of between €65 million and €130 million per percentage shortfall on its overall binding target after 2020 until it meets its targets.

The Climate Change Advisory Council similarly notes within their *2019 Annual Review* that while the share of renewable electricity generation, particularly wind, is increasing in Ireland, the pace of decarbonisation of the electricity generation sector is not compatible with a low-carbon transition to 2050. As such, Ireland can continue to 'comply' with EU targets by purchasing emission allowances; however, the expenditure of public funds to do so would not result in any domestic benefit, and furthermore, would result in a more difficult and expensive challenge for the county to meet its future 2030 targets and beyond. The *Review* concludes that continued and additional investment in capacity and technologies in the renewable energy sector is required to reach these said targets.

Figure 2.3 below shows the latest data available for the share of renewable energies in gross final energy consumption according to the Eurostat online data and the targets that have been set for 2020. The share of renewables in gross final energy consumption stood at 18% in the EU-28 in 2018. The data shows that twelve member states have reached a share equal to or above their 2020 target. This is not the case with Ireland who, as evident in Figure 2.3, are still considerably below meeting its 2020 target. Per the 2018 data Ireland were at 11.1% of its 16% target.

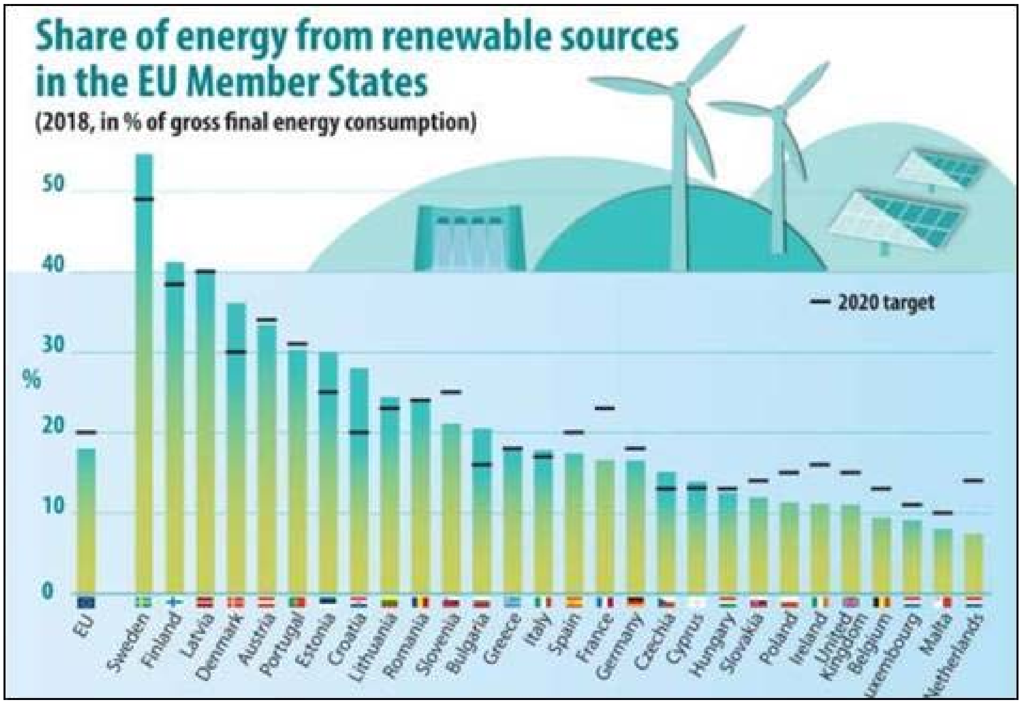

Figure 2.3. Share of energy from renewable sources (2018)
(Source:https://ec.europa.eu/eurostat/documents/2995521/10335438/8-23012020-AP-EN.pdf/292cf2e5-8870-4525-7ad7-188864ba0c29)

EirGrid in their 'All Island Generation Capacity Statement 2019 - 2028' (September 2019), state that, in the absence of the National Energy and Climate Plan 2021 – 2030, it is assumed that renewable targets will be achieved largely through the deployment of additional wind powered generation in Ireland. New wind farms commissioned in Ireland in 2018 brought the total wind capacity to over 3666 MW, contributing to the increase in overall RES-E percentage to 32.5%, with wind energy accounting for 27.6%. EirGrid estimates that between 3.9 – 4.4 Gigawatts (GW) of wind may be required to meet the 2020 Renewable Energy Supply - Electricity (RES-E) target of 40%. The most likely scenario for installed wind capacity in 2020 is expected to be 4200 MW which would imply an average build-out of approximately 330 MW per year until the end of 2020 to achieve targets. In this context, the loss of CWFG's output would be detrimental towards Ireland's overall capability to meet its future targets.

It is noted by EirGrid within their 2019 – 2028 statement that, at a median demand level, Ireland does not have adequate generation capacity to meet demand from 2026 once Moneypoint closes, and should any other plant close prior to this, earlier deficits may arise. This is especially pertinent with regard to the recent announcement that the Electricity Supply Board intends to close the peat-fired Shannonbridge and Lough Ree Power Stations at the end of 2020.

The key driver for electricity demand in Ireland for the next number of years is the connection of new large energy users, such as data centres. Specifically, there is currently 1000 MVA demand capacity that is contracted to data centres and other large energy users. This statement notes that *'Large industrial connections normally do not dominate a country's energy demand forecast but this is the case for Ireland at the moment'.* EirGrid analysis shows that demand from data centres could account for 29% of all demand by 2028 in a median demand scenario (accounts for the connection of all 1400MVA of potential demand in the connection process). The median demand scenario is now higher than last year's forecast for high demand, indicating the progression of many of the data centre projects. It should be noted that each MW of additional data centre load will add at least 1 MW of wind to the 40% RES-E 2020 target[3]. Alternatively, 3 MW of wind could be required per MW of data centre electricity demand, if the data centre wants to commit to being powered by 100% renewable energy. Many data centres have made such commitments and have well-publicised company policies to use only renewable electricity for their power needs.

In October 2015, the Irish Wind Energy Association (IWEA) commissioned a study titled *'Data-Centre Implications for Energy Use in Ireland'* and concluded that an additional 1 GW of electricity demand may be required in Ireland by 2020 due to growth in data centres.

2.2.2.4 SEAI National Energy Projections 2019

The SEAI National Energy Projections 2019, published in May 2019, acknowledges the significant increase in renewable energy share in Ireland over the past number of years. The report details that in 2005, 5% of Ireland's energy came from renewable sources, and in 2019, it is estimated that approximately 13% of Irelands energy will be generated by renewable sources, which includes output from the CWFG. Notwithstanding, this current progress is below the required 16% target. The report details that there is still a significant way to go to achieve Ireland's European target of 16%, and consequently, Ireland will unlikely meet EU 2020 targets. Compared to other European countries, Ireland was 22nd out of the EU-28 for overall renewable energy share and 26th out of the EU-28 for progress towards overall 2020 renewable energy target.

- 38.9% renewable electricity by 2020 (target is 40%);
- 9.8% renewable heat by 2020 (target is 12%); and
- 10.8% renewable transport by 2020 (target is 10%)

It is assumed that future renewable targets and future commitments will be achieved largely through the deployment of additional wind powered generation. In 2018 according to the SEAI, over 500 MW of wind generation was installed which resulted in wind generation accounting for 25.2% of the electricity generated. Wind generation is now the second largest source of electricity generated after natural gas.

In the context of climate change the report details that:

> *"Climate change is now recognised as the biggest threat to life on earth, and it is now urgent that we take immediate action to reduce anthropogenic emissions of greenhouse gases to limit its damaging effects."*

Although Ireland has had considerable success in increasing the share of renewables in electricity generation, there continues to be a need for further achievement within this sector in order to take full advantage of the country's abundant renewable resources. It is detailed that '*given the cumulative nature of emissions, an immediate acceleration of emissions reductions is required to put Ireland on the committed long-term trajectory*'. Specifically, the report notes that,

> *"Increased ambition and delivery targets supporting a sustainable energy transition are anticipated to be included in the upcoming All of Government Climate Action Plan being produced by DCCAE."*

It is noted under the strategy that to achieve the level of ambition set for 2020, but more importantly at this stage, 2030, Ireland will be dependent on:

[3] *Data centres have high load factors of around 80%. Ech 1MW uses 24 x 365 x 80% = 7GWh. EU targets require that 40% or 3GWh of that should come from renewables. A 1MW wind turbine produces roughly 3GWh/yr.*

- Increased deployment rates of sustainable energy technologies and practices across the entire economy;
- The development of a national training and skills strategy to support growth of the clean energy technology sector;
- Support for changes in business models, nascent clean energy technology supply chains and the addressing of existing market failures;
- Early resolution of planning and regulatory barriers, including continued public engagement, and the development of appropriate market structures – especially for electrification of heat and transport supported with high levels of renewable electricity;
- Significant mobilization of private investment in renewable energy and energy efficiency –additional spend on efficiency is known to achieve multiple benefits including warmer, healthier and more cost effective buildings;
- The acceleration of innovation and technology adoption, especially in the area of electricity demand response, grid flexibility and storage;
- The exploitation of advances in ICT and national strengths in this field to advance renewables and energy efficiency, particularly in relation to passenger mobility solutions;
- Aggressively adopting the 'avoid, shift and improve' transport energy policy principles – this involves managing mobility demand to avoid trips or a shift to the most efficient modes, plus improving the energy efficiency of vehicles as well as reducing the carbon intensity of fuels;
- Taking in the ethical cost of carbon consideration in all aspects of public and private enterprise planning, involving the enforcement of the polluter pays principle by including the negative external costs associated with emissions such as healthcare or environmental reparation costs;
- An approach to carbon neutrality in the agriculture and land-use sector, including forestry, that does not compromise capacity for sustainable food production; and
- The promotion of an environmentally aware and concerned citizen and community ideology to combat climate change, including recognition of the impact of diet and consumerism on climate change.

2.2.3 National Policy on Renewable Energy

2.2.3.1 Ireland's Energy Policy Framework 2007-2020

The Government White Paper entitled '*Delivering a Sustainable Energy Future for Ireland: The Energy Policy Framework 2007 – 2020*' was published by the Department for Communications, Marine and Natural Resources in 2007. Currently, c. 69% of Irish energy requirements are imported, as described in Section 2.2.1 above. Combined with our peripheral location in Europe, this situation leaves Ireland vulnerable to supply disruption and imported price volatility, as stated in the White Paper. The primary objectives of the Government's energy policy are security of supply, environmental sustainability and economic competitiveness. The Framework sets out clear actions, targets and timeframes for meeting these interlinked objectives.

Ireland's energy policy priorities are framed in the context of the European Union. Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources sets a target for Ireland for 16% of energy consumption to come from renewable sources by 2020. The 2007 Government White Paper sets a more ambitious target of 33% for energy consumption from renewable sources by 2020. This target was further increased to 40% by the Minister for Communications, Energy and Natural Resources, in 2008 as part of the Government's strategy to make the "green economy" a core component of its economic recovery plan.

In Ireland, it is widely acknowledged that the vast majority of the renewable electricity requirement is expected to be met through the development of indigenous wind power as Ireland has a strong wind resource potential, with one of the best onshore wind speed averages in Europe ('The Value of Wind Energy to Ireland', Pőyry, 2014). In 2017, wind energy accounted for 84% of renewable electricity generation, which included output from CWFG. This represents an average growth rate of 12% between 2010 – 2017 with a record of 532 MW of wind-generation capacity installed in 2017 (SEAI 2019).

The Energy White Paper 2007 states that renewable energy will be a critical and growing component of Irish energy supply to 2020 and beyond. The Government's strategic goals for sustainable energy include addressing climate change by reducing energy-related greenhouse gas emissions and accelerating the growth of renewable energy sources. Renewable energy and enhanced efficiency in power generation are integral to the Government's strategy to deliver Ireland's climate change targets under the Kyoto Protocol. The Paper states:

> *"Renewable energy is an integral part of our climate change strategy and sustainability objectives. The additional diversity which renewables bring to Ireland's energy demand will also make a direct contribution to our goal of ensuring secure and reliable energy supplies."*

2.2.3.2 Strategy for Renewable Energy 2012-2020

The Department of Communications, Energy and Natural Resources publication, *Strategy for Renewable Energy 2012 – 2020*, outlines the strategic goals which underpin the Government's energy and policy objectives. The Strategy articulates the key actions to be undertaken to support the development of each of the renewable energy sectors to deliver on Ireland's binding 2020 targets under the Renewable Energy Directive. It acknowledges the national importance of developing renewable energy and confirms the Government's commitment to this.

The Strategy sets out 5 no. strategic goals, the first of which is as follows:

> *"Strategic Goal 1 - Progressively more renewable electricity from onshore and offshore wind power for the domestic and export markets."*

At present, the CWFG only produces electricity for the domestic market.

In order to achieve the above goal, the Strategy sets out a number of key actions, including the following:

- Support delivery of the 40% target for renewable electricity through the existing GATE processes. A further targeted Gate may be developed, if necessary, following a review of the take-up of Gate 3 offers, while developing a next phase plan led approach for additional onshore capacity in future;
- Review with the Department of Environment and CER the scope for further streamlining authorisation and planning processes for renewable energy projects; and
- Implement REFIT 2 for onshore renewable energy and maintain a predictable and transparent REFIT support framework for onshore wind which is cost competitive.

2.2.3.3 White Paper on 'Ireland's Transition to a Low Carbon Energy Future' 2015 - 2030

On 12th May 2014, the Green Paper on Energy Policy in Ireland was launched which marked the start of a public consultation process on the future of Ireland's energy policy over the medium to long-term. The Department of Communications, Climate Action & Environment acknowledged that energy is an integral part of Ireland's economic and social landscape and that "*a secure, sustainable and competitive energy sector is central to Ireland's ability to attract and retain Foreign Direct Investment and sustain Irish enterprise. The three key pillars of energy policy are to focus on security, sustainability and competitiveness*".

Following on from an extensive consultation process, a Government White Paper entitled '*Ireland's Transition to a Low Carbon Energy Future 2015-2030*' was published in December 2015 by the

Department of Communications, Energy and Natural Resources. This Paper provides a complete energy update and a framework to guide policy up to 2030. The Paper builds upon the White Paper published in 2007 and takes into account the changes that have taken place in the energy sector since 2007.

The policy framework was developed to guide policy and actions that the Irish Government intends to take in the energy sector up to 2030 and also reaching out to 2050 to ensure a low carbon future that maintains Ireland's competitiveness and ensures a supply of affordable energy. The Energy Vision 2050, as established in the White Paper, describes a '*radical transformation*' of Ireland's energy system which will result in GHG emissions from the energy sector reducing by between 80% and 95%, compared to 1990 levels. The paper advises that a range of policy measures will be employed to achieve this vision with emphasis on the generation of electricity from renewable sources, which there are plentiful indigenous supplies and increasing the use of electricity and bio energy to heat homes and fuel transport.

In this White Paper, the DCENR acknowledges that onshore wind is one of the cheapest forms of renewable energy in Ireland, stating that:

> *"Onshore wind continues to be the main contributor (18.2% of total generation and 81% of RES-E in 2014). It is a proven technology and Ireland's abundant wind resource means that a wind generator in Ireland generates more electricity than similar installations in other countries. This results in a lower cost of support."*

The grant of permission for the existing grid connection will directly contribute to Ireland's on-going progression towards its 2030 and 2050 targets, and the affordability of its energy supply, by ensuring that CWFG remains operational and continues to export renewable electricity to the local and wider region.

2.2.3.4 National Wind Energy Guidelines

DoEHLG Wind Energy Guidelines (2006)

In June 2006, the then Department of Environment, Heritage and Local Government (DoEHLG) published '*Wind Energy Development Guidelines for Planning Authorities'* (the Guidelines) under Section 28 of the Planning and Development Act, 2000. The aim of these guidelines was to assist the proper planning of wind power projects in appropriate locations around Ireland. The Guidelines highlight general considerations in the assessment of all planning applications for wind energy. Specifically, they set out advice to planning authorities on planning for wind energy through the development plan process and in determining applications for planning permission. They also contain guidelines to ensure consistency of approach throughout the country in the identification of suitable locations for wind energy development.

It is the case that each wind project has its own characteristics and defining features, and therefore, it was acknowledged that it was impossible to write specifications for universal use. It is noted that the guidelines should be applied practically and do not replace existing national energy, environmental and planning policy. The Department of the Environment, Community and Local Government published proposed revisions to the guidelines in December 2013 as part of a targeted review relating to Noise, Proximity and Shadow Flicker for discussion. The Department is continuing this review and Draft Revised Guidelines were published in December 2019.

Relevant to the existing development, the Guidelines establish several design criteria for grid connections between wind energy development and the national grid, which have been reproduced below:

- Power line connections between turbines and from turbines to the control building should be underground;
- Power lines should be interred alongside turbine access roads in order to minimise spatial extent of soil/hydrological and vegetation damage/ disturbance;
- The cost of underground connection from the compound to the national grid is generally prohibitive. This connection can thus be above ground in all but the most sensitive landscapes; and
- In order to reduce visual impact, connections should preferably be carried on wooden poles rather than lattice towers, except where necessary for changes in direction and within the compound

The majority of the subject CWFG grid connection are underground cables laid in the public roads as described by the Guidelines. There are, however, reasonable exceptions to this within the existing grid connection route due to existing infrastructure and associated sensitivities within the surrounding environment:

- The initial connection to the Crory 110 kV substation comprises an underground cable along private access road corridor (c. 500 metres);
- The final connection to Ballycadden Wind Farm is an underground cable installed in a private road, a track and fields (c. 1,000 metres); and
- The final connection to Gibbet Hill Wind Farm is an underground cable routed across a private road, a track and fields (c. 800 metres)

As indicated above, the installation of these sections of underground cable still primarily utilise access roads / tracks where feasible in order to minimise environmental disturbance during construction. Due to the requirement for a road opening licence and the absence of significant impacts for the current operation of the CWFG (as detailed within this rEIAR), it is reasonable to assume that construction of the grid connections has complied with relevant health and safety and traffic management requirements. There is also a linked section of cable connection between Knocknalour and Ballynancoran Wind Farms that comprises an overhead power line, consisting of three overhead lines supported by standard single wooden poles across fields, for c. 2 km in distance.

The existing grid connection is considered compliant with these design guidelines with deviations considered both reasonable and appropriate in the context of the surrounding environment.

IWEA Best Practice Guidelines for the Irish Wind Energy Industry (2012)

The Irish Wind Energy Association (IWEA) published updated Wind Energy Best Practice Guidelines for the Irish Wind Industry in 2012. The guidelines aim to encourage and define best practice development in the wind energy industry, acting as a reference document and guide to the main issues relating to wind energy developments. The purpose of the guidelines is to encourage responsible wind farm development, which takes into consideration the concerns of local communities, planners and other interested groups. The guidelines outline the main aspects of wind energy development with emphasis on responsible and sustainable design and environmental practices on aspects of development which affect external stakeholders and good community engagement practices. In approaching the development of IWEA's guidelines, the aim was to be complementary to the Department of the Environment Heritage and Local Government's 'Wind Energy Development Guidelines' (2006).

Further details on the scoping and consultations undertaken as part of this rEIAR are presented in Section 2.8 below.

Interim Guidelines for Planning Authorities on Statutory Plans, Renewable Energy and Climate Change (2017)

In July 2017, the Department of Housing, Planning, Community and Local Government (DoHPCLG) published '*Interim Guidelines for Planning Authorities on Statutory Plans, Renewable Energy and Climate Change'* under Section 28 of the Planning and Development Act 2000. Planning authorities are obliged to have regard to guidelines issued pursuant to Section 28 in the performance of their functions under the Planning and Development Act 2000 (as amended).

The guidelines state that it is a specific planning policy requirement under Section 28(1C) of the Act that, in making a development plan with policies or objectives that relate to wind energy developments, a Planning Authority must:

1. *"Ensure that overall national policy on renewable energy as contained in documents such as the Government's 'White Paper on Energy Policy - Ireland's Transition to a Low Carbon Future', as well as the 'National Renewable Energy Action Plan', the 'Strategy for Renewable Energy' and the 'National Mitigation Plan', is acknowledged and documented in the relevant development plan or local area plan;*
2. *Indicate how the implementation of the relevant development plan or local area plan over its effective period will contribute to realising overall national targets on renewable energy and climate change mitigation, and in particular wind energy production and the potential wind energy resource (in megawatts); and*
3. *Demonstrate detailed compliance with item number (2) above in any proposal by them to introduce or vary a mandatory setback distance or distances for wind turbines from specified land uses or classes of land use into their development plan or local area plan. Such a proposal shall be subject to environmental assessment requirements, for example under the SEA and Habitats Directives. It shall also be a material consideration in SEA, when taking into account likely significant effects on climatic factors, in addition to other factors such as landscape and air, if a mandatory setback or variation to a mandatory setback proposed by a planning authority in a development plan or local area plan would create a significant limitation or constraint on renewable energy projects, including wind turbines, within the administrative area of the plan."*

Department Circular PL5/2017

On the 3rd of August 2017, the Department of Housing, Planning and Local Government issued Circular PL5/2017 to provide an update on the review of the wind energy and renewable policies in development plans. The circular also provided an update on the advice contained within a previous Departmental Circular PL20-13. Circular PL20-13 advised that local authorities should defer amending their existing Development Plan policies in relation to wind energy and renewable energy, generally, as part of either the normal cyclical six-yearly review or plan variation processes and should instead operate their existing development plan policies and objectives until the completion of a focused review of the Wind Energy Development Guidelines 2006. The new circular (PL05/2017) reconfirms that this continues to be the advice of the Department.

The Department circular also sets out the four key aspects of the preferred draft approach being developed to address the key aspects of the review of the 2006 Wind Energy guidelines as follows:

- The application of a more stringent noise limit, consistent with World Health Organisation noise standards, in tandem with a new robust noise monitoring regime, to ensure compliance with noise standards;
- A visual amenity setback of 4 times the turbine height between a wind turbine and the nearest residential property, subject to a mandatory minimum distance of 500 metres between a wind turbine and the nearest residential property;
- The elimination of shadow flicker; and
- The introduction of new obligations in relation to engagement with local communities by wind farm developers along with the provision of community benefit measures.

The release of Circular Letter PL05/2017 and the Interim Guidelines coincide with the publication of Ireland's first statutory National Mitigation Plan (previously discussed above).

Commission for Regulation of Utilities: Grid Connection Policy (2018)

The Commission for Regulation of Utilities (CRU) (previously the Commission for Energy Regulation (CER)) launched a new grid connection policy in March 2018 for renewable and other generators, known as ECP-1, which will seek to allow *"shovel ready"* projects that already have a valid planning permission, connect to the electricity networks. The principal objective which guides this decision is to facilitate greater opportunities for advanced projects to connect to the network in addition to the preparing for future, more regular batches for connection. In August 2018, the applicants for new connection capacity under ECP-1 were published. The CRU is expected to launch the second round of grid connection offers knows an ECP-2 in the middle of 2020.

The enduring connection policy regime replaces the previous 'Gate' system of grid connection applications. The grid connection application window under ECP-1 is the first time since 2007 that certain renewable energy projects, including wind farms, have an opportunity to secure a new grid connection offer.

It is important to note that the construction and operation of the CWFG, including the subject grid connection, were approved by the Commission for Regulation of Utilities (CRU) through the issuing of Authorisation to Construct Consents and Generating Licenses.

Draft Revised Wind Energy Development Guidelines (2019)

The Department of Housing, Planning and Local Government published the Draft Wind Energy Guidelines (referred to as the Draft Revised Guidelines) in December 2019 and these Draft Guidelines were under public consultation (until 19th February 2020). Following the previous 2013 consultation and subsequent detailed engagement between the relevant Government Departments, a "preferred draft approach" to inform and advance the conclusion of the review of the 2006 guidelines was announced in June 2017 (previously discussed above).

The Draft Revised Guidelines clearly sets out that the recognition that the proper planning and sustainable development of areas and regions must be taken into account when local authorities prepare their development plans and assess planning applications, irrespective of the significant role renewable energy has to play in tackling climate change. The Draft Revised Guidelines note that potential impacts of wind energy development proposals on the landscape, including the natural and built environment, must be considered along with the legitimate concerns of local communities. With this in regard, and in line with the previously stated "preferred draft approach", the 2019 Draft Guidelines primarily focus on addressing a number of key aspects including, but not limited to:

- Acceptable noise thresholds and monitoring frameworks;
- Visual amenity setback and spacing;
- Control of shadow flicker;
- Compliance with Community consultation and dividend requirements, as included within the obligatory Community Report; and
- Consideration of the siting, route and design of the grid connection as part of the whole project.

Similar to the 2006 Guidelines, the Draft Revised Guidelines also note that underground grid connections for wind energy projects are considered the most appropriate environmental and/or engineering solution (e.g. default approach), particularly in sensitive landscapes.

- Power line connections between turbines and from turbines to the control building and from the compound to the national grid should be underground, except where specific ground conditions would prevent this; and
- Power lines should be interred alongside turbine access roads in order to minimise spatial extent of soil/hydrological and vegetation damage/ disturbance.

As indicated above, the Draft Revised Guidelines note that there may be cases where specific circumstances prevent the feasibility of undergrounding cables approach. Where undergrounding is being pursued, the Draft Revised Guidelines state that the proposal should demonstrate that environmental impacts are minimised:

- Habitat loss as a result of removal of field boundaries and hedgerows (right of way preparation) followed by topsoil stripping (to ensure machinery does not destroy soil structure and drainage properties);
- Short to medium term impacts on the landscape where, for example, hedgerows are encountered;
- Impacts on underground archaeology;
- Impacts on soil structure and drainage; and
- Impacts on surface waters as a result of sedimentation

As discussed within the relevant rEIAR chapters, the installation and operation of the CWFG and the subject grid connection, both underground and overhead components, has not resulted in any significant impacts on the above environmental receptors, and it is considered to be compliant with the "preferred draft approach" as articulated by the Department in June 2017, and the current Draft Revised guidelines.

2.3 Strategic Planning Context

2.3.1 National Policy

2.3.1.1 National Planning Framework (2018)

The National Planning Framework (NPF), published in February of 2018, aims to shape and guide the future growth and development of Ireland up to 2040. The sets out five strategic actions:

- Developing a new region-focused strategy for managing growth;
- Linking this to a new 10-year investment plan, the Project Ireland 2040 National Development Plan 2018-2027;
- Using state lands for certain strategic purposes;
- Supporting this with strengthened, more environmentally focused planning at local level; and
- Backing the framework up in law with an Independent Office of the Planning Regulator.

The NPF forms the top tier of the national planning policy structure which establishes the policy context for the Regional Spatial and Economic Strategies and local level development plans. In an effort to move away from developer led development to one informed by the needs and requirements of society, a number of objectives and policies have been put in place in order for the country to grow and develop in a sustainable manner. The NPF notes that the population of Ireland is projected to increase by approximately 1 million people by 2040 which will result in a population of roughly 5.7 million. This population growth will place further demand on both the built and natural environment. In order to strengthen and facilitate more environmentally focused planning at the local level, the NPF states that future planning and development will need to

> "*Tackle Ireland's higher than average carbon-intensity per capita and enable a national transition to a competitive low carbon, climate resilient and environmentally sustainable economy by 2050, through harnessing our country's prodigious renewable energy potential.*"

The Framework notes that while the overall quality of the country's environment is good, it is not without challenges. It acknowledges that the manner in which we plan for the potential challenges, e.g. sustaining and increasing renewable energy generation, will be important in how we create a sustainable environment for the future.

> *"While the overall quality of our environment is good, this masks some of the threats we now face. Key national environmental challenges include the need to accelerate action on climate change, health risks to drinking water, treating urban wastewater, protecting important and vulnerable habitats as well as diminishing wild countryside and dealing with air quality problems in urban areas. It is also important to make space for nature into the future, as our population increases."*

The NPF seeks to achieve ten strategic priorities surrounding:

1. *Compact Growth*
2. *Enhanced Regional Accessibility*
3. *Strengthened Rural Economies and Communities*
4. *Sustainable Mobility*
5. *A Strong Economy, supported by Enterprise, Innovation and Skills*
6. *High-Quality International Connectivity*
7. *Enhanced Amenity and Heritage*
8. *Transition to a Low Carbon and Climate Resilient Society*
9. *Sustainable Management of Water and other Environmental Resources*
10. *Access to Quality Childcare, Education and Health Services*

Relevant to the CWFG and the subject grid connection, the **National Strategic Outcome 8** (*Transition to Sustainable Energy*), notes that in creating Ireland's future energy landscape, new energy systems and transmission grids will be necessary to enable a more distributed energy generation which connects established and emerging energy sources, i.e. renewables, to major sources of demand. Specifically, the NPF notes that reinforcement of the distribution and transmission network to facilitate planned growth and distribution of a more renewables focused source of energy, e.g. the subject grid connection, across the major demand centres. Ireland's national energy policy under **Objective 55** aims to 'promote renewable energy use and generation at appropriate locations within the built and natural environment to meet national objectives towards achieving a low carbon economy by 2050'. Through this, it is noted that there are three pillars of focus which must be considered:

1. *Sustainability;*
2. *Security of supply;*
3. *Competitiveness.*

The NPF highlights the important role which the Southern region will have in promoting a sustainable renewable energy supply and has been noted as a key future planning and development priority. It notes that '*harnessing the potential of the regions in renewable energy terms across the technology spectrum from wind and solar to biomass, where applicable, wave energy, focusing in particular on the extensive tracts of publicly owned peat extraction areas in order to enable a managed transition of the local economies of such areas in gaining the economic benefits of greener energy*'. The government recognises that they must reduce greenhouse gas emissions which come from the energy sector by at least 80% by 2050 when compared to 1990 levels while ensuring a secure supply of energy, which the continued operation of the CWFG will contribute towards.

In association with the above obligations, the NPF identifies and details the key need for the long-term sustainability of the environment. The NPF notes that it aims to ensure that decisions that are made today meet our future needs in a sustainable manner.

> *"The manner in which we plan is important for the sustainability of our environment. Our planning system has influence across a wide range of sectors, both directly and indirectly and interacts with many common issues related to effective environmental management, including water services, landscape, flood risk planning, protection of designated sites and species, coastal and marine management, climate mitigation and adaptation, and land use change."*

The Government will address environmental and climate challenges through the following overarching aims as listed under '*Resource Efficiency and Transition to a Low Carbon Economy*':

- Sustainable Land Management and Resource Efficiency
- Low Carbon Economy
- Renewable Energy
- Managing Waste

In order to meet legally binding targets agreed at EU level (as discussed above), it is a national objective for Ireland to make a transition and become a competitive low carbon, economy by the year 2050. To aid in meeting these targets, the NPF notes that the Government will aim to '*integrate climate considerations into statutory plans and guidelines in order to reduce vulnerability to negative effects and avoid inappropriate forms of development in vulnerable areas*'. Accordingly, it is envisioned that the national strategy will be supported, implemented and translated through the planning hierarchy by the local development plans and regional strategies.

Key Sustainability Elements of National Planning Framework

A key theme underpinning the NPF is the fostering of a transition toward a low carbon, climate-resilient society. In this regard, one of the key elements of the NPF is an Ireland which has a secure and sustainable renewable energy supply and facilitates the ability to diversify and adapt to new energy technologies. The NPF further references the National Climate Policy Position which established the fundamental national objective of achieving transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050. In relation to energy production, the NPF emphasises that rural areas, such as the Ferns, Co. Wexford, are have a strong role to play in securing a sustainable renewable energy supply for the country and acknowledges that *"rural areas have significantly contributed to the energy needs of the country and continue to do so"*. In this regard, the NPF states:

> *"In meeting the challenge of transitioning to a low carbon economy, the location of future national renewable energy generation will, for the most part, need to be accommodated on large tracts of land that are located in a rural setting, while also continuing to protect the integrity of the environment".*

Section 9 of the NPF addresses the theme of *"Realising Our Sustainable Future"* and sets out a number of National Policy Objectives under this subject, with a key focus on resource efficiency and the transition towards a low carbon economy. In relation to climate action and planning, the NPF reiterates the commitment of the Government to a long-term climate policy based on the adoption of a series of national plans over the period to 2050, informed by UN and EU policy, and progressed through the National Mitigation Plan and the National Climate Change Adaptation Framework.

Key features identified in the NPF to facilitate the transition towards a low carbon energy future include:

- A shift from predominantly fossil fuels to predominantly renewable energy sources;
- Increasing efficiency and upgrades to appliances, buildings and systems;

- Decisions around development and deployment of new technologies relating to areas such as wind, smart grids, electric vehicles, buildings, ocean energy and bio energy; and
- Legal and regulatory frameworks to meet demands and challenges in transitioning to a low carbon society.

The NPF further emphasises that new energy systems and transmission grids will be necessary for a more distributed, more renewables focused energy generation system to harness the considerable on-shore and off-shore potential from energy sources such as wind, wave and solar and *"connecting the richest sources of that energy to the major sources of demand"*. The NPF recognises that the development of on-shore and off-shore renewable energy is critically dependent on the development of enabling infrastructure including grid facilities to connect to major sources of energy demand.

In achieving this desired National Strategic Outcome of a transition to sustainable energy, the NPF reiterates the following national policy target of delivering *"40% of our electricity needs from renewable sources by 2020 with a strategic aim of in excess of 50% by 2030 and more by 2040 and beyond using wind, wave, solar, biomass and hydro sources".*

2.3.1.2 Draft Renewable Electricity Policy and Development Framework (2016)

The Renewable Electricity Policy and Development Framework has been formulated to ensure Ireland meets its future needs for renewable electricity in a sustainable manner compatible with environmental and cultural heritage, landscape and amenity considerations.

The Framework will contribute toward meeting Ireland's future energy needs, particularly up to 2030 and beyond, as informed by national and European policy, and will be reviewed at five-yearly intervals. The Policy and Development Framework will be primarily for the guidance of An Bord Pleanála, planning authorities, other statutory authorities, the general public and persons seeking development consent in relation to large scale projects for the generation of renewable electricity on land. It will set out policy in respect of environmental considerations, community engagement and the potential, future export of renewable electricity. It will seek to broadly identify suitable areas in the State, where large-scale renewable electricity projects can be developed in a sustainable manner.

The existing system for planning permission applications to local authorities or An Bord Pleanála will remain unchanged in respect of renewable electricity projects. These will still require planning permission including environmental impact assessment, where appropriate. It is proposed that the Policy and Development Framework will be focused on providing for renewable electricity projects of large scale. It is considered that a threshold of 50 MW and upwards would be appropriate, having regard to the provisions of the strategic infrastructure development legislation.

In July 2018, tenders for the provision of consultancy services for Strategic Environmental Assessment (SEA), Appropriate Assessment (AA) and related services including spatial planning, landscape and visual assessment in relation to the framework were requested. The tender documentation circulated has indicated that the updated REPDF will have the following objectives:

- To maximise the sustainable use of renewable electricity resources in order to develop progressively more renewable electricity for the domestic and potentially, for future export markets;
- To assist in the achievement of targets for renewable energy, enhance security of supply and foster economic growth and employment opportunities. It will identify appropriate parts of the country for large renewable electricity projects and will assess the environmental impact of renewable electricity projects at various scales at a national level;
- To identify strategic areas on land for large scale renewable energy generation and this analysis will include a spatial component; and

- In addition, the amended scope will include renewable electricity projects below this threshold (including wind and solar PV) at a national level.

The updated scope will also include an assessment of available grid capacity in relation to the location of large and medium-scale renewable electricity generation plants.

2.3.2 Regional Policy

The strategic objectives of the National Spatial Strategy, superseded by the NPF, are implemented at a regional level by the Southern Regional Assembly's Regional Spatial and Economic Strategy (RSES). The Project is located within the administrative boundary of Wexford County Council which is part of the Southern Regional Assembly (SRA) as of January 2015.

The SRA covers 9 no. counties, including Carlow, Tipperary, Waterford, Wexford, Kilkenny, Cork, Kerry, Clare and Limerick.

2.3.2.1 Regional Spatial & Economic Strategy for the Southern Region

The Southern Regional Assembly has a recognised leadership role in setting out regional policies and coordinating initiatives which support the delivery and implementation of the NPF. The primary vehicle for this is the preparation and implementation of the Regional Spatial and Economic Strategy (RSES). One of the principal functions of the SRA is to deliver the RSES which considers both spatial and economic factors within the regional planning framework.

Adopted on the 31st of January 2020, the principal statutory purpose of the RSES is to support the implementation of the Project Ireland 2040 NPF / National Development Plan and the economic policies and objectives of the Government. The RSES aims to builds on the region's strengths and potential to become a more prosperous, sustainable, climate resilient and attractive region for the benefit of all its people. up to 2040 and beyond. The RSES Vision includes the following objectives:

- Nurture all our places to realise their full potential;
- Protect, and enhance our environment;
- Work to achieve economic prosperity and improved quality of life for all our citizens;
- Successfully combat climate change;
- Achieve economic prosperity and improved quality of life for all citizens;
- Accommodate expanded growth and development in suitable locations; and
- Make the Southern Region one of Europe's most creative, innovative, greenest and liveable regions.

The RSES notes that planning policy and objectives must incorporate resilience and adaptability to ensure that the Region are agile and responsive to change. As set out within the Strategy, climate change represents the most serious threat to human life and the environment; specifically, the RSES acknowledges that,

> *"If action is not taken on a global scale, global warming will continue to change weather patterns, cause sea levels to rise, threaten the future of entire nations and pose wider risks in terms of degradation of biodiversity, and threaten the planet's ability to provide adequate food and shelter for the human population."*

At present, Irish per capita GHG emissions are among the highest in Europe and the Government has identified '*Climate Change as the most important long-term challenge facing Ireland' with a stated commitment to 'the transformation required to achieve a low carbon resilient future'*. Transition to a low carbon energy future will require a wide range of policy responses across industry and public sectors, including electricity. To achieve national and EU targets in the context of the electricity sector, the RSES notes that further investment is required in measures to develop alternative renewable energies with greater interconnection to energy resources. Both the NPF and RSES emphasise, however, that the planning process is well placed to implement and integrate climate change objectives.

De-carbonising electricity to achieve binding international targets will require investment in measures to develop alternative renewable energies with greater interconnection to energy resources. This key enabling action is captured under *Strategic Aim 8* which sets out the need to *safeguard and enhance the environment through sustainable development, prioritising action on climate change across the region, driving the transition to a low carbon and climate resilient society*.

The RSES sets out a number of Regional Policy Objectives (RPOs) designed to facilitate greater integration of renewables into the National Grid. The RSES notes that there is significant potential to use renewable energy across the Region to achieve climate change emission reduction targets. As such, the RSES supports renewable industries and requirements for transmission and distribution infrastructure.

- **RPO 87 (Low Carbon Energy Future)**: The RSES is committed to the implementation of the Government's policy under Ireland's Transition to a Low Carbon Energy Future 2015-30 and Climate Action Plan 2019. It is an objective to promote change across business, public and residential sectors to achieve reduced GHG emissions in accordance with current and future national targets, improve energy efficiency and increase the use of renewable energy sources across the key sectors of electricity supply, heating, transport and agriculture.
- **RPO 95 (Sustainable Renewable Energy Generation)**: It is an objective to support implementation of the National Renewable Energy Action Plan (NREAP), and the Offshore Renewable Energy Plan and the implementation of mitigation measures outlined in their respective SEA and AA and leverage the Region as a leader and innovator in sustainable renewable energy generation.
- **RPO 96 (Integrating Renewable Energy Sources)**: It is an objective to support the sustainable development, maintenance and upgrading of electricity and gas network grid infrastructure to integrate a renewable energy sources and ensure our national and regional energy system remains safe, secure and ready to meet increased demand as the regional economy grows.
- **RPO 99 (Renewable Wind Energy)**: It is an objective to support the sustainable development of renewable wind energy (on shore and offshore) at appropriate locations and related grid infrastructure in the Region in compliance with national Wind Energy Guidelines.
- **RPO 100 (Indigenous Renewable Energy Production and Grid Injection)**: It is an objective to support the integration of indigenous renewable energy production and grid injection.

An important element within the Southern RSES is the introduction of a regional scale approach to identifying and capitalising on renewable energy opportunities.

- **RPO 98 (Regional Renewable Energy Strategy)**: It is an objective to support the development of a Regional Renewable Energy Strategy with relevant stakeholders.

This policy instrument, if implemented correctly, could assist in facilitating a more consistent approach to renewable energy / wind strategies at the county level, and furthermore, could identify opportunities for large cross-county renewable schemes via stakeholder led collaboration.

The sustainable growth of the Southern Region requires the provision of services and infrastructure central to the RSES strategy which includes for provision of infrastructure and services in a sustainable, plan led manner to ensure the sustainable management of environmental resources. The RSES acknowledges that a '*safe, secure and reliable supply of energy*' is critical to a well-functioning region. As such, existing regional infrastructure represents major and on-going capital and infrastructural investment in strategic national assets and is considered by the RSES as essential for the continued provision of a secure and reliable electricity supply. The sustainable development of the Region, however, must also be balanced with consideration to natural heritage and biodiversity, particularly landscape. **RPO 129** notes that it is an objective of the Regional Authority to develop a *Regional Landscape Strategy* in order to facilitate landscape protection, management and change in the region.

At present, the RSES notes that the Region has *more* renewable energy generation than demand which indicates a strategic role for the region's energy assets in national energy generation and transmission. With projected increases in population and economic growth, the demand for energy is set to increase in the coming years. In the context of transitioning to a more energy efficient society and increasing renewable sources of energy, the RSES notes that there is a need to set a policy approach which address meeting national targets for renewable electricity generation, climate change and security of energy supplies, both regionally and nationally.

The RSES sets out a number of infrastructural Regional Policy Objectives, relevant to the subject grid connection between the CWFG and the national grid, which indicate that the Region is open to, and ready to invest in, renewable energy generation.

- **RPO 219 (New Energy Infrastructure)**: It is an objective to support the sustainable reinforcement and provision of new energy infrastructure by infrastructure providers (subject to appropriate environmental assessment and the planning process) to ensure the energy needs of future population and economic expansion within designated growth areas and across the Region can be delivered in a sustainable and timely manner and that capacity is available at local and regional scale to meet future needs.
- **RPO 221 (Renewable Energy Generation and Transmission Network)**
  - A) Local Authority City and County Development Plans shall support the sustainable development of renewable energy generation and demand centres such as data centres which can be serviced with a renewable energy source (subject to appropriate environmental assessment and the planning process) to spatially suitable locations to ensure efficient use of the existing transmission network;
- **RPO 222 (Electricity Infrastructure)**: It is an objective to support the development of a safe, secure and reliable supply of electricity and to support and facilitate the development of enhanced electricity networks and facilitate new transmission infrastructure projects that might be brought forward in the lifetime of this plan under EirGrid's (2017) Grid Development Strategy (subject to appropriate environmental assessment and the planning process) to serve the existing and future needs of the Region and strengthen all-island energy infrastructure and interconnection capacity.

As identified above by the RSES, the Southern Regional Assembly strongly supports renewable wind energy development such as the Project in order to ensure a '*safe, secure and reliable supply of electricity*' for the region. The successful implementation of the Project will contribute to the successful transition to a low carbon economy.

2.3.3 Local Policy – County Development Plans

The Project is located within the administrative boundary of Wexford County Council, and therefore, the Wexford County Development Plan 2013 – 2019 is considered the most pertinent planning resource in demonstrating the 'local' appropriateness of the subject grid connection. However, the existing grid connection is located c. 250m south from the County Wicklow border at its closest point. In order to undertake a comprehensive assessment of all relevant policy applicable to the subject development, the Wicklow County Development Plan 2016 – 2022 (as varied) was also assessed. The strategic analysis of both development plans in the context of the subject grid connection is set out below.

2.3.3.1 Wexford County Development Plan 2013 – 2019

The Wexford County Development Plan 2013 – 2019, hereafter referred to as the WCDP, is the principal instrument that is used to manage change in land use in the County. The Plan sets out the Council's intentions for the future development of land, including measures for the improvement of the natural and physical environment and the provision of infrastructure. It is important to note that the Council, as noted within the WCDP, intends to take a positive approach to development, unless there are '*strong, persuasive justifications for doing so having regard to European, national and regional policies'*. With reference to the above sections of this Chapter, justification of the appropriateness and strategic need of the subject grid connection is considered to have been adequately demonstrated, and furthermore, in compliance with European, national and regional policies and objectives.

The WCDP addresses a wide range of interrelated economic, social and environmental issues which share the same underlying themes of sustainable development and adapting to climate change. Within the WCDP, sustainable development has been defined as '*development which meets the needs of the present generation without compromising the ability of future generations to meet their own needs*'. Key considerations in assessing sustainable development include, but not limited to:

- The conservation of natural resources;
- Protection of the natural environment;
- Environmentally friendly patterns of development;
- Energy efficiency; and
- High quality design.

With regard to climate change adaptation, the WCDP states that the Council is committed to addressing climate change in a *proactive manner* through careful consideration of growth and development, such as facilitating the sustainable development of renewable energy resources. The Plan sets out the Strategic Vision of the county, '*Green-Smart-Sustainable*' and strategic aims for achieving this vision which, considered relevant to the subject grid connection, include the following:

- Promote the balanced and sustainable development of the urban and rural areas of the county for a range of residential, services and employment opportunities;
- Protect and enhance the county's unique natural heritage and biodiversity, while promoting and developing its cultural, educational and eco-tourism potential in a sustainable manner; and
- Harness the county's natural resources in a manner that is compatible with the sensitivity of rural areas, the existing quality of life, and the protection and enhancement of the county's natural heritage and biodiversity

Similar to the policy ethos established at the higher levels of governance, the WCDP notes its support for the development of sustainable renewable energy sources in order to reduce fossil fuel dependency and greenhouse gas emissions, and ultimately, facilitate the transition to a low carbon economy. It is acknowledged within the Plan that the development and use of renewable sources of energy, e.g. wind, is a sustainable solution to the climate change challenge:

> *"The energy potential of these resources can be harnessed to meet the energy needs of the county and perhaps can be exported as an economic output. The Council will prioritise the development of renewable energy resources and the maximisation of electricity production from renewable sources where possible."*

The WCDP acknowledges that the '*A reliable energy supply is essential for social and economic development*'; specifically, the Plan notes that Wexford's ability to deliver a *secure and uninterrupted sustainable* energy supply at a competitive cost is critical for the county to continue to attract inward investment and to provide a supportive environment for industry. The Economic Development Strategy within the WCDP further notes that the development, or in the case of the subject grid connection, maintenance of established renewable energy operations, can reduce the county's dependence on fossil fuels in addition to creating direct and indirect employment generation.

The overall objective of this Energy Programme is to ensure the **long term security of energy supply** which is competitively priced whilst meeting a high level of environmental standards. As such, it is noted that the Council will encourage the development of renewable energy resources and the maximisation of electricity production from renewable sources. As further discussed below, the Wind Energy Strategy for County Wexford 2013-2019 set a target of 255 MW of wind energy by 2019 which would enable the county to generate the equivalent of over 70% of electricity demand via wind whilst also contributing to the national target of 40% electricity consumption from renewables by 2020. The subject grid connection and the operation of the CWFG will have contributed directly to both the local 70% target and the overarching target of 40%. Renewable energy policies and objectives relevant to the subject grid connection are reproduced below:

- To facilitate the achievement of a secure and efficient energy supply and storage for County Wexford (**Objective EN01**);
- To promote County Wexford as a low carbon county by 2019 as a means of attracting inward investment and to facilitate the development of energy sources which will achieve low carbon outputs (**Objective EN02**);
- To encourage and favourably consider proposals for renewable energy developments and ancillary facilities in order to meet national, regional and county renewable energy targets and to facilitate a reduction in CO2 emissions and the promotion of a low carbon economy, subject to compliance with development management standards in Chapter 18 and compliance with Article 6 of the Habitats Directive (**Objective EN07**);
- To promote and facilitate wind energy development in accordance with Guidelines for Planning Authorities on Wind Energy Development (Department of Environment, Heritage and Local Government, 2006) and the Wind Energy Strategy which forms part of this Plan, subject to compliance with normal planning and environmental criteria and the development management standards contained in Chapter 18 (**Objective EN11**);
- To have regard to the any future Climate Change Action Plan for the South-East Region (**Objective CC02**);
- To prepare, in conjunction with other key stakeholders, a Climate Change Strategy for the county during the life time of the Plan (**Objective CC03**);
- To minimise greenhouse gas emissions in order to contribute to a reduction and avoidance of human induced climate change in accordance with the Kyoto agreement. The Council supports and is committed to the National Climate Change Strategy and in general to facilitating measures which seek to reduce emissions of greenhouse gases (**Objective CC04**)

The WCDP does, however, highlight that the sustainable development of renewable energy infrastructure cannot be facilitated at the expense of other considerations, such as the landscape (**Objectives L03**) or Wexford's tourism sector (**Objective TM01**). It is important to again note that the construction and operation of the subject grid connection has not resulted in any significant environmental impacts as further discussed within the remainder of the rEIAR. Furthermore, the operation of the CWFG as a whole contributed to the increased growth of renewable generated electricity on the grid which has supplemented the on-going decarbonisation of the energy sector, an important component of the WCDP.

Wexford Landscape Character Assessment 2013 - 2019

The WCDP acknowledges that the county's landscapes offer a significant economic asset and sets out a broad aim to '*promote and enable appreciation of the county's landscapes and to minimise adverse visual impacts on these landscapes in the interests of the common good'*. However, the Council also appreciates that there is need for a balanced approach to ensure that future sustainable development within particular landscapes.

> *"The aim of the Strategy will be to put in place a framework to achieve a balance between active management, forward planning and the protection of Ireland's internationally renowned landscape as a physical, economic and cultural asset."*

The Landscape Character Assessment 2013 – 2019 (LCA) was undertaken by the Council to ensure that change to Wexford's landscape can be sustainably managed. The subject grid connection is located partly within designated "Uplands" (northern areas) and partly within designated "Lowlands" (southern areas) of the county. Relevant to these classification in the context of the development is **Objective L03**, '*To ensure that developments are not unduly obtrusive in the landscape, in particular in the Upland, River Valley and Coastal landscape units and on or in the vicinity of Landscapes of Greater Sensitivity'*. The 'Uplands' and 'Lowlands' classified landscapes, as defined below, are provided within the LCA:

- **Uplands**
  This landscape, which extends along the north-western and northern parts of the county, contains concentrations of more elevated and steeper land, ridges and skylines, which are very prominent in the overall landscape of the county and are generally more sensitive to development. This landscape unit has limited capacity to absorb development. Commercial wind farms have become a recent addition in recent years.
- **Lowlands**
  The Lowland area generally comprises gently undulating lands and relates to extensive areas of the county. This landscape has characteristics which provide it with a higher capacity to absorb development without causing significant visual intrusion although care still needs to be taken on a site by site basis, particularly to minimise the risks of developments being visually intrusive.

It is important to note that the subject grid connection is not routed within or in proximity to any 'Landscapes of Greater Sensitivity' (LGS), *landscapes and seascapes which have the most visual interest and prominence, and which are generally more sensitive to development*. The closest LGS is Carrigroe Hill, which is c. 9 km from the 110 kV Crory substation.

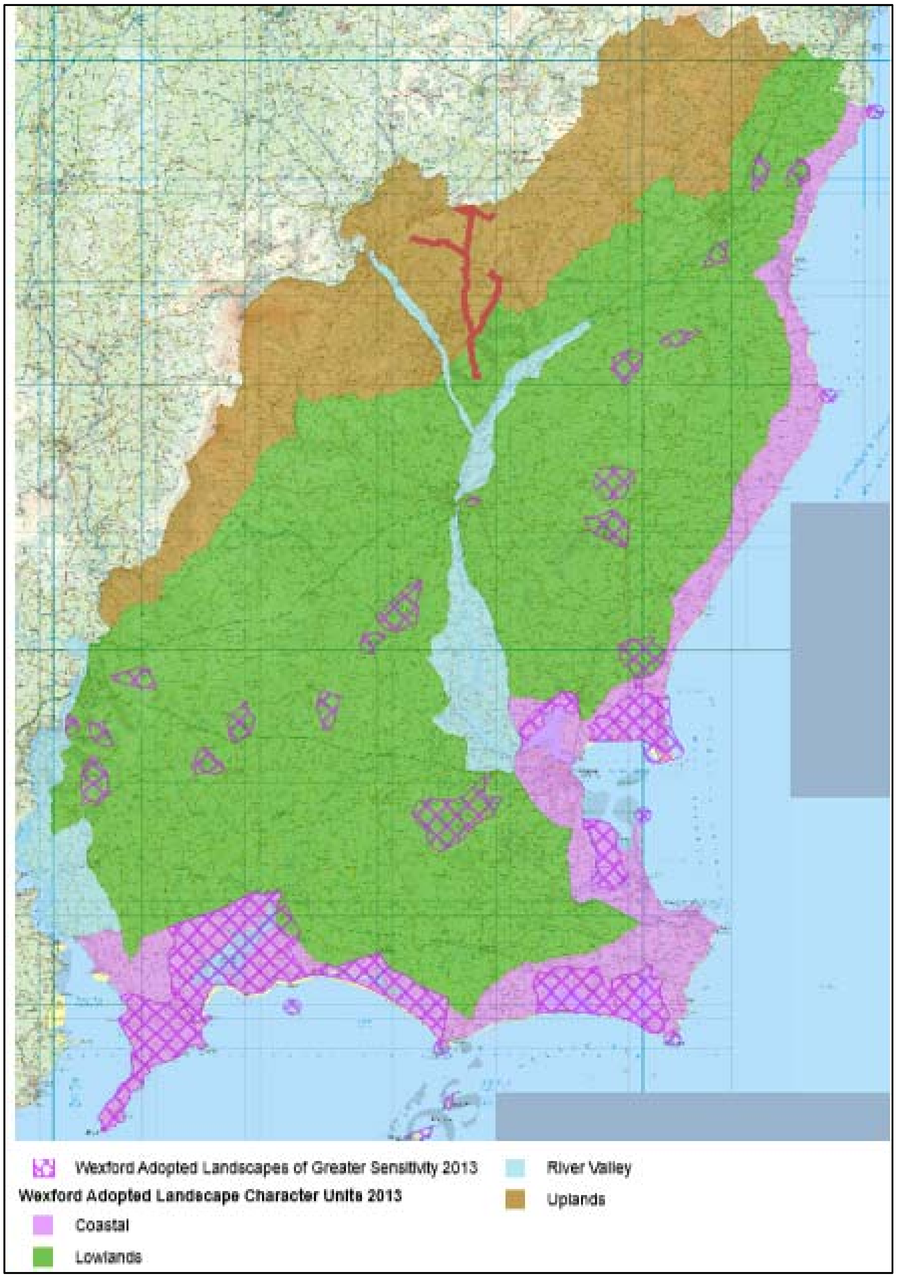

Figure 2.4. Landscape Character Assessment 2013 – 2019
Note: 'Red line' indicative of subject grid connection
Source: Wexford County Council

There is no evidence that the subject grid connection has interfered with any protected landscape character, views or prospects as the majority of the development is located underground. While the overhead section of the subject grid connection is located in the designated 'Uplands' area, prior assessment of the grid connection by An Bord Pleanála (ABP RL 3408/09/10/11) has effectively screened out its potential for significant impacts, as noted below:

> *"While the overhead section of the grid connections is located in the designated Uplands in the current Wexford County Development Plan it could not, in my view, be considered to interfere with this landscape character. As previously indicated this section comprises 3 no. cables strung to single wooden poles, similar in nature to the common electricity connections found across the countryside."*

The potential for landscape and visual impacts from the subject grid connection is further assessed in Chapter 10 (Landscape) of this rEIAR.

Wind Energy Strategy 2013 - 2019

The Wind Strategy 2013 – 2019, adopted as part of the WCDP, identifies areas of the county where wind farm developments are acceptable in principle or open for consideration based on wind speed, access to the electricity and transmission grids and avoidance of adverse impacts on the landscape and designated sites. The Wind Energy Strategy aims to achieve the following key objectives which are considered relevant to the subject grid connection:

- Ensure the security of energy supply by supporting, in principle and at appropriate scales and locations, the development of wind energy resources in the county;
- Promote the development of wind energy and other renewable energy sources in the county to meet national renewable energy targets (supplying a minimum of 40% of electricity consumption from renewable sources by 2020); and
- Work towards a target of 255 MW of wind energy, to enable County Wexford to make the initial steps toward a low carbon economy by 2020 and generate the equivalent of 70% of its electricity needs from wind energy.

At the time of publishing this strategy, County Wexford's share of Ireland's total installed wind capacity comprised five wind farms with a combined installed capacity of 151.85 MW which represents 6.75% of the total installed wind capacity in Ireland to date. Table 2.1 below indicates the current wind energy fleet in County Wexford as of January 2020.

Table 2.1. Installed Wind Energy Infrastructure within County Wexford

Wind Farm	Installed Capacity (MW)	Gate	Nearest 110 kV Substation
Ballywater	42	PG / 2	Crane
Castledockrell	41.4	2	Lodgewood
Gibbet Hill*	14.8	2	Crory
Ballycadden*	24.21	1 / 3	Crory
Knocknalour*	8.95	1 / 3	Crory
Ballyduff	4.6	2 / 3	Crory
Ballynancoran*	4	2	Crory
Ballaman	3.6	2	Crory
Richfield	27	PG	Wexford
Carnsore	11.9	PG	Wexford
Total: 182.46MW			
	Contracted		
Cranemore Single Wind Turbine	0.499	Non-GPA	Crane
Monaughrim Wind Farm	0.5	Non-GPA	Crane
Total: 1MW			

Note: (*) indicates those wind farms which comprise the Crory Wind Farm Group

As indicated above, the current portfolio of wind farms operating within County Wexford consists of 10 no. windfarms with a maximum installed capacity of 182.46MW, which represents an increase of c. 31MW since 2013. County Wexford currently exceeds its proportionate share of the national 40% renewables target for electricity in 2020 based on installed and permitted wind farm developments and is progressing towards over 50% of electricity consumption from renewable sources. The Wind Energy Strategy notes that County Wexford has the potential to support further additional wind energy developments in order to make a more '*significant contribution to the de-carbonising of Ireland's energy supply*'.

The Landscape Character Assessment (LCA), as discussed in the above section, was used to inform the Strategy; specifically, the landscape character units (Uplands and Lowlands) were used as a baseline to assess capacity for areas to accommodate wind farm development and the scale of wind farm development that may be acceptable within each unit. This baseline assessment of these landscape character units is reproduced below in Figure 2.5.

LCA	Characteristics	Wind Resources and Wind Farm Potential	Capacity of Landscape for Wind Farm Development	LCTs in 2006 Guidelines	Appropriate Size of Wind Farms
Uplands	Low intensity agriculture and stock rearing, coniferous forestry plantations and areas of transitional vegetation. Higher ground is characterised by poor drainage, higher wind/rainfall, limited vegetation and land use. This landscape contains elevated and steeper land, ridges and skylines, which are prominent in the overall landscape and which are generally more sensitive to development. Recently constructed wind farms have become a feature in this landscape.	Potential: High 220kV line runs through/adjacent to this area Areas of high wind speed Castledockrell wind farm (12 turbines) and Ballindaggin wind farm (6 turbines) are located in this area and permission has been granted for a further eight wind farms.	Limited capacity to absorb further development.	Mountain Moorland – may be inappropriate for wind energy development for reasons of natural heritage and the fact that some of these landscapes are of rare scenic quality and/or support some of the last wilderness areas of relatively pristine, unspoilt and remote landscapes.	No longer suitable – located in the Not Normally Permissible area.
Lowlands	Predominantly fertile lands with higher levels of population and intensive agriculture. Slope and topography occurs in a shallow / gradual transition. Extensive views across large fields. Number of prominent hills which provide more enclosure and 'punctuation' within the overall landscape.	Potential: Moderate to High 220kV and 110kV lines run through this area High wind speeds Richfield wind farm (18 turbines) is located in the southern part of this zone.	High capacity outside of the exclusion zones for settlements and the natural heritage designations. To avoid disproportionate visual impacts and considering the open, flat and often regular nature of the landscape, wind farm developments should be confined to specific areas of the region. Hence, cumulative visual impacts should be restricted to those locations and their surrounding environs and not affect viewsheds throughout the rest of the County.	Hilly and Flat Farmland – although hilly and flat farmland type is usually not highly sensitive in terms of scenery, due regard must be given to houses, farmsteads and centres of population.	There are opportunities to accommodate wind farm developments in the zoned areas subject to careful layout and siting that avails of topographical screening where possible.

Figure 2.5. LCA Baseline Assessment for Potential Wind Energy Infrastructure

Due to the number of existing and permitted wind farms, and having regard to the areas open for consideration for wind farm development in adjoining counties, the Wind Energy Strategy notes that the north-west of the county, which currently supports the subject grid connection and CWFG, will reach capacity in terms of wind farm development. Therefore, this region of the county has been included in the Not Normally Permissible area. However, it is important to reiterate that there is no evidence that the subject grid connection has interfered with any protected landscape character, views or prospects as the majority of the development is located underground whilst the overhead line component is similar in nature to the '*common electricity connections found across the countryside*'. In the context of County Wicklow, the region immediately north of the subject grid connection is classified by Wicklow County Council as 'Most Favourable' for wind energy development.

The Wind Energy Strategy also emphasises that all new wind farm developments will need to comply with a set of development management standards, which include pre-planning considerations, consultation with the local community, siting, layout and design, boundaries / fencing, access roads, ancillary structures and equipment, shadow flicker, noise and other environmental considerations (e.g. landscape, archaeology and cultural heritage). These considerations have already been comprehensively assessed under each individual planning application for the wind farms comprising the CWFG.

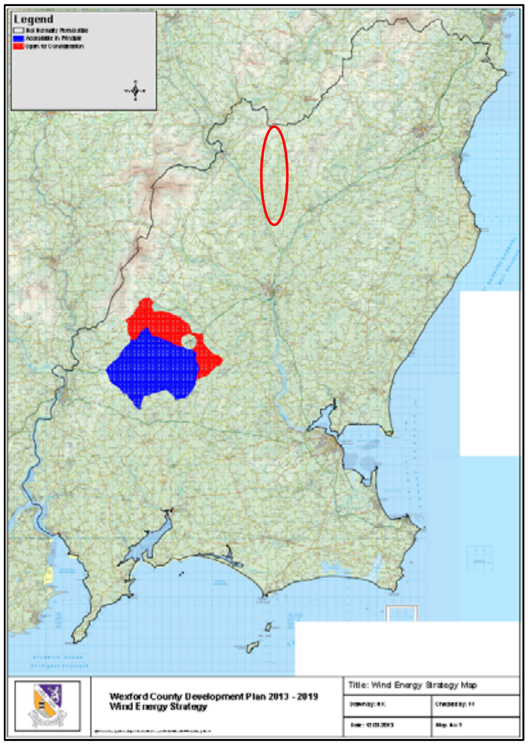

Figure 2.6. Wexford County – Wind Energy Infrastructure Zoning
Note: 'Red Eclipse' is indicative of subject grid connection

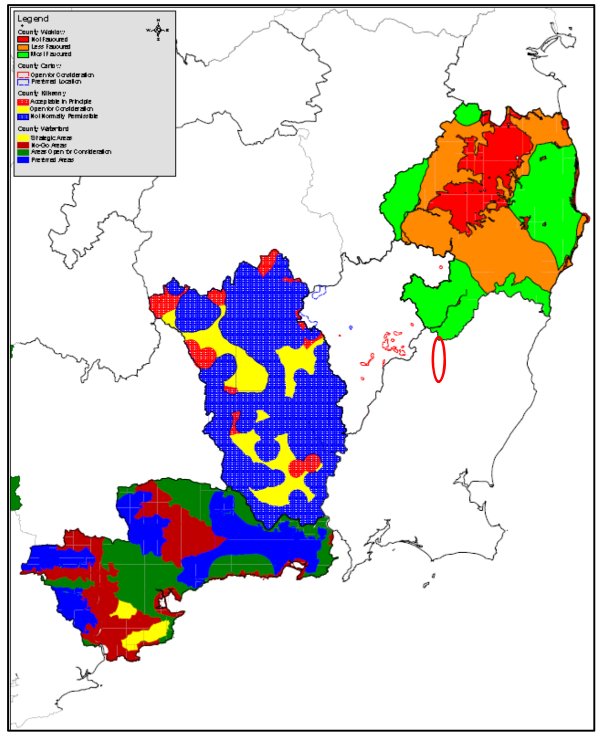

Figure 2.7. Wexford County – Wind Energy Infrastructure Zoning for Adjacent Counties.
Note: Red Eclipse' is indicative of subject grid connection

The Wind Energy Strategy identifies a number of wind energy objectives which the subject grid connection, and the continued operation of the CWFG, have historically and will continue to directly contribute towards:

- **Objective WE01**: Ensure the security of energy supply by supporting the development of wind energy resources in County Wexford at appropriate scales and in appropriate locations, subject to compliance with normal planning and environmental criteria and the development management standards;
- **Objective WE02**: Aim to achieve a target of 255 MW of wind energy, to enable County Wexford to make the initial steps toward a low carbon economy by 2020;
- **Objective WE03**: Facilitate wind energy development on appropriate sites in the county and work with the relevant agencies to encourage investment in research and technology associated with wind farms and other renewable energy technology; and
- **Objective WE04**: Favourably consider proposals for the development of infrastructure for the production, storage and distribution of electricity through the harnessing of wind energy in appropriate sites and locations, subject to relevant policy, legislation and environmental considerations and the development management standards

As described in full within this rEIAR, construction and operation of the grid connection has not given rise to any significant effects over and above those likely to arise from the wind farms or any other projects or plans that might be considered, with particular consideration towards landscape character, views and prospects, archaeological and preservation/conservation objectives. Specifically, the subject grid connection has been designed with regard to established best practice and installed in line with relevant health / safety and traffic management requirements as per granted road opening licences and supervision by ESB Networks. It is also important to note that the subject grid connection and CWFG have been approved by the CRU through the issuing of Authorisation to Construct Consents and Generating Licences.

2.3.3.2 Wicklow County Development Plan 2016 – 2022 (as varied)

The Wicklow County Development Plan 2016-2022, hereafter referred to as the WWCDP, sets out the overall strategy for the proper planning and sustainable development of County Wicklow for the plan period and beyond. The WWCDP provides for, and controls, the physical, economic and social development of the County, in the interests of the overall common good and in compliance with environmental controls. In the context of the subject grid connection, the Plan's policies and objectives regarding natural heritage and landscape are considered the most pertinent in this assessment.

Landscape Strategy

The WWCDP states that the landscape of the county is recognised as a national asset characterised as having a variety of landscape 'types' formed naturally over time. However, it is acknowledged that increasing development pressures over recent years has resulted in changes in the natural landscape, considered unprecedented in scale and nature. In response to these challenges, the Government set out guidelines for a landscape appraisal to ensure that '*the environment and heritage generally are maintained in a sustainable manner, while at the same time enabling a proactive approach to development*'. The following landscape policies and objectives are considered relevant to the subject grid connection:

- **NH49**: All development proposals shall have regard to the County landscape classification hierarchy in particular the key landscape features and characteristics identified in the Wicklow Landscape Assessment;
- **NH51**: To resist development that would significantly or unnecessarily alter the natural landscape and topography, including land infilling / reclamation projects or projects involving significant landscape remodelling, unless it can be demonstrated that the development would enhance the landscape and / or not give rise to adverse impacts; and
- **NH52**: To protect listed views and prospects from development that would either obstruct the view / prospect from the identified vantage point or form an obtrusive or incongruous feature in that view / prospect.

The subject grid connection is located c. 250m south from land classified as 'Rolling Lowlands' within County Wicklow, at its closest point. 'Rolling Lowlands' are classified as the second lowest within the WWCDP's landscape hierarchy. 'Rolling Lowlands' are generally described as,

> *"Gently rolling and undulating countryside best described as low-lying when compared to the rest of the terrain in Co. Wicklow. These landscape areas are generally located adjacent to the corridor zone or surrounded by more elevated lands within the 'Area of High Amenity'"*

The WWCDP notes that the 'Rolling Lowlands' generally have a higher capacity to absorb development than other landscape areas. Development in these areas (or in their periphery as is the case of the subject grid connection) is recommended to be integrated into their surroundings in order to minimise the effect on the landscape and to maximise the potential for development. Specific objectives for 'Rolling Lowlands' landscape character types are reproduced below:

- Development proposals within this area should aim to locate within existing clusters of structures / tree stands and avoid locating new development in open fields; and
- Throughout the rolling lowlands field patterns, intact hedgerows should be conserved and where possible enhanced.

The sitting of the 2km overhead line section of the grid connection (single wooden pole sets) in the vicinity of this landscape character type is not considered to result in any significant visual impacts as this infrastructure is representative of any common electrical connection within the Irish countryside.

It is also important to note that the subject grid connection is not within the vicinity of any Areas of High Amenity or Areas of Outstanding Natural Beauty nor would the overhead line component of the connection be visible from any scenic views / prospects identified by the WWCDP.

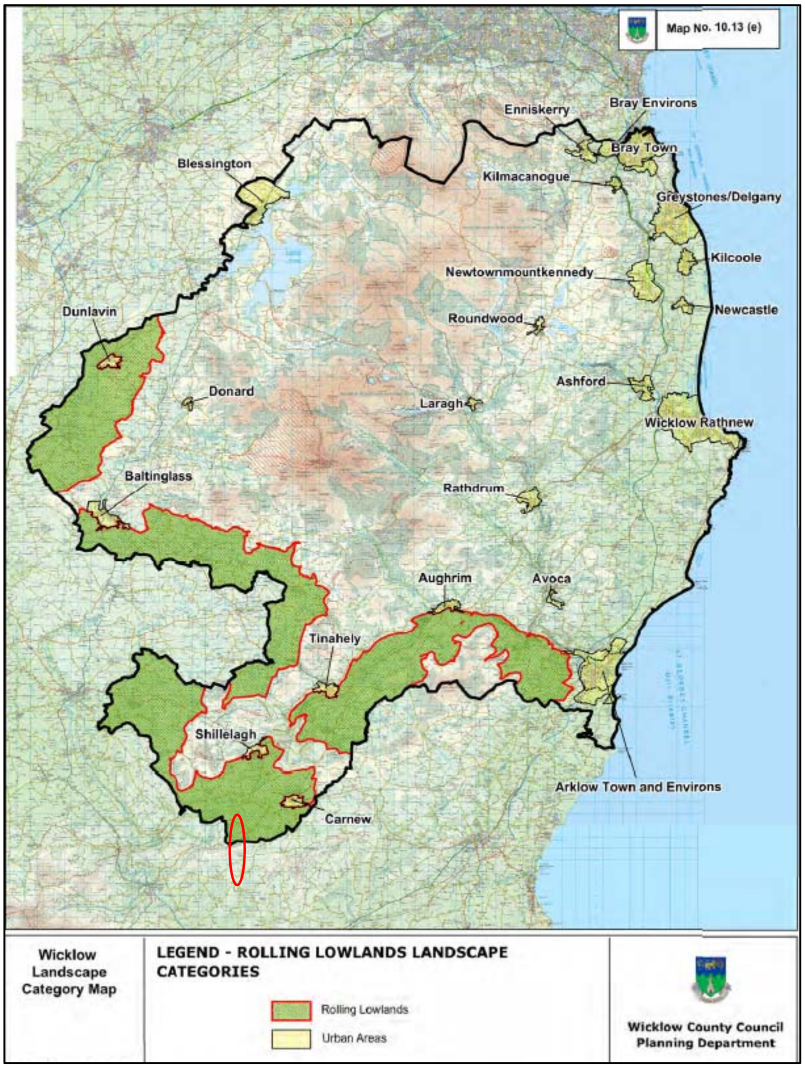

Figure 2.8. Wicklow County – Rolling Lowlands Landscape Mapping
Note: 'Red Eclipse' is indicative of subject grid connection

2.4 Planning Conclusions

As demonstrated by the strategic policies and objectives set out within European, national, regional and local development plans, continued investment within and maintenance of Ireland's renewable energy sector is a key prerequisite in achieving Ireland's 2030 renewable energy target and subsequent net zero carbon energy system by 2050. This is particularly relevant in the context of County Wexford's vision of developing a sustainable, secure and resilient energy supply through a diverse renewable energy portfolio.

The subject grid connection is considered consistent with the overarching planning framework set out in the above European, national, regional and local polices and plans. The rational for this conclusion is based on the following:

European

- Ireland will likely miss the target set for the period 2013 to 2020 for renewables by about 3% and for cumulative emissions by a little under 5%. Furthermore, EPA's Greenhouse Gas Emissions 2018-2040 projections indicate that Ireland faces significant challenges in meeting EU 2030 reduction targets in the non-ETS sector and national 2050 reduction targets, particularly in electricity generation. The continued operation of the CWFG, dependent upon the subject grid connection, will allow Ireland to continue to progress towards future national and EU targets.

National

- The Irish Government recognises that they must reduce greenhouse gas emissions which come from the energy sector by at least 80% by 2050 when compared to 1990 levels while ensuring a secure supply of energy. The development of onshore renewable energy is, however, critically dependent on the implementation of enabling infrastructure, such as the subject grid connection, which will facilitate the continued export of renewable generated electricity on to the national grid.
- The majority of the subject grid connection are underground cables laid in the public roads as described by the Wind Energy Guidelines (2006). There are reasonable exceptions to this within the subject grid connection route due to existing infrastructure and associated sensitivities within the surrounding environment. The installation and operation of the CWFG and the subject grid connection, both underground and overhead components, has not resulted in any significant impacts on relevant environmental media, and it is considered to be compliant with the "preferred draft approach" as articulated by the Department Circular PL5/2017, and accordingly, the current Draft Revised Wind Energy Development Guidelines.

Regional

- Specifically, the Southern Region is recognised as having a substantial renewable energy resource potential which can make significant contributions, through wind energy, to the transition towards a more energy efficient society and increasing renewable sources of energy. The subject grid connection will facilitate the on-going operation of the CWFG which will contribute to both national renewable energy generation targets and regional goals regarding energy self-sufficiency.

Local

- The overall objective of Wexford County Council's Energy Programme is to ensure the long term security of energy supply while meeting a high level of environmental standards. The subject grid connection and the operation of the CWFG will have contributed directly to both the local 70% target and the overarching national target of 40% and the on-going decarbonisation of the energy sector.
- The WCDP highlights that the sustainable development of renewable energy infrastructure cannot be facilitated at the expense of other considerations. It is important to note that the construction and operation of the subject grid connection has not resulted in any significant environmental impacts as further discussed within this rEIAR. Specifically, the subject grid connection has been designed with regard to established best practice and installed in line with relevant health / safety and traffic management requirements as per granted road opening licences and supervised by ESB Networks
- The subject grid connection is located partly within designated "Uplands" (northern areas) and partly within designated "Lowlands" (southern areas) of the county. There is no evidence that the subject grid connection has interfered with any protected landscape character, views or prospects as the majority of the development is located underground

whilst the overhead line component is similar in nature to the common electricity connections found across the Irish countryside.

2.5 Planning History

This Section of the rEIAR sets out the planning history of the subject grid connection, relevant planning applications in the vicinity of the grid connection route and other wind energy applications within the wider area.

2.5.1 Applications Underpinning the Subject Grid Connection

The planning permissions, and relevant conditions for the same, for Ballycadden Wind Farm, Ballynancoran Wind Farm, Gibbet Hill Wind Farm and Knocknalour Wind Farm, which comprise the Crory Wind Farm Group, are summarised below.

2.5.1.1 Ballycadden Wind Farm

Pl Ref. 2009/1730: Application by Ballycadden Wind Farm Ltd. to develop a wind farm of up to 9 no. wind turbine generators to export electricity with a hub height of up to 85 metres and a blade length of up to 41 metres, the construction of an electrical substation, site roads, meteorological mast and ancillary services in the townlands of Ballycadden Lower, Ballycadden Upper, Curralane, Oldtown, Lackendarragh and Bolinrush.

Prior to the lodgement of Pl Ref. 2009/1730, an existing planning permission for a wind farm (**Pl Ref. 2002/2904** and **An Bord Pleanála Ref. Pl. 26.201448**) were current on the site. The developer noted that Pl Ref. 2009/1730 would supersede these prior permissions, if granted. It should also be noted that an Environmental Impact Statement (EIS) was undertaken for the proposed development and submitted with the planning application.

The application was lodged to the Wexford County Council (Planning Authority) on the 22nd of December 2009 and was granted conditional permission in April 2010. Relevant to the subject grid connection, 2 no. conditions attached to the grant of the permission required the following:

- *7. Prior to commencement of works on site, the applicant shall obtain planning permission for connection of the wind farm to the National Grid.*
  ***Reason**: In the interest of clarity and the proper planning and sustainable development of the area.*
- ***15.** This permission shall not in any way be construed as any form of consent or agreement to a connection to the national grid or to the routing or nature of any such connection.*
  ***Reason**: In the interest of clarity and the proper planning and sustainable development of the area.*

The Ballycadden Wind Farm was commissioned in 2012 and is currently operational.

2.5.1.2 Ballynancoran Wind Farm

Pl Ref. 2003/3444: Application by K. McCarthy to develop a wind farm consisting of 2 no. wind turbines and service trackways on the site and ancillary work, including the erection of an electrical transformer compound, control housing and anemometer on the same site in the townland of Ballynancoran, Ballybeg. It is important to note that the application did not require an Environmental Impact Statement to be undertaken as part of development. The application was lodged to the Planning

Authority on the 9th of October 2003 and was granted conditional permission on the June 2004 which included the following condition:

- *10. Prior to the commencement of development, planning permission shall be obtained for the erection of powerlines to facilitate the connection of the proposed wind turbines to the national grid.*
  ***Reason**: In the interest of the proper planning and development of the area.*

Pl Ref. 2011/0202: Application by K. McCarthy for modifications to existing site tracks including the installation of underground electrical cables, widening of site entrance, construction of 2 no. Crane hard-stand areas and the relocation of an electrical substation previously consented under Pl Ref. 2003/3444. The purpose of this development was to facilitate access and construction of the previously consented development. Conditional permission was granted by the Planning Authority for this development on the 27th of May, 2011.

The Ballynancoran Wind Farm was commissioned in 2013 and is currently operational.

2.5.1.3 Gibbet Hill Wind Farm

Pl Ref. 2003/3753: Application by D. Kennedy and Wexwind Ltd. for the erection of erect three wind turbines not exceeding 80 meters hub height with a rotor diameter not exceeding 72 meters, and ancillary buildings and roadways at Kiltilly, Kilrush. Conditional permission for the development was granted by the Planning Authority on the 11th of February, 2004.

Pl Ref. 2009/0266: Application by Wexwind Ltd. to construct a wind farm consisting of 6 no. turbines, not exceeding 80m hub height with rotor diameter not exceeding 90m and ancillary building and roadways in and ancillary works in the townlands of Graigue More, Bolinahealy and Kiltilly, Kilrush. An EIS was undertaken for the proposed development and submitted with the planning application. The application was lodged to the Planning Authority on the 27th of February 2009 and was granted conditional permission in December, 2009.

- *7. Prior to commencement of works on site, the applicant shall obtain planning permission for connection of the wind farm to the National Grid.*
  ***Reason:** In the interest of clarity and the proper planning and sustainable development of the area.*
- *17. This permission shall not in any way be construed as any form of consent or agreement to a connection to the national grid or to the routing or nature of any such connection.*
  ***Reason**: In the interest of clarity and the proper planning and sustainable development of the area.*

ABO Wind Ireland Ltd lodged an application under **Pl Ref. 2011/0083** for the construction of a new approach road 292.50m long and the widening of an existing forest track on the 1st of February, 2011. This new approach road was proposed to connect to the north of the Gibbet Hill Wind Farm, as previously approved under Pl Ref. 2009/0266. The Planning Authority granted conditional permission for the proposed development of the 29th of April, 2011.

The Gilbert Hill Wind Farm was commissioned in 2013 and is currently operational.

2.5.1.4 Knocknalour Wind Farm

Pl Ref. 2011/0504: Application by Knocknalour Wind Farm Ltd. to develop a wind farm of up to 4 wind turbine generators to export electricity with a hub height of up to 85 metres a rotor diameter of up to 82 metres and ancillary works including, the construction of a crane hardstanding for each turbine, an electrical substation, underground cabling, site roads, and ancillary services in the townland of

Knocknalour, Bunclody. An EIS was undertaken for the proposed development and submitted with the planning application.

Prior to the lodgement of Pl Ref. 2011/0504, there were 2 no. existing planning permissions current on the proposed application site for a total of 4 no. wind turbines (**Pl Refs: 2003/2204** and **2009/1392**) with a hub height of up to 80m and a rotor diameter of up to 72m. The developer noted that Pl Ref. 2011/0504would supersede these prior permissions if granted; specifically, only 4 no. wind turbines as detailed in the application would be considered.

The application was lodged to the Planning Authority on the 30th of May 2011 and was granted permission in August, 2011, which included the following condition:

- ***8.** Prior to commencement of works on site, the applicant shall obtain planning permission for connection of the wind farm to the National Grid.*
  ***Reason**: In the interest of clarity and the proper planning and sustainable development of the area.*

The Knocknalour Wind Farm was commissioned in 2013 and is currently operational.

2.5.1.5 An Bord Pleanála Referral

Pl Ref. EXD00574: Application lodged by F. Clauson in August 2015 under Section 5 of the Planning and Development Act 2000 (as amended) to the Planning Authority requesting that the Authority make a determination on whether the provision of grid connections from the Crory 110 kV/Lodgewood 220 kV substation to the Ballycadden, Gibbet Hill, Knocknalour and Ballynancoran wind farms is or is not development and is or is not exempted development. The Planning Authority, in its consideration of the matters raised by the Applicant, decided to refer the Section 5 request to An Bord Pleanála (**RL3408/09/10/11**).

The Planning Inspector, within their report dated 17 June 2016, recommended that the subject grid connection was development and not exempted development. This recommendation was based on the following key points:

- *The said grid connections come within the scope of Sections 2(1) and 3(1) of the Act and constitute development;*
- *The said grid connections come within the scope of article 9(1)(a)(i), Planning and Development Regulations, 2001, as amended, as their construction contravened Conditions 7, 7, 8 and 10 of planning permissions PA Ref.s 2009/1730; 2009/0266; 2011/0504; and 2003/3444 respectively, being the planning permissions for the relevant wind farms (Ballycadden; Gibbet Hill; Knocknalour; Ballynancoran).*

The Board upheld the Inspector's recommendation on the 28th of June, 2016. Subsequent to this decision, ESB International Ltd. lodged an application to An Bord Pleanála (**ABP-301989-18**) for Leave to Apply for Substitute Consent for the subject grid connection on the 29th June 2018. The Board granted ESB International Ltd. leave to apply for substitute consent under Section 177D of the Planning and Development Act 2000 (as amended) on the 23rd of June, 2019. The Board's decision to grant leave was based on the conclusion that an environmental impact assessment and appropriate assessment are required and that exceptional circumstances exist such that it is appropriate to permit the opportunity for the regularisation of the subject grid connection.

2.5.2 Applications in the Vicinity of the Subject Grid Connection

The grid connection between the Crory 110 kV substation and the CWFG traverses a rural landscape that is predominantly pastural and agricultural land with pockets of coniferous forest and woodland scrub located in the immediate settings of the individual wind farms. The only urban areas in proximity to the subject grid connection route are Bunclody to the west (c. 5.7km), Ferns to the south (c. 3km) and Camolin to the east (c. 6.70km).

A total of 318 no. planning applications were lodged to the Planning Authority, either adjacent to or within the immediate vicinity of the underground grid connection route, between 1983 and 2020. Of those applications granted permission, 18% (60) were granted between 2010 - 2020 with only 10% (34) granted within the last 5 no. years. The majority of granted applications identified are historic in nature (1983 – 2009), having been submitted between 10 and 40 years ago, and would be considered well established at the time of writing this report.

The majority of planning applications granted permission by the Planning Authority, either adjacent to or within the immediate vicinity of the underground grid connection route, relate to one-off rural dwelling houses, residential development and agricultural development, including new entrances, sheds and ancillary plant and infrastructure. The most recent applications for residential dwellings are Pl Ref. 2019/0946, Pl Ref. 2019/0901 and Pl Ref. 2018/0555 which are located immediately adjacent to the grid connection in the townlands of Tombrack, Ballaman and Ballyandrew, respectively. Due to the distance of urban areas from the subject grid connection, there have been no proposals for development exceeding 5 no. dwellings in proximity to the development. The most recent application for a multi-residential unit was granted conditional permission in 2007 (Pl Ref. 2006/0694) for 5 no. units in Ballyroebuck, Kilrush, adjacent to the grid connection. A review of aerial imagery in January 2020 did not indicate that any development on this site has commenced.

There are several applications for community facilities, e.g. health institutions, school alterations and community centres, located within the immediate proximity of the grid connection that were granted permission in the last ten years.

- **Pl Ref. 2010/0914**: Planning application by New Dawn Housing Association for the change of use as a house, to use as a residence for persons with an intellectual disability, and to make alterations and modifications to the existing dwelling, new boundary wall, entrance, and the installation of a new effluent treatment system and associated site works at Ballaman townland. Conditional permission was granted conditional permission by the Planning Authority on the 10th of December, 2010.
- **Pl Ref. 2010/0857**: Planning application by the Board of Management (Tombrack National School) to construct a single storey extension to the existing school building and to construct a single storey storage building, including all associated site works at Tombrack townland. Conditional permission was granted by the Planning Authority on the 29th of October, 2010.
- **Pl Ref. 2010/0810**: Planning application by Askamore/Kilrush GAA Club to construct an extension to the front of existing clubhouse with associated site works at Ballyroebuck townland. Conditional permission was granted by the Planning Authority on the 13th of May, 2011.
- **Pl Ref. 2009/0101**: Planning application by the Board of Management (Ballyroebuck National School) to erect extension to rear of existing national school consisting of new classroom and toilets with associated site works at Ballyroebuck townland. Conditional permission was granted by the Planning Authority on the 1st of May, 2009.

There have been 2 no. planning applications for commercial development within the general setting of the grid connection between 2019 and 2015.

- **Pl Ref. 2018/0355**: Murphy Van Parts lodged an application to the Planning Authority on the 23rd of March, 2018 for the retention of an existing vehicle recovery yard of 0.637ha, retention and completion of existing decontamination workshop and office building, retention and completion of existing vehicle delivery, washdown and hardstanding areas together with associated site and drainage works and for planting of trees, shrubs & hedging to provide screening to existing site in the townland of Tombrack, adjacent to the grid connection. The Planning Authority granted conditional permission for the development on the 29th of August, 2018.

- **Pl Ref. 2016/0595**: Power Capital Renewable Energy Limited lodged an application to the Planning Authority on the 31st of May, 2016 for the construction of an up to 5 mw solar PV farm comprising approximately 20,000 no. photovoltaic panels on ground mounted frames within a site area of 10.84 hectares and associated ancillary plant, 1 no. client side substation, a single storey storage building, a single storey communications building, a single storey building and the formation of an access road to the site from the adjoining road at Ballycarney townland, immediately north of the Crory 110 kV substation. The Planning Authority granted conditional permission for the development on the 22nd of August, 2016. At the time of writing this report, a review of aerial imagery did not indicate that any development on the site has commenced.

There have been no recent applications for energy generation or transmission infrastructure, or for significant industrial operation, identified within the immediate vicinity of the subject grid connection.

2.5.3 Applications Relating to the Crory 110 kV Substation

The Crory 110 kV Substation has been subject to 2 no. planning applications lodged by EirGrid, on behalf of the ESB, and one application lodged by ESB between 2008 and 2010. These applications have been summarised below:

- **Pl Ref. 2008/2620**: Planning application by EirGrid for a variation to a previously approved permission under Pl Ref. 2007/0373 for the proposed Lodgewood 220 kV substation. The alterations consist of the reduction in size of station control building, the inclusion of 1 no. new 110 kV cable bay and associated structures, 4 no. lightning masts of height 20.25m, 9 no. prefabricated units and 1 no. interface kiosk. The application also proposed the relocation of 1 no. 220 kV line bay, 1 no. 220 kV transformer bay and associated portals and equipment. Conditional permission was granted by the Planning Authority on the 20th of February, 2009.
- **Pl Ref. 2010/0469**: Planning application by EirGrid for alterations to Lodgewood 220 kV substation, the alterations consist of new 110 kV cable bay, IPP interface kiosk, 25m high lightning mast, new IPP compound to include new palisade fence and gates, new internal access road and associated site works. Conditional permission was granted by the Planning Authority on the 30th of July, 2010.
- **Pl Ref. 2010/0634**: Planning application by the ESB for the development including a new 110 kV electrical transformer station, as an extension to the existing Lodgewood 220 kV substation site, consisting of control building, 3 no. 110 kV transformers, new internal access road and new palisade compound fence and gates, new bio-cycle unit with raised percolation area and new oil interceptor. The proposal also included alterations to the existing Lodgewood 220 kV electrical transformer station consisting of 3 no. 110 kV cable bays with interface kiosks, one no. 25m high lightning mast and associated site works. Conditional permission was granted by the Planning Authority on the 12th of November, 2010.

There were no further applications attached to the Crory 110 kV substation on record.

2.5.4 Other Wind Farm Sites

Within the wider area of the subject grid connection, there have been a number of planning applications lodged for wind farm developments; specifically, Castledockrell Wind Farm, Ballaman Wind Farm and Ballyduff Wind Farm. The relevant planning history of these wind farm applications is summarised below.

Ballyduff and Ballaman wind farms are connected to the national grid via a separate, single shared underground cable installed within a duct which connects to Crory 110 kV substation. It is important to note that neither of these wind farms form part of the Crory Wind Farm Group.

2.5.4.1 Castledockrell Wind Farm

- **Pl. Ref. 2004/1077**: Application by Castledockrell Wind Group Ltd. for the construction of a wind farm comprising of 9 no. wind turbines, with tower heights not exceeding 85m and rotor diameters not exceeding 71.5m., and ancillary buildings, incidental site works, including site roads, in the townlands of Carranroe, e.d. Castledockrell, Ballynelahillan, e.d. Castledockrell, Kilcullen, e.d. Ballindaggan, Sroughmore, e.d. Ballindaggan and Knockduff, e.d. Ballindagan. An EIS was submitted to the Planning Authority with the application. The application was withdrawn on the 25th of June, 2004.
- **Pl Ref. 2004/4702**: Application by Castledockrell Wind Group Ltd. for the construction of a wind farm comprising of 11 no. wind turbines, with tower heights not exceeding 85m and rotor diameters not exceeding 71.5m., and ancillary buildings, incidental site works, including site roads, in the townlands of Carranroe, e.d. Castledockrell, Ballynelahillan, e.d. Castledockrell, Kilcullen, e.d. Ballindaggan, Sroughmore, e.d. Ballindaggan and Knockduff, e.d. Ballindagan. An EIS was submitted to the Planning Authority with the application. Conditional permission was granted by the Authority on the 16th of March, 2005 which was subject to a 1st Party appeal to An Bord Pleanála in order to amend Condition 7 attached to the grant of permission. An Bord Pleanála decided not to amend the condition as per its powers under Section 146A of the Planning and Development Act 2000 (as amended). refused to amend.
- **Pl Ref. 2005/3945**: Application by Castledockrell Wind Group Ltd. for the construction of a 110kv sub-station and perimeter fence and incidental site works (to service Castledockrell Wind Farm). The substation will consist of a compound measuring approximately 39m x 18m, and in addition to electrical equipment, will contain a general purpose building measuring approximately 9.64m x 7.14m. Conditional planning permission was granted by the Planning Authority on the 3rd of March, 2006.
- **Pl Ref. 2007/3077**: Application by Bolamore Wind Farms Ltd. for the erection of a single wind turbine, as an extension to Castledockrell Wind Farm, and ancillary buildings, incidental site works, including site roads. The Planning Authority decided to refuse permission for the proposed development on the 11th of October 2007.
- **Pl Ref. 2008/0335**: Application by Bolamore Wind Farms Ltd. for the erection of a single wind turbine, as an extension to Castledockrell Wind Farm, and ancillary buildings, incidental site works, including site roads. The tower height will not exceed 85m and the rotor diameter will not exceed 72m. The anticipated output from the turbine will be 2.3mw. Conditional planning permission was granted by the Planning Authority for the development on the 9th of May, 2008.

The Castledockrell Wind Farm was commissioned in 2011 and is currently operational.

2.5.4.2 Ballaman Wind Farm

- **Pl Ref. 2002/3959**: Application by K. Rothwell for the erection of a wind farm consisting of 3 wind turbines and service roadways. The developer also proposed to erect an electrical transformer compound, control housing and anemometer on the same site. The Planning Authority decided to refuse permission for the proposed development on the 21st of February, 2003.
- **Pl Ref. 2003/3445**: Application by K. Rothwell for the erection of a wind farm consisting of 3 wind turbines and service roadways at Ballaman, Moneydurtlow and Tombrack townlands. The developer also applied to erect an electrical transformer compound, control housing and anemometer. Conditional planning permission was granted by the Planning Authority for the development on the 2nd of December, 2003.

- **Pl. Ref. 2010/0733**: Application by K. and M. Rothwell for the construction for a wind farm comprising of up to 2 no. turbines, with a hub height of up to 85m and a blade length of up to 45m, and the construction of an electrical substation, site roads and associated ancillary services at Ballaman and Moneydurtlow, Tombrack. Conditional permission was granted by the Authority on the 5th of November, 2011.

The Ballaman Wind Farm was commissioned in 2013 and is currently operational.

2.5.4.3 Ballyduff Wind Farm

- **Pl. Ref. 2003/4003**: Application by C. Brennan for the construction of a wind farm comprising of 2 no. turbines not exceeding 85 metres hub height with a rotor diameter not exceeding 80 metres, and ancillary buildings and roadways at Ballyduff, Kilcomb. Conditional permission was granted by the Authority on the 16th of April, 2004. The Ballyduff Wind Farm was commissioned in 2017 and is currently operational.

2.6 Alternatives

2.6.1 Introduction

Article 5 of the Environmental Impact Assessment (EIA) Directive as amended by Directive 2014/52/EU states that the information provided in an Environmental Impact Assessment Report (EIAR) should include a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the final choice, taking into account the environmental effects. The consideration of alternatives typically refers to alternative sites, designs and processes.

This section of the EIAR contains a description of the alternatives that were considered for the optimised development, in terms other land-use options for the site, turbine numbers, design and site layout and transport routes to the site.

The consideration of alternatives is an effective means of avoiding environmental impacts. As set out in the 'Draft Guidelines on The Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017), the presentation and consideration of reasonable alternatives investigated is an important part of the overall EIA process.

2.6.2 "Do Nothing" Scenario

The existing grid connection is already constructed and operational, under the "Do Nothing" scenario the grid connection infrastructure will remain unchanged and continue to provide a connection from the wind farms to the national grid. There is no potential for additional environmental impacts associated with this scenario. The existing grid connection route was designed to provide the most efficient and least environmentally impactful connection to the national grid by using the existing road infrastructure. Retaining the existing grid connection has been determined to have the least environmental impacts. The environmental impacts associated with the construction and operation of the existing grid connection are discussed in detail in Chapters 4 to 12 of this rEIAR.

2.6.3 Alternatives to the Existing Grid Connection

If the existing grid connection infrastructure has to be removed then alternative grid connection routes and/or designs would be sought and implemented to provide grid connections from the windfarms to the national grid.

Removal of the existing infrastructure has the potential for significant impacts on the environmental receptors. Furthermore, the existing grid connection route and design were optimised to minimise significant impacts to the environment. It is considered that any alternative grid connection route would likely result in significantly greater environmental impacts that the current route. Furthermore, the existing grid connection is predominantly located underground within the public road network thus minimising environmental impacts. Alternative designs, such as overhead lines, or underground lines located outside of the road network would result in greater environmental impacts than the existing grid connection. Since all possible alternatives to the existing grid connection would likely result in greater impacts to the environment, these alternatives are not considered further in the rEIAR.

2.7 Scoping and Consultation

2.7.1 Scoping

Scoping is the process of determining the content, depth and extent of topics to be covered in the environmental information to be submitted to a competent authority for projects that are subject to an remedial Environmental Impact Assessment (rEIA). This process is conducted by contacting the relevant authorities and Non-Governmental Organisations (NGOs) with interest in the specific aspects of the environment with the potential to be affected by the proposal. These organisations are invited to submit comments on the scope of the rEIAR and the specific standards of information they require. Comprehensive and timely scoping helps ensure that the rEIAR refers to all relevant aspects of the subject development and its potential effects on the environment and provides initial feedback in the early stages of the project, when alterations are still easily incorporated into the design. In this way scoping not only informs the content and scope of the rEIAR, it also provides a feedback mechanism for the proposal design itself.

A scoping report, providing details of the application site and the subject grid connection, was prepared by MKO and circulated in November 2019. MKO requested the comments of the relevant personnel/bodies in their respective capacities as consultees with regards to the rEIA process.

2.7.2 Scoping Responses

Table 2.2 presents a summary of all scoping responses received. Copies of the scoping responses are included in Appendix 2-1 of this rEIAR. The recommendations of the consultees have informed the rEIAR preparation process and the contents of the same.

Table 2.2. Scoping Responses

No.	Consultee	Response
1	Department of Culture, Heritage and the Gaeltacht	The Department of Culture, Heritage and the Gaeltacht responded to the Scoping Request on the 12th December 2019 and noted the following in their response: - As part of the cultural heritage assessment, all watercourses (rivers, riverbanks, streams, lakes or associated bridges, etc.) should be archaeologically assessed via Underwater Archaeological Impact Assessment (UAIA); - A suitably qualified and suitably experienced underwater archaeologist to carry out the UAIA; - The UAIA shall include detailed bank and in-water archaeological assessments and supported by detailed desktop study, walkover survey and hand-held metal detection surveys; and

No.	Consultee	Response
		- Detailed method statement should accompany the licence application to the National Monuments Service section of the Department of Culture, Heritage and the Gaeltacht
2	Geological Survey of Ireland	The Geological Survey of Ireland responded to the Scoping Request on the 27th November 2019 and noted that that they had no comments on the subject grid connection at this stage.
3	Health Service Executive	No response to date
4	Inland Fisheries Ireland	Inland Fisheries Ireland (IFI) responded to the Scoping Request on the 22nd January 2020 and noted that the subject grid connection runs through the catchment area of 5 no. separate Slaney River tributaries (Mine River, Ballycarnery River, Ballingale River, Ballynabarney Stream and Clohamon Stream). The IFI set out the following in their response: - Salmon spawning is recorded in the Mine, Ballingale and Ballycarney Rivers; - Ballynabarnery and Clohamon Stream represent excellent salmonid nursery habitats and hold populations of brown trout; - All tributary catchments are likely to hold populations of European Eel and Brook Lamprey, with Mine, Ballingale and Ballycarney Rivers having potential as lamprey spawning habitats
5	Irish Water	No response to date
6	National Transport Authority	No response to date
7	Transport Infrastructure Ireland	Transport Infrastructure Ireland (TII) responded to the Scoping Request on the 4th of December 2019 and provided general guidance for the preparation of remedial EIAR, which may affect the national road network.
8	Wexford County Council – Roads Section	No response to date
9	Wexford County Council – Environment Section	No response to date
10	Wexford County Council – Water Services	No response to date

2.8 Cumulative Impact Assessment

The EIA Directive and associated guidance documents state that as well as considering any indirect, secondary, transboundary, short-, medium-, and long-term, permanent and temporary, positive and negative effects of the project (all of which are considered in the various chapters of this rEIAR), the description of likely significant effects should include an assessment of cumulative impacts that may arise. The factors to be considered in relation to cumulative effects include population and human health, biodiversity, land, soil, water, air, climate, material assets, landscape, and cultural heritage as well as the interactions between these factors.

2.8.1 Methodology for the Cumulative Assessment of Projects

To gather a comprehensive view of cumulative impacts on the above environmental considerations and to inform the rEIA process being undertaken by the consenting authority, each relevant chapter within the rEIAR addresses the potential for cumulative effects to arise, where appropriate.

The potential cumulative impact of the subject grid connection and other relevant developments has been carried out with the purpose of identifying what influence the development has had on the surrounding environment when considered cumulatively and in combination with relevant permitted, proposed and constructed projects in the vicinity of the site.

The cumulative impact assessment of projects has three principle aims:

- To establish the range and nature of existing projects within the cumulative impact study area of the subject development;
- To summarise the relevant projects which have a potential to create cumulative impacts; and
- To identify the projects that hold the potential for cumulative interaction within the context of the subject grid connections and discard projects that will neither directly nor indirectly contribute to cumulative impacts.

Assessment material for this cumulative impact assessment was compiled on the relevant developments within the vicinity of the subject grid connection. The material was gathered through a search of relevant online Planning Registers, reviews of relevant EIAR documents, planning application details and planning drawings and served to identify past and future projects, their activities and their environmental impacts.

2.8.2 Projects Considered in Cumulative Assessment

The projects considered in relation to the potential for cumulative impacts and for which all relevant data was reviewed include those listed below.

Crory Sub-Group Wind Farms

The 4 no. wind farms that constitute the Crory Wind Farm Group (Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour) are connected to the national grid via the grid connection as discussed previously in this chapter. Any cumulative effects arising are considered in the relevant chapters of this rEIAR.

Other Wind Turbines

There are 3 no. wind farms (Castledockrell, Ballaman and Ballyduff Wind Farms) located within the general vicinity of the subject grid connection, as identified previously in this Chapter. Any cumulative effects arising are considered in the relevant chapters of this rEIAR.

Other Developments

The review of the Wexford County Council planning register documented relevant general development planning applications in the vicinity of the subject grid connection, most of which relate to the provision and/or alteration of one-off rural housing and agriculture-related structures, as described previously above. These applications have also been taken account in describing the baseline environment and in the relevant assessments.

All relevant potential cumulative effects have been considered, where necessary, in the following sections of this rEIAR.

3. DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 Introduction

This section describes the Subject Development, including the construction methodologies employed during its installation. For the purposes of the substitute consent application to be submitted to An Bord Pleanála, the full description of the Subject Development is as follows:

"The Electricity Supply Board (ESB) intend to apply for substitute consent for development at this site in the townlands of Ballyroebuck, Ballyandrew, Tincurry, Ballaman, Ballynancoran, Corah, Kiltilly, Curralane Oldtown, Knocknalour, Moneydurtlow, Bolinahaney, Bolacaheer, Graigue More, Tombrack, Boris, Ballycarney, Curraduff, Boolnadrum, County Wexford.

The development seeking substitute consent consists of the as-constructed 20kV electricity grid connection elements (consisting of approx. 26 kms of underground cables (UGC) and approx. 2 kms of overhead lines (OHL)), at the townlands specified above, which connects the four separate windfarms Ballycadden, Ballynancoran, Gibbet Hill and Knocknalour Wind Farms (collectively referred to as the Crory Wind Farm Group) to the national electricity grid at Crory ESB substation, County Wexford.

The as-constructed elements consist of the following: c. 2km of 20 kV overhead line (OHL). The as-constructed OHL consists of c. 26 wood poles (ranging from 9m to 12.5m above ground) supporting electrical conductor lines and ancillary structures and equipment. The as-constructed UGC generally consists of cables within the public road (a trench was excavated to a depth of c. 1.2m and to a maximum width of 2.2m – the cables were then placed in ducts within this trench which was then backfilled) with some minor deviations off the public road. The UCG also includes joint bays and other ancillary structures/equipment and is marked by road and bridge markers".

3.2 Description of the Cable Route

A description of the physical characteristics of the study area for this rEIAR is provided in Section 2.5 of this rEIAR. The Grid Connection route is shown in Figure 2.9. In total, the cable route passes through 18 townlands in Co. Wexford, as listed in Table 2.1 of the rEIAR.

The subject development is located approximately 3 kilometres west of Ferns in County Wexford at its nearest point, as illustrated in Figure 2.9. The route extends from the existing Crory 110 kV substation in the south to the Knocknalour and Ballynancoran windfarms in the north, a straight line distance of approximately 12 kms. A spur to the east extends to the Ballycadden Wind Farm, and a spur to the west extends to the Gibbet Hill Wind Farm.

An overhead power line connects the two turbines of the Ballynancoran Wind Farm located in the townland of Ballynancoran to the Knocknalour Wind Farm substation located in the townland of Knocknalour. From the Knocknalour Wind Farm the Grid Connection consists of an underground cable that runs southeast through the windfarm site and emerges from the site onto the existing public road at Grid Reference Coordinate E298,402 N159,504 (Irish National Grid). From this point the underground cable route runs south along the L-5114, the L-5143, the L-5141, the L-5133, the L-5132, and the L-6072 crossing the R-745 at Grid Reference Coordinate E298,499 N149,371. The cable route leaves the public road at approximately Grid Reference Coordinate E298,662 N148,494 and runs west across farm fields to terminate at the Crory 110kV Substation in the townland of Tincurry.

The western spur that serves the Gibbet Hill Wind Farm in the townland of Graigue More leaves the wind farm site at approximately Grid Reference Coordinate E294,526 N157,843 and runs east along the

L-1017 before joining the cable from Knocknalour at the junction with the L-5143 at Ballyroebuck. The eastern spur that serves the Ballycadden Wind Farm in the townlands of Curralane Oldtown, Lackeendaragh, and Ballycadden Lower joins the L-1017 at approximately Grid Reference Coordinate E299,626 N155,319 and runs east along this road before turning south and following the L-5138 southwest to the junction with the L-5141 at Tombrack. All the lines continue in the same trench from this point south to the substation.

The area surrounding the Grid Connection route is characterised by good quality arable land with a substantial amount of one-off housing. The majority of the subject Grid Connection are underground cables laid in the public roads. The main exceptions are; the initial connection to the Crory substation, which comprise an underground cable which crosses two fields (a distance of approximately 500 metres); the final connection to Ballycadden Wind Farm which is an underground cable installed in a private road, a track and fields (a distance of approximately 1,000 metres); the final connection to Gibbet Hill Wind Farm – an underground cable routed across a private road, a track and fields (a distance of approximately 800 metres); and the link section between the Knocknalour and Ballynancoran Wind Farms that comprises an overhead power line across fields (a distance of approximately 2 kms). Overall, the Grid Connections comprises approximately 26 kms of 20 kV underground cable (the route of which is marked by road and bridge markers) and approximately 2 kms of 20 kV overhead powerline. Drawings of the Grid Connection route are provided in Appendix 3-1 of this rEIAR.

3.3 Construction Methodology

This section describes the construction methodologies that were used for the installation of the Grid Connection cable. The construction of the Grid Connection was conducted in compliance with ESB's specifications that were current at the time of construction. The completed Grid Connection was inspected and energised by ESB following commissioning of the wind farms.

3.3.1 Excavation and Duct Installation

3.3.1.1 Parallel Road Excavations in Road & in Grass Margin & Road Crossings

The underground cable ducts were constructed and installed in accordance with the requirements, and under the supervision of ESBN. All works in the public road were carried out in accordance with the conditions of the road opening licence for the project.

- The area where excavations were planned was surveyed and all existing services were identified.
- All relevant bodies i.e. ESB, Bord Gáis, Eir, Wexford County Council etc. were contacted and all drawings for all existing services sought.
- A road opening licence was obtained
- All plant operators and general operatives were inducted and informed as to the location of any services.
- An excavator was used to excavate the trench to the dimensions specified in the ESB Networks "Specification for the Installation of Ducts and Structures for Underground 10-20kV Power Cables and Communications Cables" (ESB Networks, 2011)
- All excavated material was either removed to the Ballycadden wind farm borrow pits for restoration of the pits or to a permitted waste recovery facility at Kildavin Bunclody or, if suitable, reused for backfilling where appropriate.
- Once the trench was excavated a base layer of unwashed sand with a thermal resistivity of max 1.0K.m/watt at 0% moisture content (BS882 standard) was installed and compacted
- Ducting consists of 125mm outer diameter uPVC duct with draw ropes.
- The minimum separation to adjacent ducts on the same circuit is c.150mm.

- The minimum separation to adjacent ducts on separate circuits is c.200mm.
- Ducting for communication lines also consists of 125mm outer diameter uPVC duct with draw ropes.
- Once the ducts were installed couplers were fitted and capped to prevent any dirt etc. entering the duct.
- Extreme care was taken to ensure that all duct collars (both ends) were clean and in good condition prior to ducts being joined.
- The as built location of the ducting was surveyed using a total station/GPS.
- Installed ducts were backfilled using unwashed sand with a thermal resistivity of max 1.0K.m/watt at 0% moisture content (BS882 standard) with a minimum cover of 75mm over the ducts.
- A Red Cable Protection Strip was installed above the unwashed sand.
- A 300 mm layer of C12/15 Leanmix concrete was installed above the Red Cable Protection Strip and the remainder of the trench was backfilled and compacted per Wexford County Council Requirements.
- A Yeller Marker Warning Tape was installed 300mm below the surface the full width of the trench.
- The finished surface was reinstated as per original specification or to the requirements of Wexford County Council as appropriate.
- Marker Posts were installed to denote all changes of direction, road crossings, etc.

Representative photographs of the current conditions along the completed Grid Connection route are provided as Plates 3.1 to 3.4, below. A typical as-built cross-section drawing of the installed cable trench is provided as Figure 3.1.

Plate 3.1 View of current condition of Grid Connection Route, facing north towards Tinkerstown Crossroads.

Plate 3.2 View of current condition of Grid Connection Route, facing north at Ballyandrew Cross Roads.

Plate 3.3 View of current condition of Grid Connection Route, facing northwest at Boolnadrum Bridge.

Plate 3.4 View of marker post along the grid connection route

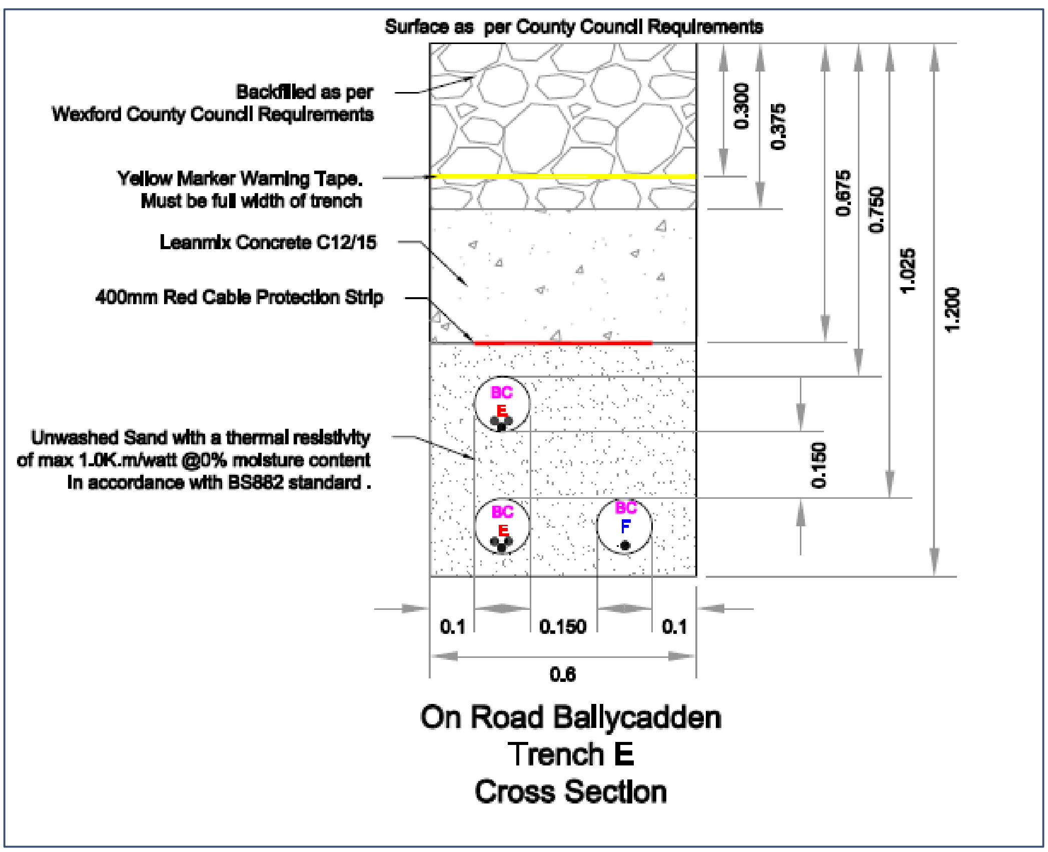

Figure 3.1 Typical As-Built Trench Cross Section

3.3.1.2 Existing Underground Services

Any underground services encountered along the cable routes were surveyed for level. The ducting passes over the service provided adequate cover is available, otherwise the ducting was installed under the services. A minimum clearance of 300 mm was maintained between the ducts and the services.

3.3.1.3 Joint Bays

Joint bays are pre-cast concrete chambers where lengths of cable are joined to form one continuous cable. They are located at various points along the ducting route at approximately 500-metre intervals. The joint bays for the grid connections were constructed according to the ESB specification current at the time. Following the completion of the cable installation the joint bays were backfilled and the road surface reinstated. Plate 3.5 is representative of typical joint bay construction.

Plate 3.5 Typical joint bay construction, adjacent to public road (generic example).

3.3.1.4 Grid Connection Watercourse/Culvert Crossings

There is a total of 10 no. natural watercourse crossings along the Grid Connection, the locations of which are shown in Figure 3.2. In addition, there are numerous small storm drainage pipe crossings at various locations along the Grid Connection route.

The methodologies utilized for the provision of the Grid Connection at these locations are provided in the following sections. All natural watercourse crossings, with the exception of the crossing of the Ballycarney Stream at the Corah Bridge (Crossing 2, Figure 3.2) and the crossing of the Borris Stream (Crossing 6, Figure 3.2) were completed using the existing bridge/culvert structures. The crossings of the Ballycarney Stream near the Corah Bridge and the Borris Stream were completed using a Horizontal Directional Drilling method as the bridge deck was deemed not suitable to accommodate the underground cables. A description of each crossing method utilized is provided below. Instream works were not required at any watercourse crossing along the Grid Connection and there was therefore no direct impact to any streams or watercourses.

Map Legend

- Grid Connection Route
- Natural Watercourse Crossing

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Drawing Title	
Watercourse Crossings	
Project Title	
Crory Wind Farm Group Grid Connection	
Drawn By: TJB	Checked By: MH
Project No.: 190806	Drawing No.: Figure 3.2
Scale: 1:55000	Date: 04.01.2020

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3.3.1.4.1 *Crossing under pipes*

Where the culvert or pipe to be crossed consisted of a socketed concrete or sealed plastic pipe, a trench was excavated beneath the culvert and cable ducts were passed under the sealed pipe. The existing pipe was left in-situ and there was no disturbance of the watercourse. Instream works were not required and there was therefore no direct impact to an streams or watercourses associated with this crossing method. This method was used for crossing small storm drainage pipes throughout the project. Watercourse crossing number 9 was also achieved using this method. A typical cross section of this type of crossing is shown in Figure 3.3, below. A representative photograph of a typical storm drainage pipe crossing location is provided as Plate 3.6, below.

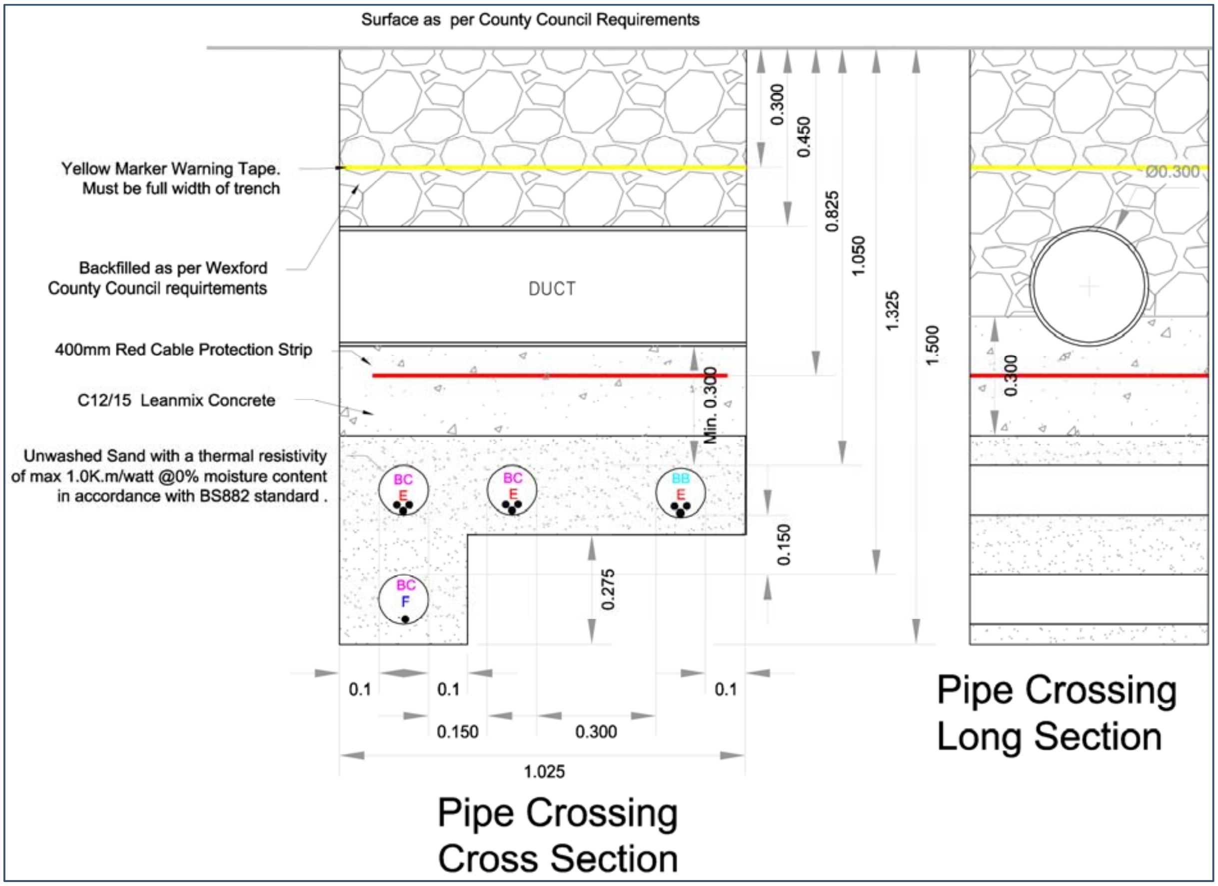


Figure 3.3 Typical Detail for Crossing under existing storm drainage pipes

Plate 3.6 View of current, post construction conditions at typical storm drainage pipe crossing location

Where duct installation method could not be achieved due to the invert level of the existing culvert or due to the composition of the culvert e.g. stone culverts, the ducts were installed by alternative means as set out in the following sections.

3.3.1.4.2 *Flatbed Formation over Bridges/Culverts*

Where cable ducts were installed over an existing culvert, the ducts were laid in a shallow trench the depth of which was determined by the location of the top of the culvert or bridge arch. The ducts were laid in this trench in a flatbed formation over the existing culvert and were encased in 6mm thick steel galvanized plate with a 30N concrete surround as per ESB Networks specification. Watercourse crossings 2, 3, 4, 5, 7 and 10 (Figure 3.2) were achieved using this method. Typical details for this crossing method are provided as Figures 3.4 and 3.5, below. Plates 3.7 and 3.8 are representative of current conditions at Stream Crossing 3 which was crossed using the method described above.

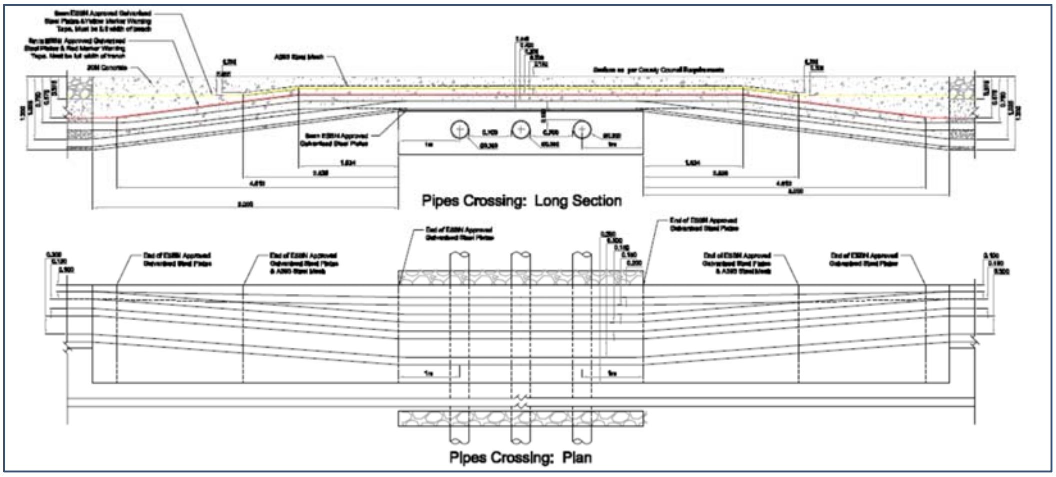


Figure 3.4 Crossing over existing culvert, plan long profile

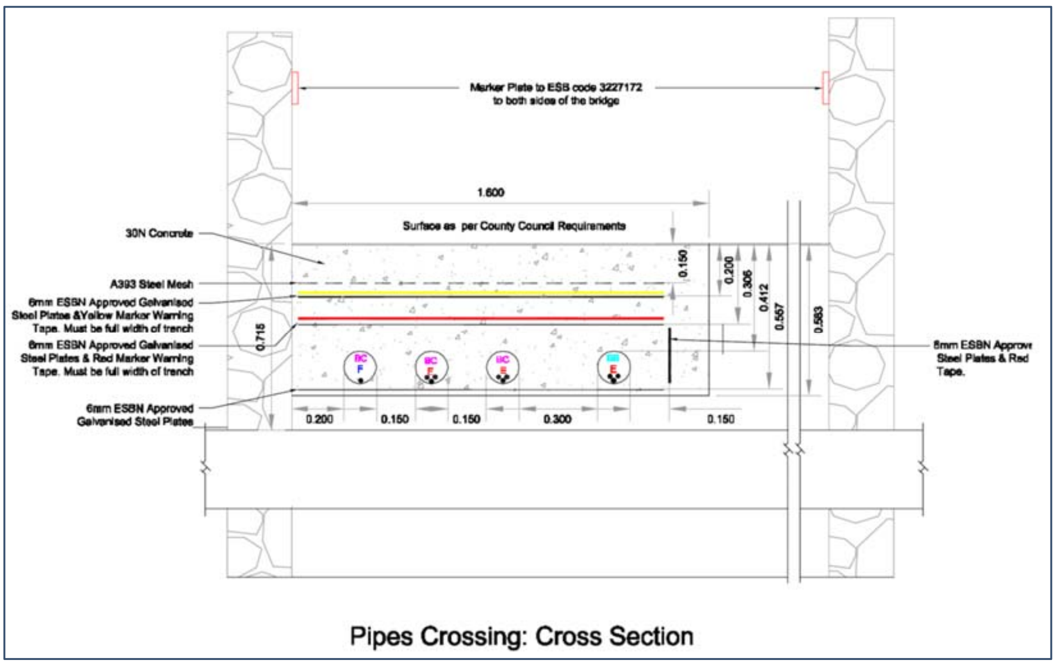


Figure 3.5 Crossing over existing culvert, cross section

Plate 3.7 View of current, post-construction conditions at bridge over Ballingale Stream south of Curraduff Cross Roads (Crossing 3). Cable is installed in bridge deck.

Plate 3.8 View of current, post-construction conditions at bridge over Ballingale Stream south of Curraduff Cross Roads (Crossing 4), facing downstream. Cable is installed in bridge deck.

3.3.1.4.3 *Directional Drilling*

Directional drilling was utilized for two stream crossings where the methods described above were not appropriate. There was insufficient cover over the existing box culvert at Chain 1950 of the Gibbet Hill grid connection spur (Crossing 6, Figure 3.2) and at Corah Bridge (Crossing 1, Figure 3.2). Directional bores were used to make the stream crossings at this location without resulting in any impacts to the stream channels. Representative photographs of these crossing locations are included as Plates 3.9 and 3.10, below. The directional drilling method of duct installation was carried out using Vermeer D36 x 50 Directional Drill (approximately 22 tonnes), or similar plant. The launch and reception pits were approximately 0.55m wide, 2.5m long and 1.5m deep. The pits were excavated with a suitably sized excavator. The typical drilling method is described below. Detailed drawings are provided in Appendix 3-1 of this rEIAR.

The drilling rig was securely anchored to the ground by means of anchor pins which were attached to the front of the machine. The drill head was secured to the first drill rod and the operator drilled into the launch pit to a suitable angle which enabled him to obtain the depths and pitch required to the line and level of the required profile.

During the drilling process, a mixture of a natural, inert and fully biodegradable drilling fluid such as Clear Bore™ and water was pumped through the centre of the drill rods to the reamer head and forced into void to enables the annulus which has been created to support the surrounding sub soil and thus prevent collapse of the reamed length. When the reamer entered the launch pit, it was removed from the drill rods which were then passed back up the bore to the reception pit and the next size reamer attached to the drill rods and the process was repeated until the required bore with the allowable tolerance was achieved. Backfilling of launch and reception pits was conducted in accordance with the normal specification for backfilling excavated trenches.

Plate 3.9 View of Corah Bridge over Ballycarney Stream. Directional bore was used to install cable parallel to bridge.

Plate 3.10 View of box culvert on Borris Stream. Directional bore was used to install cable under culvert.

3.3.1.5 20kV Overhead Power Line

A 20kV overhead power line was constructed to connect the Ballynancoran wind farm to the substation at the Knocknalour wind farm. The overhead line is approximately 2 kilometres in length and consists of three overhead lines supported by standard single wooden poles. The poles measure between 9 and 12.5 metres in height and are spaced approximately every 100 metres.

The construction techniques used to construct the overhead line were in line with international best practice and fully comply with all ESB and health and safety requirements. Pole base excavation and erection was carried out using a rubber wheeled or tracked excavator. One natural watercourse (Crossing 8, Figure 3.1) is crossed by the overhead line, however there were no impacts to this watercourse associated with the construction or operation of the line. Representative photographs of the installed overhead line are provided as Plates 3.11 and 3.12, below.

Plate 3.11 View of 20kV overhead line from the Knocknalour Wind Farm sub-station.

Plate 3.12 View of 20kV overhead line facing northeast

3.3.2 Construction Site Management

The following measures pertaining to water quality and invasive species were incorporated into the design phase of the project to avoid impacts on ecological and environmental receptors.

3.3.2.1 Pollution Prevention Control Measures

The following methods and best practice measures were implemented to ensure that sediment release and potential for pollution during the construction phase was minimised and reduced to insignificance. In general, the majority of the works areas were located at significant distances from water courses however precautions were taken in general and in particular at and close to water course crossing locations.

Drainage

The following measures were put in place to prevent the transportation of silt-laden water or pollutants from entering the wider environments including downstream watercourses.

There was no release of suspended solids to any watercourse as a direct or indirect result of the works based on the project design and the measures specified below:

- No watercourse was altered with as part of the proposed works.
- Temporary fills and stockpiles were covered with polyethylene sheeting to avoid sediment release associated with heavy rainfall.
- Silt fences were used to prevent siltation of watercourses in or surrounding the works area.

Hydrocarbons

The use of hydrocarbons during the construction process can result in the potential for pollution and accidental spillage to enter natural watercourses downstream of the site via drainage and groundwater.

Construction best practice was followed during the construction of the Grid Connection ensuring that there were no releases of hydrocarbons into the environment that could result in potentially negative impacts to soils, geology, human health, or water.

The following guidelines and documents informed the detailed planning of the works phase:

- Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA) in particular;
- C532 Control of water pollution from construction sites: guidance for consultants and contractors (Masters-Williams et al, 2001); and
- SP156 Control of water pollution from construction sites - guide to good practice (Murnane et al, 2002).
- Requirements for the protection of fisheries habitat during construction and development works at river sites developed by the ERFB.

3.3.3 Invasive Species Management

The introduction and/or spread of invasive species such as Japanese Knotweed and Himalayan Knotweed for example, could result in the establishment of the species and this may have knock on effects on the surrounding environs.

Third Schedule invasive species, Bohemian Knotweed (*Fallopia bohemica*), was recorded in one area along the grid connection route on both sides of the road in the townland of Boolnadrum (approx. grid ref. E300394; N155108 to E300347; N155089). All works in this area were confined to the existing road and did not impact on this Third Schedule species. No significant effect in relation to invasive species has occurred.

3.4 Operational Phase

No works are required during the operational phase of the Grid Connection and therefore there is no potential for effects on any environmental media.

3.5 Decommissioning Phase

The cable grid connection forms an integral part of the local electricity network. Therefore, it is intended that the cables will be retained as a permanent structure and will not be decommissioned.

4. POPULATION & HUMAN HEALTH

4.1 Introduction

This chapter assesses the potential direct, indirect and cumulative effects, through a description of the impacts, that the subject development may have had during the construction stage and may have during the operational stage on Population and Human Health. Potential effects on human health are also addressed in separate chapters of this remedial Environmental Impact Assessment Report (rEIAR) including Noise and Vibration (Chapter 9), Air (Chapter 8), Water (Chapter 7) and Traffic (Chapter 12).

The assessment of the effects of a development on Population and Human Health includes the following broad areas of investigation:

- Population
- Human Health
- Services and Amenities
- Health and Safety
- Tourism

4.2 Statement of Authority

This section of the EIAR has been prepared by Thomas Blackwell and reviewed by Michael Watson, both of MKO. Thomas has over 15 years of progressive experience in environmental consulting in Ireland and the USA. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin. Michael has over seventeen years' experience in the environmental sector and had worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael completed an MA in Environmental Management at NUI, Maynooth in 1999. Michael is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv).

4.3 Methodology

Information regarding human beings, population, and employment and general socio-economic data were sourced from the Central Statistics Office (CSO), the Wexford County Development Plan 2007 - 2013, Fáilte Ireland and any other literature pertinent to the area. The study includes an examination of the population and employment characteristics of the area. This information was sourced from the results of the Censuses of Ireland 2011 and 2016 which are available on the CSO website, www.cso.ie. Census information is divided into State, Provincial, County, Major Town and District Electoral Division (DED) level, but may not be available for all levels. For the purposes of this section of the rEIAR, a 100m buffer was applied to both sides of the cable route. Settlement and land use within this buffer area are discussed below.

4.4 Receiving Environment

The grid connection cable route crosses a total of 18 no. townlands as listed in Table 1.1 of Section 1.1 of this rEIAR. The grid connection route extends for approximately 28 kilometres from the existing Ballycadden, Gibbet Hill, Ballynancoran, and Knacknalour wind farms to the existing Crory substation in the townland of Tincurry, near Ferns, Co. Wexford. The majority of the grid connection route is located within the public road corridor and does not pass through any significant settlements.

4.4.1 Settlements, Population and Land-use

The overall level of residential development in the area around the grid connection route is low, and comprises mainly one-off houses. There are 174 houses located within 100 metres of the cable route, as shown in Figure 4.1.

Current land-use along the cable route comprises primarily transport, as the subject development works were restricted to the existing road corridor throughout almost its entire length. A short section of the cable route, between the Ballynancoran and Knocknalour wind farms, consists of overhead line that crosses agricultural land. The surrounding land comprises mainly agriculture with some one-off rural residential housing. On the lands within the wider area, agriculture, forestry and some residential developments comprise the primary land-uses.

4.4.2 Services and Amenities

The nearest large settlement to the development is the town of Bunclody, which, at its nearest point, is located approximately 3 kilometres west of the Gibbet Hill end of the underground cable. The southern end of the cable route terminates approximately 2.3 kilometres southwest of the village of Ferns. A description of the nearest main services and amenities to the grid connection location is provided below.

4.4.2.1 Education

There are two primary schools located immediately adjacent to the cable route. Ballyroebuck National School is located in the townland of Ballyroebuck, approximately 6.5 kilometres east of Bunclody, towards the northern end of the cable route. Tombrack National School is located in the townland of Tombrack, approximately 3 kilometres west of Ferns.

The secondary school located closest to cable route is F.C.J. Bunclody, located in the town of Bunclody approximately 3 kilometres east of the cable route, at its nearest point. Bunclody Vocational College is also located in the town of Bunclody, approximately 3.5 kilometers east of the cable route.

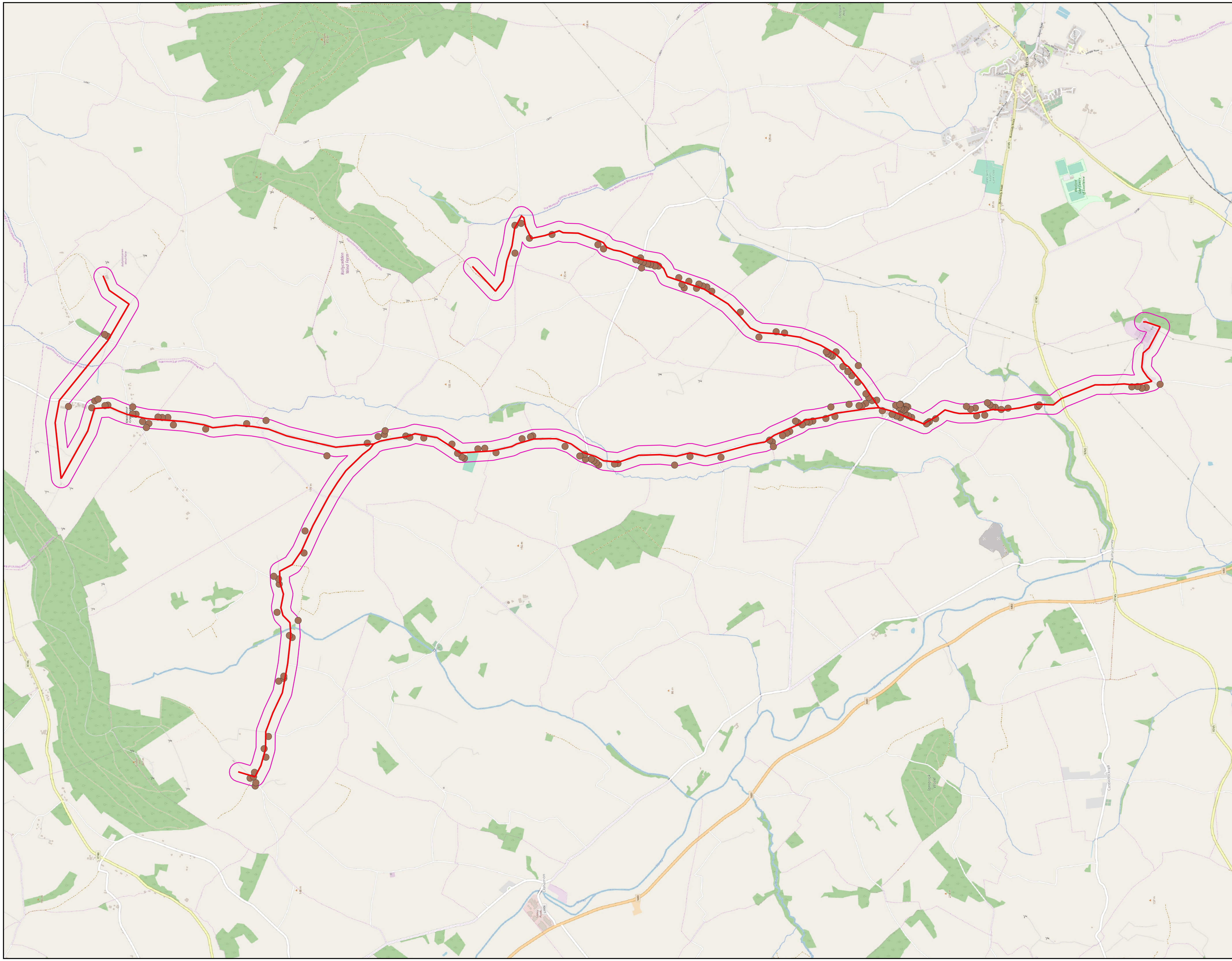
The nearest third-level institution is Institute of Technology Carlow located approximately 29 kilometres northwest of the cable route

4.4.2.2 Access and Public Transport

The nearest National Roads are the N11 National Primary Route (Dublin to Wexford), which passes through the village of ferns approximately 1.9 kilometres southeast of cable route, and the N80 (Portlaoise to Enniscorthy) which is located west of the River Slaney approximately 2 kilometres from the cable route at its nearest point.

The development site is also accessible from the R745 Regional Roads which crosses the underground cable route. The cable route itself is located along local roads which can be accessed via the above regional road.

The cable route itself is not served by public transport. The nearest functioning train station to the subject development site is in Enniscorthy, located approximately 9.2 kilometres south of the site. Bus connections are available from the village of Ferns. Train routes from Enniscorthy serve Dublin, Wexford, and Rosslare. Bus routes from Ferns serve Dublin and Wexford from where further connections are available nationwide. Dublin Airport is located approximately 85 kilometres north of the cable route. Rosslare Europort is located approximately 50 kilometres southeast of the cable route.



Map Legend

- Grid Connection Route
- 100m Buffer
- Houses within 100m

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Drawing Title

Adjacent Houses

Project Title	Crory Wind Farm Group Grid Connection
Drawn By: TJB	Checked By: MW
Project No.: 190806	Drawing No.: Figure 4.1
Scale: 1:35000	Date: 06.01.20

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4.4.2.3 Amenities and Community Facilities

Most of the local available amenities and community facilities, such a golf club, other sports clubs and recreational areas, and a Library are located in Bunclody, which is the nearest town to the subject development site. Kilrush Askamore GAA club is located directly adjacent to the cable route near Ballyroebuck. St. Aidan's GAA Club and the Wexford GAA Centre of Excellence are both located in close proximity to the site.

Numerous churches are located close to the cable route, with the nearest being located in the village of Ferns which is approximately 3 kilometres south east of the cable route.

St. John's Community Hospital is in Enniscorthy approximately 10 kilometres from the cable route.

4.4.3 Tourism

Ireland is divided into seven tourism regions. The South East region, in which the site is located, comprises Counties Carlow, Kilkenny, Tipperary, Waterford and Wexford. This Region benefited from approximately 11% of the total number of overseas tourists to the country and approximately 6% of the associated tourism income generated in Ireland in 2018.

There are no tourist attractions pertaining specifically to the site of the cable route. Key attractions in the area are the village of Ferns with its castle and cathedral which is located approximately 3 kilometres southeast of the cable route.

Enniscorthy Castle is located approximately 9 kilometres south of the site. Built in the 13th century the castle houses a visitor centre that highlights the history of the castle and the town of Enniscorthy.

Local walking and hiking trails include the Askamore walks and trails, which are of various lengths from 6 to 12 kilometres. These are located approximately 3.3 kilometres east of the cable route at their nearest point.

There is limited scope for visual impacts associated with the subject development as the majority of the cable is underground. The potential for visual impacts arising from the development on the wider landscape is assessed in Chapter 10 of this rEIAR and concludes that the project will have negligible impact.

4.5 Human Health and Safety

4.5.1 Electric Magnetic Fields

The provision of underground and overhead electric cabling of the capacity of the installed grid connection cable is common practice throughout the country and installation to the required specification does not give rise to any specific health concerns. The extremely low frequency (ELF) electric and magnetic fields (EMF) expected to be associated with the operation of the grid connection fully comply with the international guidelines for ELF-EMF set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), a formal advisory agency to the World Health Organisation, as well as the EU guidelines for human exposure to EMF. Accordingly, there will be no operational effect on properties (residential or other uses) as the ICNIRP guidelines will not be exceeded at any distances even directly above or below the cables.

The ESB document "EMF & You: Information about Electric & Magnetic Fields and the electricity transmission system in Ireland" (ESB, 2017) provides further practical information on EMF and is included as Appendix 4-1 of this rEIAR.

4.5.2 Assessment of Effects on Human Health

As set out in the Department of Housing, Planning, Community and Local Government Key Issues Consultation Paper on the Transposition of the EIA Directive 2017, the consideration of the effects on populations and on human health should focus on health issues and environmental hazards arising from the other environmental factors, for example water contamination, air pollution, noise, accidents, disasters.

Underground and overhead cabling are not recognised sources of pollution. The construction of these elements is not an activity that falls within any thresholds requiring Environmental Protection Agency licensing under the Environmental Protection Agency Licensing Act 1992, as amended. As such, the grid connection is not considered to have any ongoing significant emissions to environmental media and the subsequent potential for human health effects.

Chapters 6: Land, Soils & Geology, Chapter 7: Hydrology and Hydrogeology, Chapter 8: Air and Climate and Chapter 10: Noise and Vibration provide an assessment of the effects of the development on these areas of consideration. There is the potential for negative effects on human health during the construction phase related to potential emissions to air of dust, potential emissions to land and water of hydrocarbons and noise emissions. The use of best practice during the construction phase successfully mitigated the risk of potential emissions and the assessments show that the residual impacts are not significant and have not led to significant effects on any environmental media. On this basis, the potential for negative health effects associated with this development is negligible.

4.5.3 Vulnerability of the Project to Natural Disaster

As outlined in Section 4.6.2 above, electrical cabling is not a recognised source of pollution. Should a major accident or natural disaster occur the potential sources of pollution onsite during operational phases are limited. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects on health such as bulk storage of hydrocarbons or chemicals, storage of wastes etc. do not exist.

There is limited potential for significant natural disasters to occur within the subject development site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to flooding or fire. The risk of flooding is addressed in Chapter 8: Hydrology and Hydrogeology. As described earlier, there are no significant sources of pollution in the development with the potential to cause environmental or health effects.

Major industrial accidents involving dangerous substances pose a significant threat to humans and the environment; such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident. The development site is not regulated or connected to or close to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO sites, and so there is no potential effects from this source.

4.6 Likely, Significant Effects of the Project and Associated Mitigation Measures

4.6.1 Construction Phase

4.6.1.1 Health and Safety

The civil works for the grid connection involved the construction of joint bays, excavation of trenches, installation of ducting, backfilling and re-instatement of excavated ground for the underground cable.

Directional drilling was used to facilitate one stream crossing. The grid connection works required the use of machinery along the public road, which in the absence of mitigation or health and safety plans could have posed a potential hazard to construction workers and members of the public. This is considered to be a short-term potential significant negative impact.

Mitigation Measures Implemented

During construction phase of the development all staff were made aware of and adhered to the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2006'. This encompasses the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan.

All works were carried out in a safe manner and members of the public were informed through the provision of advance notification and advised in relation to any temporary localised traffic management protocols (e.g. local stop-go traffic control systems etc.). Works areas were marked and segregated from the general public, through the use of cones and tape.

There were no accidents or safety incidents recorded during the construction phase of the project. Implementation of the measures described above successfully mitigated the potential significant impacts to Health and Safety.

Residual Impact

Due to the mitigation measures implemented during the construction phase, the residual impact on health and safety was determined to be a **Temporary, slight, negative Impact**

Assessment of Effects

Based on the assessment above there was an overall **Insignificant Effect** on Population and Human Health, in terms of health and safety

4.6.1.2 Population

Those working on the construction phase of the cable route travelled daily to the site from the wider area. The small number of employees, and the relatively short length of the construction phase, meant that the development did not have any impact or associated effect on the population of the Study Area in terms of changes to population trends or density, household number, age structure, or settlement patterns

Assessment of Effects

Based on the assessment above there was **No Significant Effect** on Population as a result of the construction of the project

4.6.1.3 Noise and Vibration

Details on potential noise and vibration impacts and associated effects of the construction phase of the development are included in Chapter 9 of this EIAR. In relation to noise during the construction phase, a precautionary approach has been adopted and Chapter 9 demonstrates that although the construction works of the underground cabling likely gave rise to noise impacts on sensitive receptors in the area, these noise effects were very temporary in nature as the works moved along the underground cable route.

Mitigation Measures Implemented

Best practice measures for noise and vibration control were adhered to onsite during the construction phase of the development in order to mitigate the slight short-term negative effect associated with this phase of the development. The measures include:

- Working methods: construction noise was controlled by restricting construction work to the specified working hours. Any construction work carried out outside of these hours shall be restricted to activities that will not generate noise of a level that may cause a nuisance. The phasing of works has also been designed with regard to avoidance of noise effects.
- Plant was selected taking account of the characteristics of noise emissions from each item. All plant and machinery used on the site complied with E.U. and Irish legislation in relation to noise emissions.
- Operation of plant: all construction operations complied with guidelines set out in British Standard documents 'BS 5338: Code of Practice for Noise Control on Construction and Demolition Sites' and 'BS5228: Part 1: 1997: Noise & Vibration Control on Construction and Open Sites'. The correct fitting and proper maintenance of silencers and/or enclosures, the avoidance of excessive and unnecessary revving of vehicle engines, and the parking of equipment in locations that avoid possible effects on noise-sensitive locations was employed.

Residual Impact

Due to the mitigation measures implemented during the construction phase, the residual noise impact associated with the construction of the project was a **Likely, temporary, slight negative impact.**

There was no impact from vibration effects during the construction phase.

Significance of Effects

Based on the assessment above there was **No Significant Effect** on human health, in terms of construction phase noise.

4.6.1.4 Dust

Some minor emissions associated with construction vehicles and plant, and excavation of soils are likely to have occurred. This potential impact will not have been significant and was restricted to the active construction area and also limited to the duration of the construction phase of the development. This had the potential to have a temporary, slight, negative impact.

Mitigation Measures Implemented

Construction best practices were implemented to reduce the potential for fugitive dust during the construction phase. These practices include the use of tarpaulins when transporting excavated material from the site, and good site maintenance. The implementation of these measures largely mitigated any potential negative effects in terms of dust emissions.

Residual Impact

Temporary, imperceptible, negative impact.

Assessment of Effects

Based on the assessment above there were **No Significant Effects** on human health, in terms of dust emissions.

4.6.1.5 Tourism and Amenity

As there were some traffic restrictions in place through the construction phase, there was likely a short-term slight negative effect to local tourism. Impacts associated with the grid connection cabling were limited to the active construction area and were temporary in nature.

Mitigation

Construction of the subject development was designed to work in conjunction with a traffic management plan which was developed to ensure a safe system of works, allowing access to be maintained during the construction period. Where road closures were required to facilitate underground cabling works along narrow stretches of the public road, appropriate diversions and alternative routes for through traffic were put in place.

Residual Impact

Temporary, imperceptible negative impact.

Significance of Effects

There was likely **No Signficant Effect** on people, in terms of traffic and hence on tourism and amenity.

4.6.2 Operational Phase

There are no potential effects on Population and Human Health during the operational phase of the development because all required works were completed during the construction phase. There are no emissions associated with the operational phase, in terms of dust or noise and vibration.

The road corridors in which underground cable was constructed have been fully reinstated, leaving no visible above-ground evidence of the works, other than required safety markers, that have the potential to give rise to any operational phase effects.

Significance of Effects

There is a likely, imperceptible, positive, long term effect on Population and Human Health associated with the Operational Phase of the project.

4.6.3 Cumulative Impact Assessment

The projects considered as part of the cumulative impact assessment are described in Section 2.3.2 of this rEIAR in Chapter 2: Background to the Development. These projects include the Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour wind farms, other windfarms in close proximity to the subject development, and other minor projects.

Potential cumulative effects associated with dust and noise are addressed in Chapters 8 and 9 of the rEIAR. Potential cumulative effects associated with traffic are addressed in Chapter 12.

4.6.3.1 Effects on Population

A local contractor was used to install the grid connection cable. Those working on the subject development travelled daily to the site from the wider area. Similarly, due to the relatively short construction phase of the windfarms, those working on the wind farms likely travelled daily to the sites from the wider area. Therefore, construction of this project and the construction of others listed in Section 2.3.2 had no effect on the population of the Study Area in terms of changes to population trends or density, household size or age structure.

4.6.3.2 Effects on Human Health

The grid connection connects to, and facilitates the operation of the Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour wind farms, and therefore the potential for cumulative effects does exist between the grid connection and the wind farms. Any imperceptible impact that the grid connection may have had on Human Health was temporary in nature and related to the construction phase of the project. The windfarms were constructed in accordance with the conditions of their respective planning consents and were subject to Environmental Impact Assessments. It was determined that the construction of the windfarms would have no significant effects on the environment, including Human Health. Therefore, any cumulative effects between the construction phase of the grid connection and the wind farms was negligible. Other developments outlined in Section 2.3.2 of this rEIAR considered as part of this cumulative effect assessment are relatively local in nature and the potential for cumulative effects between them and the grid connections are negligible Since there are no effects on Human Health associated with the operational phase of grid connection there is no potential for cumulative effects during the operational phase of the project.

4.7 Summary

Based on the analysis above there are **no significant effects** on population and human health resulting from the construction and continued operation of the subject development.

5. BIODIVERSITY FLORA AND FAUNA

5.1 Introduction

This section of the remedial Environmental Impact Assessment Report (rEIAR) is based on a desktop assessment and field surveys that were carried out along the cable route. Works were completed by suitably qualified ecologist, Laoise Kelly (B.Sc.) from MKO. A field survey was undertaken on the 14^{th} and 15^{th} of November 2019. The development consists of a medium voltage 20kV grid connection that comprises c. 26km of 20kV underground cable and c. 2km of 20kV overhead powerline laid within the road corridor and agricultural land. The sections below provide information on the baseline environment and assesses the potential for impacts (direct, indirect and cumulative) on the flora and fauna present within and surrounding the works areas.

The following defines terms utilised in this chapter:

- For the purposes of this rEIAR, where the 'development site' or 'the site' is referred to, this relates to the primary study area for the development, as delineated in red on the rEIAR figures (maps). "Development Footprint" refers to the construction envelope.
- "Zones of Influence" (ZOI) for individual ecological receptors refers to the zone within which potential effects are anticipated ZOIs were assigned following best available guidance.

5.1.1 Objectives

The key objectives of this assessment include:

- Carry out a desktop assessment of the baseline ecological characteristics of the locations of the underground and overhead grid connection route;
- Evaluate the ecological significance of the route of the underground and overhead grid connection in the context of flora and fauna;
- Assess the direct, indirect and cumulative impacts of the underground and overhead grid connection on ecological receptors within and surrounding the development; and
- Assess the effectiveness of the mitigation used during the construction and operational phases of the development.

5.1.2 Legislation and Ecological Guidance

This report has been prepared having regard to legislation aimed at the protection of wild flora and fauna and referenced throughout the Environmental Impact Statement:

- The Habitats Directive 92/43/EEC
- The Birds Directive 79/409/EEC
- EIA Directive 2011/92/EU and Directive 2014/52/EU
- EU Water Framework Directive (2000/60/EC)
- The European Communities (Birds and Natural Habitats) Regulations 2011 (transposes EU Birds Directive2009/147/EC and EU Habitats Directive 2009/147/EC, 92/43/EC)
- Irish Wildlife Act 1976 to 2019

The following ecological guidance documents were consulted during the preparation of this Environmental Impact Assessment Report.

- *Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater Coastal* and Marine version 1.1. (CIEEM, 2018).
- *Guidelines for assessment of Ecological Impacts of National Road Schemes*, (NRA, 2009).

- *Advice Notes on Current Practice (in preparation of Environmental Impact Statements)* (Environmental Protection Agency (EPA), 2003).
- *Guidelines on the information to be contained in Environmental Impact Statements* (EPA, 2002).
- *Draft Revised guidelines on the information to be contained in Environmental Impact Statements* (EPA, 2017).
- *Environmental Impact Assessment of National Road Schemes –A Practical Guide* (NRA, 2009).
- *Guidelines for assessment of Ecological Impacts of National Road Schemes*, (NRA, 2009). (referred to hereafter as the NRA Ecological Impact Assessment Guidelines)
- *Environmental Assessment and Construction Guidelines* (NRA, 2006).

5.1.3 Statement of Authority

Ecological baseline surveys were conducted by MKO ecologist Laoise Kelly (B.Sc.). All MKO ecologists have relevant academic qualifications and are competent experts in undertaking habitat and ecological assessments to this level.

This rEIAR chapter has been prepared by a competent expert, Laoise Kelly and reviewed by John Hynes B.Sc. (Env.) M.Sc. (Eco) MCIEEM).

5.1.4 Methodology and Limitations

The habitats, flora and fauna of the site were assessed by means of a desk study of literature pertinent to the site and surrounding area, and field surveys including a survey of habitats and flora and walkover faunal surveys along with general observation work. Seasonal factors that affect distribution patterns and habits of species were considered when conducting the surveys and the potential of the site to support certain populations (in particular those of conservation importance that may not have been recorded during the field survey due to their seasonal absence or cryptic nature) was assessed.

5.1.5 Desktop Review

The desk study undertaken for this assessment included a thorough review of the available ecological data including the following

- Review of online web-mappers: National Parks and Wildlife Service (NPWS), Teagasc, EPA, Water Framework Directive (WFD),
- Review of the publicly available National Biodiversity Data Centre (NBDC) web-mapper
- Records from the NPWS web-mapper and NPWS database as requested for the relevant hectads pertaining to the site
- Review of impact assessments associated with nearby developments including wind farms

5.1.6 Scoping and Consultation

MKO undertook a scoping exercise during preparation of this rEIAR, as described in Section 2.8 in Chapter 2 of this rEIAR. Table 2.2, Chapter 2 of the rEIAR, provides a list of the organisations consulted with regard to biodiversity during the scoping process, and notes where scoping responses were received.

Copies of all scoping responses are included in Appendix 2-1 of this rEIAR. The recommendations of the consultees have informed the rEIAR preparation process and the contents of this chapter. Table 2.2 in Chapter 2 of this rEIAR describes where the comments raised in the scoping responses received have been addressed in this assessment.

5.2 Field Surveys

A comprehensive survey of the flora and fauna of the site of the underground and overhead grid connection development has been undertaken.

The following paragraphs fully describe the ecological surveys that have been conducted and provide details of the methodologies followed, dates of survey and guidance followed.

5.2.1 Multi-disciplinary Walkover Surveys (as per NRA Guidelines, 2009)

The multi-disciplinary walkover survey comprehensively covered the entire study area. The surveys were carried out in accordance with NRA *Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna* on National Road Schemes (NRA, 2009).

The surveys carried out on the 14th and 15th of November 2019 assessed the habitats present along the constructed grid connection route. Surveys were undertaken outside of the optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith *et al.*, 2011), however habitats were confined to the road corridor and agricultural land and were common in a local and national context and readily identifiable. Habitats were classified in accordance with the Heritage Council's *'Guide to Habitats in Ireland'* (Fossitt, 2000).

The walkover survey was designed to detect the presence, or likely presence, of a range of protected species, including Otter, Fish species, Badger, Irish Hare, Pine Marten, Red Squirrel, Pygmy Shrew, Irish Stoat, Hedgehog, Amphibians and Bats. The surveys included a search for badger setts, areas with suitable habitats, potential features likely to be of significance to bats and additional habitat features for the full range of other protected species that are likely to occur in the vicinity of the subject grid connection route (e.g. otter etc.).

During the multidisciplinary survey, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted.

5.2.2 Faunal Surveys

A general walkover faunal survey was undertaken of the entire length of the cable route including c. 26 km of 20 kV underground cable and c. 2 km of 20 kV overhead powerline and connection to the existing 110kv Crory substation. Following the completion of the ecological walkover surveys, no requirement for further dedicated faunal surveys was identified due to the nature of the grid connection route within the road corridor and agricultural land.

Watercourse crossings along the grid connection route were identified as providing potential habitat for Otter and were subject to specialist targeted survey. The Otter surveys were conducted as per NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes). This involved a search for all Otter signs e.g. spraints, prints, slides, trails, couches and holts. In addition to the width of the rivers/watercourses, a 10m riparian buffer (both banks) was considered to comprise part of the Otter habitat (NPWS 2009), *Threat Response Plan: Otter (2009-2011).* Areas identified as providing potential habitat for badger were subject to specialist targeted survey e.g. agricultural land. The badger survey was conducted adhering to best practice guidance and followed the *'Guidelines for the Treatment of Badger Prior to the Construction of National Roads Schemes'* (NRA, 2006a). The badger surveys were conducted in order to determine the presence or absence of badger signs within and outside the development footprint and study area. This involved a search for all potential badger signs (latrines, badger paths and setts). If encountered, setts would be classified as per the convention set out in the NRA (2006) guidelines (i.e. main, annexe, subsidiary, outlier). Areas identified as providing potential habitats for Bats were subject to specialist targeted survey. Trees and bridges along the subject grid connection route have the potential to provide roosting sites for bats within crevices, cracks or holes in their structures.

Structures with potential to support roosting and foraging/commuting bats were assessed in accordance with Table 4.1 of BCT (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines*.

5.2.2.1 Invasive Species

During the multi-disciplinary walkover surveys, a search for non-native invasive species was undertaken. The survey focused on the identification of invasive species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (As Amended) (S.I. 477 of 2015).

5.2.3 Methodology for Assessment of Effects

5.2.3.1 Geographical Framework

The importance of the ecological features identified within the study area was determined with reference to a defined geographical context. This was undertaken following a methodology that is set out in Chapter 3 of the 'Guidelines for Assessment of Ecological Impacts of National Roads Schemes' (NRA, 2009). These guidelines set out the context for the determination of value on a geographic basis with a hierarchy assigned in relation to the importance of any particular receptor. The guidelines provide a basis for determination of whether any particular receptor is of importance on the following scales:

- International
- National
- County
- Local Importance (Higher Value)
- Local Importance (Lower Value)

Locally Important (lower value) receptors contain habitats and species that are widespread and of low ecological significance and of any importance only in the local area. Internationally important sites are designated for conservation as part of the Natura 2000 Network (SAC or SPA) or provide the best examples of habitats or internationally important populations of protected flora and fauna.

5.2.3.2 Determining the Significance of Effects

The ecological significance of the effects of the development are determined following the precautionary principle and in accordance with the methodology set out in Section 5 of CIEEM (2018).

For the purpose of EcIA, 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local (CIEEM, 2018).

When determining significance, consideration is given to whether:

- Any processes or key characteristics of key ecological receptors will be removed or changed
- There will be an effect on the nature, extent, structure and function of important ecological features
- There is an effect on the average population size and viability of ecologically important species.
- There is an effect on the conservation status of important ecological habitats and species.

The EPA draft guidelines on information to be included in Environmental Impact Statements (EPA, 2017) and the *Guidelines for assessment of Ecological Impacts of National Road Schemes*, (NRA, 2009) were also considered when determining significance and the assessment is in accordance with those guidelines.

The terminology used in the determination of significance follows the suggested language set out in the Draft EPA Guidelines (2017) as shown in Table 5-1 below.

Table 5.1 Criteria for determining significance of effect, based on (EPA, 2017) guidelines

Effect Magnitude	Definition
No change	No discernible change in the ecology of the affected feature.
Imperceptible effect	An effect capable of measurement but without noticeable consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight effect	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate effect	An effect that alters the character of the environment that is consistent with existing and emerging trends.
Significant effect	An effect which, by its character, its magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound effect	An effect which obliterates sensitive characteristics.

5.2.3.3 Limitations

The information provided in this rEIAR chapter accurately and comprehensively describe the baseline ecological environment; provides an accurate prediction of the likely ecological effects of the development; has prescribed mitigation as necessary; and, describes the residual ecological impacts. The specialist studies, analysis and reporting have been undertaken in accordance with the appropriate guidelines.

No significant limitations in the scope, scale or context of the assessment have been identified.

5.3 Baseline Conditions and Receptor Evaluation

This section of the report provides details in relation to the findings of the desktop review and consultation undertaken to inform the baseline characteristics of the grid connection development.

5.3.1 Desktop Review

5.3.1.1 Identification of Designated Sites within the Likely Zone of Influence of the Development

The potential for the development to impact on sites that are designated for nature conservation was considered in this Ecological Impact Assessment.

Special Areas of Conservation (SACs) and Special Protection Areas for Birds (SPAs) are designated under EU Habitats Directive and are collectively known as 'European Sites'. The potential for effects on European Sites as a result of the development is fully considered in the remedial Natura Impact Statement that accompanies this application and discussed also in this chapter of the rEIAR.

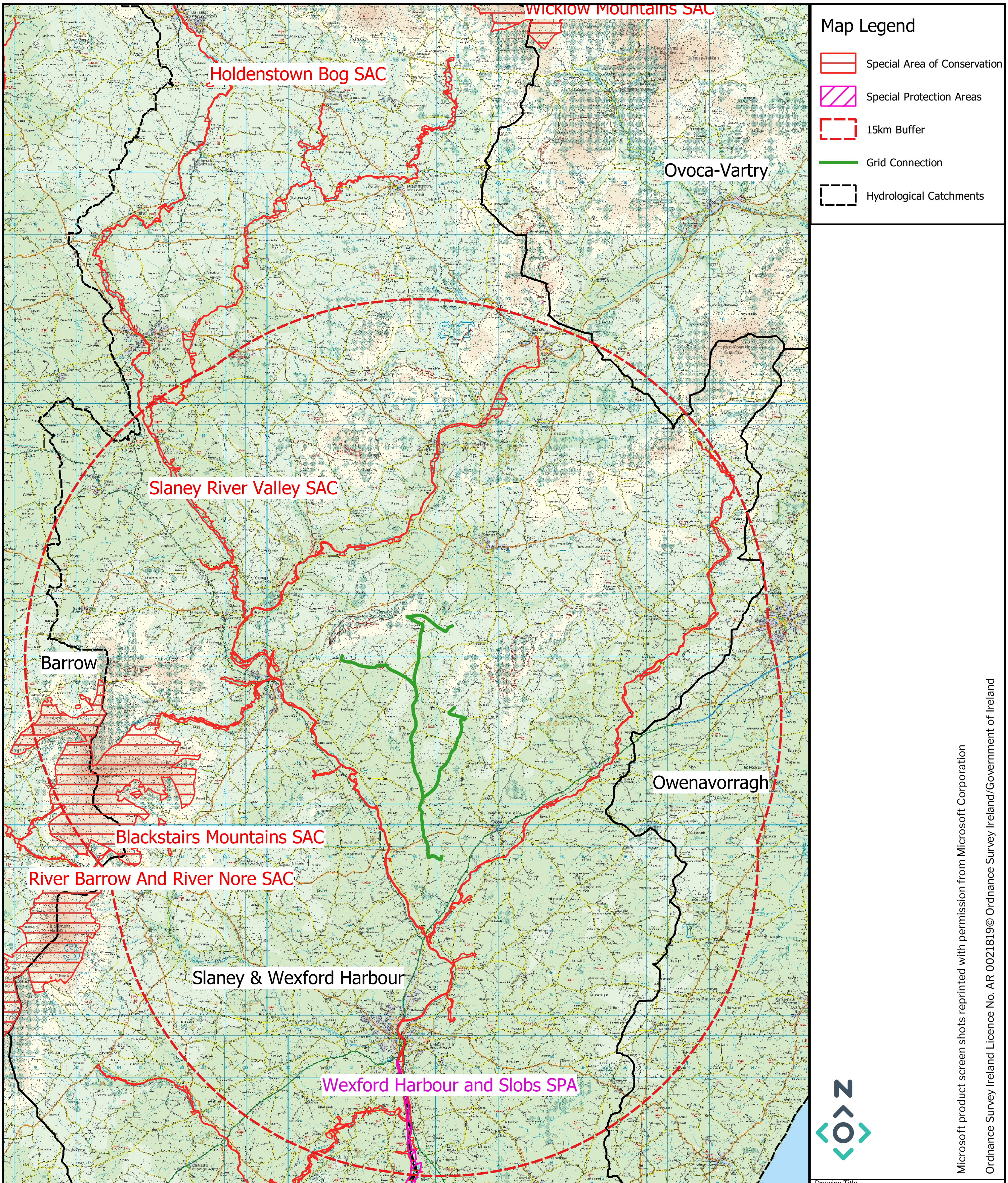
Natural Heritage Areas (NHAs) are designated under the Wildlife (Amendment) Act 2000 and their management and protection is provided for by this legislation and planning policy. The potential for effects on these designated sites is fully considered in this chapter of the rEIAR.

Proposed Natural Heritage Areas (pNHAs) were designated on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. However, the potential for effects on these designated sites is fully considered in this rEIAR.

The following methodology was used to establish which sites that are designated for nature conservation have the potential to be impacted by the grid connection development:

- Initially the most up to date GIS spatial datasets for European and Nationally designated sites and water catchments were downloaded from the NPWS website (www.npws.ie) and the EPA website (www.epa.ie) on the 03/03/2020. The datasets were utilised to identify Designated Sites which could feasibly be affected by the development.
- All designated sites within a distance of 15km surrounding the development site were identified. In addition, the potential for connectivity with European or Nationally designated sites at distances of greater than 15km from the development was also considered in this initial assessment.
- A map of all the European Sites within 15km is provided in Figure 5.1 with all Nationally designated sites shown in Figure 5.2.
- **Error! Reference source not found.** provides details of all European and Nationally designated sites within 15km of the grid connection development. All European Designated Sites are fully described and assessed in the Screening for Appropriate Assessment and Natura Impact Statement reports submitted as part of this planning application.
- The designation features of these sites, as per the NPWS website (www.npws.ie), were consulted and reviewed at the time of preparing this report 03/03/2020.

Where there was potential for any nationally designated sites to have been impacted by the grid connection works these have been assessed in Section 5.5.3.1. of this report.



Drawing Title	European Designated Sites within 15km
Project Title	A & L Goodbody Crory WF Group
Drawn By: AJ	Checked By: LK
Project No.: 190806	Drawing No.: Figure 5.1
Scale: 1:240963	Date: 12.02.2020

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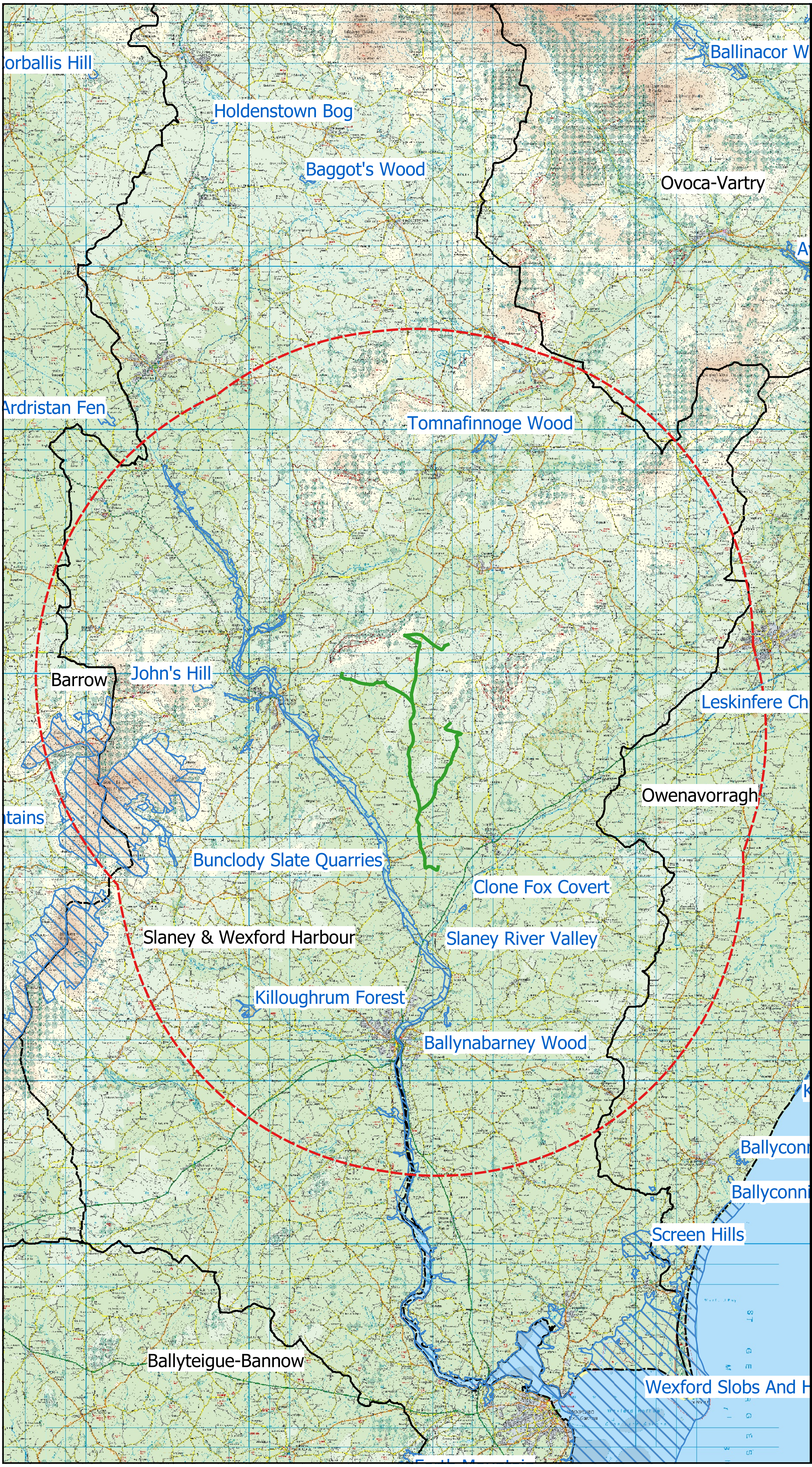

Map Legend

- Proposed Natural Heritage Area
- Grid Connection Route
- 15km Buffer
- Hydrological Catchments

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Drawing Title	Nationally Designated Sites within 15Km
Project Title	A&L Goodbody Crory WF Grid Connection
Drawn By: LK	Checked By: JH
Project No.: 190806	Drawing No.: Fig 5.2
Scale: 1:250000	Date: 25.02.2020

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Table 5.2 Designated sites within 15km of the development

European Site	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (www.npws.ie, 25/02/2020)	Conservation Objectives
Special Area of Conservation		
Slaney River Valley SAC (000781) **Distance:** 1.5km from the subject grid connection route.	- Estuaries [1130] - Mudflats and sandflats not covered by seawater at low tide [1140] - Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] - Mediterranean salt meadows (*Juncetalia maritimi*) [1410] - Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] - Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] - Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] - *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] - *Petromyzon marinus* (Sea Lamprey) [1095] - *Lampetra planeri* (Brook Lamprey) [1096] - *Lampetra fluviatilis* (River Lamprey) [1099] - *Alosa fallax fallax* (Twaite Shad) [1103] - *Salmo salar* (Salmon) [1106] - *Lutra lutra* (Otter) [1355] - *Phoca vitulina* (Harbour Seal) [1365]	Detailed conservation objectives for this site (Version 1, October 2011) were reviewed as part of the assessment and are available at www.npws.ie
Blackstairs Mountains SAC (000770) **Distance:** 8.0km from the subject grid connection route.	- Northern Atlantic wet heaths with *Erica tetralix* [4010] - European dry heaths [4030]	Detailed conservation objectives for this site (Version 1, November 2019) were reviewed as part of the assessment and are available at www.npws.ie
River Barrow and River Nore SAC (002162) **Distance:** 14.2km from the subject grid connection route.	- Estuaries [1130] - Mudflats and sandflats not covered by seawater at low tide [1140] - Reefs [1170] - Salicornia and other annuals colonising mud and sand [1310] - Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] - Mediterranean salt meadows (*Juncetalia maritimi*) [1410] - Water courses of plain to montane levels with the *Ranunculion fluitantis*	Detailed conservation objectives for this site (Version 1, July 2011) were reviewed as part of the assessment and are available at www.npws.ie

European Site	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (www.npws.ie, 25/02/2020)	Conservation Objectives
	and *Callitricho-Batrachion* vegetation [3260] - European dry heaths [4030] - *Hydrophilous* tall herb fringe communities of plains and of the montane to alpine levels [6430] - Petrifying springs with tufa formation (*Cratoneurion*) [7220] - Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] - Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] - *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016] - *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] - *Austropotamobius pallipes* (White-clawed Crayfish) [1092] - *Petromyzon marinus* (Sea Lamprey) [1095] - *Lampetra planeri* (Brook Lamprey) [1096] - *Lampetra fluviatilis* (River Lamprey) [1099] - *Alosa fallax fallax* (Twaite Shad) [1103] - *Salmo salar* (Salmon) [1106] - *Lutra lutra* (Otter) [1355] - *Trichomanes speciosum* (Killarney Fern) [1421] - *Margaritifera durrovensis* (Nore Pearl Mussel) [1990]	
Special Protection Area		
Wexford Harbour and Slobs SPA (004076) **Distance:** 9.7km from the subject grid connection route.	- Little Grebe (*Tachybaptus ruficollis*) [A004] - Great Crested Grebe (*Podiceps cristatus*) [A005] - Cormorant (*Phalacrocorax carbo*) [A017] - Grey Heron (*Ardea cinerea*) [A028] - Bewick's Swan (*Cygnus columbianus bewickii*) [A037] - Whooper Swan (*Cygnus cygnus*) [A038] - Light-bellied Brent Goose (*Branta bernicla hrota)* [A046] - Shelduck (*Tadorna tadorna*) [A048] - Wigeon (*Anas penelope*) [A050] - Teal (*Anas crecca*) [A052] - Mallard (*Anas platyrhynchos*) [A053] - Pintail (*Anas acuta*) [A054] - Scaup (*Aythya marila*) [A062]	Detailed conservation objectives for this site (Version 1, March 2012) were reviewed as part of the assessment and are available at www.npws.ie

European Site	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (www.npws.ie, 25/02/2020)	Conservation Objectives
	- Goldeneye (*Bucephala clangula*) [A067] - Red-breasted Merganser (*Mergus serrator*) [A069] - Hen Harrier (*Circus cyaneus*) [A082] - Coot (*Fulica atra*) [A125] - Oystercatcher (*Haematopus ostralegus)* [A130] - Golden Plover (*Pluvialis apricaria*) [A140] - Grey Plover (*Pluvialis squatarola*) [A141] - Lapwing (*Vanellus vanellus*) [A142] - Knot (*Calidris canutus*) [A143] - Sanderling (*Calidris alba*) [A144] - Dunlin (*Calidris alpina*) [A149] - Black-tailed Godwit (*Limosa limosa*) [A156] - Bar-tailed Godwit (*Limosa lapponica*) [A157] - Curlew (*Numenius arquata*) [A160] - Redshank (*Tringa totanus*) [A162] - Black-headed Gull (*Chroicocephalus ridibundus*) [A179] - Lesser Black-backed Gull (*Larus fuscus*) [A183] - Little Tern (*Sterna albifrons*) [A195] - Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] - Wetland and Waterbirds [A999]	
Natural Heritage Area		
No NHAs within 15km of the development		
Proposed Natural Heritage Area		
Slaney River Valley (000781) **Distance:** 1.6km from the subject grid connection route.	- N/A	- N/A
Clone Fox Covert (000755) **Distance:** 2.2km from the subject grid connection route	- N/A	- N/A

European Site	Qualifying Interests/Special Conservation Interests for which the European Site has been designated (www.npws.ie, 25/02/2020)	Conservation Objectives
Bunclody Slate Quarries (000750) **Distance:** 5.3km from the subject grid connection route	N/A	N/A
John's Hill (000808) **Distance:** 6.3km from the subject grid connection route	N/A	N/A
Ballynabarney Wood (000746) **Distance:** 6.7km from the subject grid connection route	N/A	N/A
Blackstairs Mountains (000770) **Distance:** 8.0km from the subject grid connection route	N/A	N/A
Tomnafinnogue Wood (001852) **Distance:** 9.3km from the subject grid connection route	N/A	N/A
Killoughrum Forest (000765) **Distance:** 9.7km from the subject grid connection route	N/A	N/A
Leskinfere Church (000702) **Distance:** 11.9km from the subject grid connection route	N/A	N/A

5.3.1.2 Habitats, Flora and Fauna

The following sections provide the desk study sources consulted and results obtained during the desk study assessment.

5.3.1.2.1 *National Parks and Wildlife Service Protected Species Records*

NPWS online records were searched to see if any rare or protected species of flora or fauna have been recorded from hectads S94, S95 and T05. An information request was also sent to the NPWS requesting records from the Rare and Protected Species Database. **Error! Reference source not found.** and

list rare and protected species records obtained from NPWS.

Table 5.3 Records of European Protected Species NPWS S94, S95 and T05

Common Name	Scientific Name	Hectad	Status
Otter	*Lutra lutra*	S94, S95 & T05	Annex II, IV, WA 1976-2019
Pine Marten	*Martes martes*	S94, S95 & T05	Annex V, WA 1976-2019
Common Frog	*Rana temporaria*	S94, S95 & T05	Annex V, WA 1976-2019
Freshwater Pearl Mussel	*Margaritifera margaritifera*	S94, S95 & T05	Annex II, V, WA 1976-2019
River Lamprey	*Lampetra fluviatilis*	S94, S95 & T05	Annex II, V
Sea Lamprey	*Petromyzon marinus*	S94, S95 & T05	Annex II
Irish Hare	*Lepus timidus hibernicus*	S94, S95 & T05	Annex V, WA 1976-2019
Eurasian Badger	*Meles meles*	S94, S95 & T05	WA 1976/2019
Irish Stoat	*Mustela erminea subsp. hibernica*	T05	WA 1976/2019
Hedgehog	*Erinaceus europaeus*	S95, T05	WA 1976/2019

Annex II, Annex IV, Annex V – of EU Habitats Directive, Wildlife Acts – Irish Wildlife Acts (1976, 2019).

Table 5.4 Records of species protected under the Flora Protection Order 2015 or listed in the Irish Red Data Book for Vascular Plants

Common Name	Scientific Name	Hectad	Status
Musk Thistle	*Carduus nutans*	S95	FPO, RL (Vulnerable)
Cornflower	*Centaurea cyanus*	S95	FPO, RL (Extinct)
Narrow-Leaved Helleborine	*Cephalanthera longifolia*	S94	FPO, RL (Vulnerable)
Basil Thyme	*Clinopodium acinos*	S95	FPO, RL (Vulnerable)
Blue Fleabane	*Erigeron acer*	S94, S95	FPO, RL (Vulnerable)
Small Cudweed	*Filago minima*	S95	FRO (Near Threatened)

Common Name	Scientific Name	Hectad	Status
Opposite-Leaved Pondweed	*Groenlandia densa*	S94	FPO, RL (Vulnerable)
Sharp-leaved Fluellen	*Kickxia elatine*	S94	RL (Vulnerable)
Yellow Archangel	*Lamiastrum galeobdolon*	S95	RL (Rare)
Lesser Snapdragon	*Misopates orontium*	T05	FPO, RL (Vulnerable)
Bird's-foot	*Ornithopus perpusillus*	S95	RL (Rare)
Greater Broomrape	*Orobanche rapum-genistae*	S94	RL (Rare)
Shepherd's-needle	*Scandix pecten-veneris*	S94	RL (Extinct)
Hairy Violet	*Viola hirta*	S95	FPO, RL (Vulnerable)
Pale Dog-Violet	*Viola lactea*	S95	FPO, RL (Vulnerable)
Bryophytes			
Hasselquist's Hyssop	*Entosthodon fascicularis*	S94	RL (Near threatened)
Blunt-leaved Earwort	*Diplophyllum obtusifolium*	S95	RL (Near threatened)
Spruce's Bristle-moss	*Orthotrichum sprucei*	T05	FPO, RL (Vulnerable)
Weissia brachycarpa var. brachycarpa	*Weissia brachycarpa var. brachycarpa*	S94	RL (Data deficient)
Lichen			
Reindeer Moss	*Cladonia portentosa*	S95	FPO, HD V

FPO – Flora Protection Order (2015) RL – Ireland Red List of Vascular Plants

5.3.1.2.2 *Pearl Mussel (Margaritifera margaritifera)*

The study area is partially located within Slaney-Derry, Slaney-Lower and Slaney-Bann *Margaratifera* sensitive area which are listed as having 'Catchments of other extant populations of *Margaritifera margaritifera'* (NPWS. 2017). Data received from NPWS provides records for this species within the River Slaney downstream of the grid connection works.

There were no instream works as part of the grid connection development therefore there was no impact on Freshwater Pearl Mussel as a result of the works. Consequently, this species is not considered further in this report.

5.3.1.2.3 *National Biodiversity Data Centre Data*

A search of the National Biodiversity Data Centre (NBDC) website was conducted with a focus on records of protected fauna recorded from hectads S94, S95 and T05. The results of the database search are provided below in Table 5-5. **Error! Reference source not found.** includes records of non-native invasive species listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015).

Table 5.5 NBDC Records for European protected species from hectads S94, S95 and T05

Common Name	Scientific Name	Hectad	Status
Common Frog	*Rana temporaria*	S94, S95, T05	HD Annex V, WA
Otter	*Lutra lutra*	S94, S95, T05	HD Annex II, IV, WA
Pine Marten	*Martes martes*	T05	HD Annex V, WA
Daubenton's Bat	*Myotis daubentonii*	S94, S95, T05	HD Annex IV, WA
Common Pipistrelle	*Pipistrellus pipistrellus*	S94, S95, T05	HD Annex IV, WA
Soprano Pipistrelle	*Pipistrellus pygmaeus*	S94, S95, T05	HD Annex IV, WA
Brown Long-eared Bat	*Plecotus auritus*	S94, S95, T05	HD Annex IV, WA
Leisler's Bat	*Nyctalus leisleri*	S94, S95, T05	HD Annex IV, WA
Natterer's Bat	*Myotis nattereri*	S95	HD Annex IV, WA
Nathusius' Pipistrelle	*Pipistrellus nathusii*	T05	HD Annex IV, WA
Badger	*Meles meles*	S94, S95, T05	WA
Hedgehog	*Erinaceus europaeus*	S94, S95, T05	WA
Red Squirrel	*Sciurus vulgaris*	S94, S95	WA
Marsh Fritillary	*Euphydryas aurinia*	S94, T05	HD Annex II
European Eel	*Anguilla anguilla*	S94	RL (Critically Endangered)
Common Kingfisher	*Alcedo atthis*	S94, S95, T05	BD Annex I
Little Egret	*Egretta garzetta*	S94	BD Annex I
Pergrine Falcon	*Falco peregrinus*	S94, S95, T05	BD Annex I
Golden Plover	*Pluvialis apricaria*	S94, T05	BD Annex I
Corn Crake	*Crex crex*	S95, T05	BD Annex I
Hen Harrier	*Circus cyaneus*	S95, T05	BD Annex I
Merlin	*Falco columbarius*	S95, T05	BD Annex I

Annex I – of EU Birds Directive, Annex II, Annex IV, Annex V – of EU Habitats Directive, Wildlife Acts – Irish Wildlife Acts (1976, 2019).

Table 5.6 Third Schedule non-native invasive species records from hectads S94, S95 and T05

Common Name	Scientific Name	Hectad
Canadian Waterweed	*Elodea canadensis*	S94, S95
Japanese Knotweed	*Fallopia japonica*	S94, S95, T05
Giant Knotweed	*Fallopia sachalinensis*	S94
Indian Balsalm	*Impatiens glandulifera*	S94, S95
Rhododendron	*Rhododendron ponticum*	S94, S95
American Mink	*Mustela vison*	S94, S95, T05
Grey Squirrel	*Sciurus carolinensis*	S94, S95, T05
Fallow Deer	*Dama dama*	T05
Sika Deer	*Cervus nippon*	S95, T05
Three-cornered Garlic	*Allium triquetrum*	S94, S95, T05
Brown Rat	*Rattus norvegicus*	S94, S95, T05

5.3.1.2.4 New Flora Atlas

A search was made in the *New Atlas of the British & Irish Flora* (Preston *et al.* 2002) to identify if any rare or protected plant species have been previously recorded from the hectads in which the development site is located i.e. (S94, S95 and T05). The search targeted vascular plants that are listed in Annex II of the EU Habitats Directive, the Flora (Protection) Order (FPO) of 2015, and those listed in *The Irish Red Data Book* (Jackson *et al.* 2016). The results of the Atlas search are provided in Table 5-7.

Table 5.7 Records of species listed under the Flora Protection Order 2015 or the Irish Red Data Book for Vascular Plants (S94, S95 and T05)

Common Name	Scientific Name	Status	Hectad
Narrow-leaved Helleborine	*Cephalanthera longifolia*	FPO, RL (Vulnerable)	S94
Opposite-leaved pondweed	*Groenlandia densa*	FPO, RL (Near threatened)	S94
Basil Thyme	*Clinopodium acinos*	FPO, RL (Near threatened)	S95
Small Cudweed	*Filago minima*	FPO, RL (Near threatened)	S95
Hairy Violet	*Viola hirta*	FPO, RL (Vulnerable)	S95
Pale Dog-Violet	*Viola lactea*	FPO, RL (Vulnerable)	S95
Weasel's-snout	*Misopates orontium*	FPO	S95, T05

Shepherd's-needle	*Scandix pecten-veneris*	RL (Regionally extinct)	S94
Green-winged Orchid	*Orchis morio*	RL (Vulnerable)	S94
Fragrant Agrimony	*Agrimonia procera*	RL (Near threatened)	S94
Hound's Tongue	*Cynoglossum officinale*	RL (Near threatened)	S94
Corn Marigold	*Chrysanthemum segetum*	RL (Near threatened)	S94
Common Toadflax	*Linaria vulgaris*	RL (Near threatened)	S94
Pale Flax	*Linum bienne*	RL (Near threatened)	S94
Greater Broomrape	*Orobranche rapum-genistae*	RL (Near threatened)	S94
Autumn Lady's-tresses	*Spiranthe spiralis*	RL (Near threatened)	S94
Green Field-speedwell	*Veronica agrestis*	RL (Near threatened)	S94, S95
Broad-fruited Cornsalad	*Valerieanella rimosa*	RL (Critically endangered)	S95
Common Cudweed	*Filago vulgaris*	RL (Vulnerable)	S95
Narrow-fruited Cornsalad	*Valerianella dentata*	RL (Vulnerable)	S95
Slender Thistle	*Carduus tenuiflorus*	RL (Near threatened)	S95
Greater Knapweed	*Centaurea scabiosa*	RL (Near threatened)	S95
Dwarf Spurge	*Euphorbia exigua*	RL (Near threatened)	S95
Tubular Water Dropwort	*Oenanthe fistulosa*	RL (Near threatened)	S95
Common Wintergreen	*Pyrola minor*	RL (Near threatened)	S95
Allseed	*Radiola linoides*	RL (Near threatened)	S95
Vervain	*Verbena officainalis*	RL (Near threatened)	S95
Small Bur-reed	*Sparganium natans*	RL (Near threatened)	T05

5.3.1.2.5 Inland Fisheries Ireland Online Database

The Inland Fisheries Ireland (IFI) online database was consulted for records of fish species present in the River Slaney catchment. According to surveys carried out as part of *Sampling Fish for the Water Framework Directive* (2014), nine fish species were recorded in the River Slaney, namely; Brown Trout, European Eel, Gudgeon, Minnow, Roach, Salmon, Sea Trout, Stone Loach and Three-spined Stickleback as part of this survey. A more recent survey has been carried out on the River Bann, a tributary to the River Slaney, as part of the *National Research Survey Programme* (2016). A total of seven fish species were recorded in the River Bann during the 2016 survey, namely; Brown Trout, European Eel, Lamprey sp., Minnow, Salmon, Stone Loach and Three-spined Stickleback.

5.3.1.2.6 EPA Water Quality Data

The EPA Envision map viewer was consulted on 13th February 2020 regarding the water quality status of the rivers which cross or are in close proximity to the subject grid connection. The grid connection consists of 10 natural watercourse crossings. Nine of these watercourses are tributaries to the River Slaney SAC. These watercourses provide downstream connectivity with Wexford Harbour. The Biotic Index of Water Quality (BIWQ) was developed in Ireland by the Environmental Protection Agency (EPA). Q-values are assigned using a combination of habitat characteristics and structure of the macro-invertebrate community within the waterbody. Individual macro-invertebrate families are classified according to their sensitivity to organic pollution and the Q-value is assessed based primarily on their relative abundance within a sample.

There are ten sampling stations located along and in close proximity to the grid connection route. The results for each of these sampling stations is provided in Table 5-8 below:

Table 5.8 EPA Water quality sampling stations along the grid connection route

River	Sample Station	Location	Grid Reference	Q-Value	Last Sampled
Ballycarney Stream - Slaney River	RS12B070700	Bridge u/s Slaney R confl – west of grid connection route	E 296872; N148954	3 - Poor	2016
Ballingale Stream – Slaney River	RS12B060900	Bridge u/s Slaney R confl – west of grid connection route	E296759; N149812	4 - Good	2016
Ballycarney Stream - Slaney River	RS12B070500	Ballycarney Stream - Tombrack Bridge – east of grid connection route	E299043; N150384	3 - 4 Moderate	1991
Ballingale Stream – Slaney River	RS12B060700	Ballingale Stream - Ballymorgan Bridge – west of grid connection	E297782; N151543	3 - 4 Moderate	1991
Ballycarney Stream - Slaney River	RS12B070400	Ballycarney Stream - Bridge d/s Tinnashrule Bridge – east of grid connection	E299941; N152244	3 - 4 Moderate	2016
Ballingale Stream – Slaney River	RS12B060600	Ballingale Stream - Bridge SW of Ballaman – west of grid connection	E297735; N152934	3 - 4 Moderate	2016
Ballingale Stream – Slaney River	RS12B060400	Ballingale Stream - Bridge East of Curraduff X-Rds – on grid connection route	E297858; N154140	4 - Good	1998
Ballingale Stream – Slaney River	RS12B060300	Ballycadden Bridge – east of grid connection	E298402; N156354	3 – Poor	2016
Ballycarney Stream - Slaney River	RS12B070300	Ballycarney Stream - Tinnashrule Bridge – east of grid connection	E301070; N152976	4 - Good	1991
Borris Stream – Slaney River	RS12B050200	Borris Stream - Bridge NW of Kilrush – southwest of grid connection	E295827; N155973	4 - Good	1991

River Basin Management Plans (RBMPs) have been published for all River Basin Districts in Ireland in accordance with the requirements of the Water Framework Directive. The online EPA Envision map viewer provides access to water quality information at individual waterbody level and at Water Management Unit level for all the River Basin Districts in Ireland. Waterbodies can relate to surface waters (these include rivers, lakes, estuaries [transitional waters] and coastal waters) or to groundwater.

The WFD River Waterbody Status for the Slaney River has been assigned 'Not at risk' on the upstream side of sample station RS26I010700 and 'At risk' on the downstream side.

5.4 Field Surveys

5.4.1 Habitats Present Within the Site

The grid connection comprises c. 26km of cable laid within the road corridor and c. 2km of overhead line which traverses agricultural land in the northernmost section of the route. This section of the report provides a description of the grid connection which extends from the Crory 110 kV substation in the south to the Knocknalour and Ballynancoran windfarms in the north, a straight line distance of approximately 12km. A spur to the east extends to the Ballycadden Wind Farm and a spur to the west extends to the Gibbet Hill Wind Farm. The grid connection comprises a medium voltage 20 kV grid connection, comprising c. 26 km of 20 kV underground cable and c. 2 km of 20 kV overhead powerline, and all ancillary works in the townlands of Ballyroebuck, Ballyandrew, Tincurry, Ballaman, Ballynancoran, Corah, Kiltilly, Curralane Oldtown, Knocknalour, Moneydurtlow, Bolinahaney, Bolacaheer, Graigue More, Tombrack, Boris, Ballycarney, Curraduff and Boolnadrum, Co. Wexford. (Approx. Grid Ref: E298680; N148426 to E298475; N15989).

The most southerly section of the grid connection starts at the existing Crory 110kV substation. The underground cable runs west from the substation through ***Improved Agricultural Grassland (GA1)*** and adjacent to the access road within ***Dry Meadows and Grassy Verge (GS2)*** habitat (**Error! Reference source not found.**). The route then joins the local road and progresses north through the townlands of Ballycarney, Corah and Tombrack. On reaching Tombrack the route diverges east towards Ballycadden Wind Farm (**Error! Reference source not found.**). The main line of the route progresses north from Tombrack and onwards to the townland of Knocknalour. The western spur of the underground connection diverges from the townland of Ballyroebuck towards Gibbet Hill (**Error! Reference source not found.**). Adjacent habitats along the road corridor include ***Dry Meadows and Grassy Verges (GS2), Hedgerows (WL1)***, ***Stone Walls (BL1), Treeline (WL2), Scrub (WS1)*** an example of which is shown in **Error! Reference source not found.**. Occasional residential property categorised as ***Buildings and Artificial Surfaces (BL3)*** was also recorded along the grid connection route. There were no works within adjacent habitats as part of the underground grid connection works. Species recorded within the dry meadows and grassy verges habitat included Dandelion (*Taraxacum officinalis agg.*), Yorkshire Fog (*Holcus lanatus*), Cock's-foot (*Dactylus glomerata*), Wild Carrot (*Daucus carota*), Woundwort (*Stachys sylvatica*), Great Willowherb (*Epilobium hirsutum*), Bush Vetch (*Viccia sepium*), Bracken (*Pteridium aquilinum*), Bramble (*Rubus fruticosus agg.*) and Ivy (*Hedera helix*).

The overhead section of the grid connection is located in the townlands of Knocknalour and Ballynancoran in the northernmost section of the route. The overhead section begins at Knocknalour Wind Farm and heads in an easterly direction towards Ballynancoran Wind Farm for a length of approximately 2km. This section of cable traverses fields categorised as ***Improved Agricultural Grassland (GA1)*** and ***Arable Crops (BC1)*** comprising turnip (**Error! Reference source not found.**). Species within the improved agricultural grassland included Perennial Rye-grass (*Lolium perenne*), Yorkshire Fog (*Holcus lanatus*), Clover (*Trifolium spp.*), Mouse-eared Chickweed (*Cerastium fontanum*), Nettle (*Urtica dioica*) and Pineapple Weed (*Matricaria discoidea*).

Plate 5.1 Grid connection was placed within the Dry meadows and Grassy Verge (GS2) habitat adjacent to the access road to Crory 110kV substation.

Plate 5.2 Looking north towards Ballycadden Wind Farm in the townland of Boolnadrum. Showing Hedgerow (WL1) and Treeline (WL2).

Plate 5.3 Looking north in the townland of Ballycarney showing the road categorised as Buildings and Artificial Surfaces (BL3) and adjacent habitats; Dry Meadows and Grassy Verges (GS2), Stone Walls and Other Stone Works (BL1) and Hedgerow (WL1).

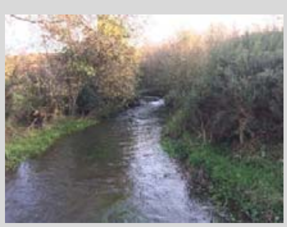
Plate 5.4 Looking west towards Gibbet Hill Wind Farm in the townlands of Borris/Bolinahaney. Showing Dry Meadows and Grassy Verges (GS2) and Hedgerow (WL1).

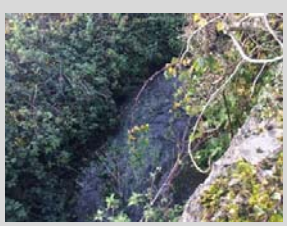
Plate 5.5 Looking east towards Ballynancoran Wind Farm in the northernmost section of the route

Watercourse Crossings

There are 10 no. natural watercourse crossings along the grid connection the locations of which are shown in Figure 3.2 in Chapter 3 of the rEIAR. In addition, there are numerous small storm drainage pipe crossings at various locations along the Grid Connection route (see detailed drawings, Appendix 3-1 of the rEIAR). All of the tributaries of the River Slaney which are crossed by the underground cable were installed using existing bridges/culverts, except for crossing no. 1 located at Corah Bridge and crossing no. 6 at Borris Stream as shown on Figure 3.2 in Chapter 3 of the rEIAR. This proactive methodology assisted in removing the potential for direct impacts on the watercourses. One natural watercourse (Crossing 8, Figure 3.2) is crossed by the overhead line, however there were no impacts to this watercourse associated with the construction or operation of the line. The individual watercourse crossings are described in **Error! Reference source not found.** below. No instream works were carried out as part of these works.

Table 5.9 Culvert Survey Summary and Crossing Methodology

Crossing No. and Methodology	Photo	Description	Crossing Option (as described in Chapter rEIAR); Notes
1		**Substrate:** Rock, sand **Instream vegetation:** Water Parsnip, Floating Sweet-grass **Adjacent habitat:** Treeline, dry meadows and grassy verge **Width:** 5– 6m	Horizontal Directional Drilling

		Flow: Fast flowing glide	
2		**Substrate:** Rock, sand, gravel **Instream vegetation:** Starwort, Fool's Watercress **Adjacent habitat:** Improved agricultural grassland, treeline **Width:** 0.5 – 4m **Flow:** Slow flowing, leaf litter instream	Crossing over bridge/culvert within the deck of the road.
3		**Substrate:** Rock, stone, gravel **Instream vegetation:** Fool's Watercress **Adjacent habitat:** Improved agricultural grassland, treeline **Width:** 5-7m **Flow:** Fast flowing glide	Crossing over bridge/culvert within the deck of the road. Potential Otter print recorded on river bank.
4		**Substrate:** Rock, sand, gravel **Instream vegetation:** Fool's Watercress **Adjacent habitat:** Improved agricultural grassland, treeline, **Width:** 1- 2m **Flow:** Fast flowing glide, existing concrete step at base of bridge	Crossing over bridge/culvert within the deck of the road
5		**Substrate:** Stone, gravel, sand **Instream vegetation:** Fool's Watercress **Adjacent habitat:** Treeline, dry meadows and grassy verge, scrub **Width:** 2m **Flow:** Fast flowing riffle, glide	Crossing over bridge/culvert within the deck of the road

6		**Substrate:** Sand, gravel, stone **Instream vegetation:** N/A **Adjacent habitat:** Treeline, conifer woodland **Width:** 1-3m **Flow:** Fast flowing riffle, glide	Horizontal Directional Drilling
7		**Substrate:** Stone, gravel, sand **Instream vegetation:** Fool's Watercress, Duckweed **Adjacent habitat:** Improved agricultural grassland, treeline **Width:** 1m **Flow:** Fast flowing glide	Crossing over bridge/culvert within the deck of the road
8		**Substrate:** Rock, sand **Instream vegetation:** N/A **Adjacent habitat:** Stream heavily shaded due to overhanging Willow treeline, other adjacent habitats included improved agricultural grassland and arable crop **Width:** 0.5-1m **Flow:** Fast flowing riffle and glide	Crossing via overhead line
9		**Substrate:** Stone, gravel, sand **Instream vegetation:** N/A **Adjacent habitat:** Improved agricultural grassland, treeline **Width:** 1 – 2m **Flow:** Fast flowing riffle, glide	Crossing over bridge/culvert within the deck of the road

10		**Substrate:** Rock, sand, gravel **Instream vegetation:** N/A **Adjacent habitat:** Treeline, dry meadows and grassy verge **Width:** 1- 2m **Flow:** Fast flowing riffle, glide	Crossing over bridge/culvert within the deck of the road

Third Schedule Invasive Species

Third Schedule invasive species, Bohemian Knotweed (*Fallopia bohemica*), was recorded in one area along the grid connection route on both sides of the road in the townland of Boolnadrum (approx. grid ref. E300394; N155108 to E300347; N155089). All works in this area were confined to the existing road and did not impact on this Third Schedule species.

Plate 5.6 Bohemian Knotweed located adjacent to the road in Boolnadrum (approx. grid ref. E300394; N155108 to E300336; N155089)

5.4.1.1 Significance of Flora

No Annex I habitats occur within the works area, i.e. the existing road, road verge and agricultural lands. All underground grid connection works were restricted to the existing road and agricultural lands. The overhead grid connection traverses habitats categorised as improved agricultural grassland and arable crop which were assigned Local Importance (lower value). The remaining habitats adjacent to the works were common in both a local and national context. None of these habitats were impacted upon as the works were restricted to the existing road curtilage, improved agricultural grassland and arable crop.

The watercourses adjacent to the works are of ecological significance as they may act as a potential conduit for pollution to downstream habitats of ecological sensitivity. Consequently, all watercourses have been assigned *Local Importance (higher value).* No in-stream works took place as part of these works and mitigation measures were incorporated into the design of the project as detailed in Section 7.4.2 of this rEIAR.

None of the other habitats recorded at or within the vicinity of the development are of particular conservation significance and were categorized as Local Importance (lower value).

5.4.2 Fauna Present Within the Development Route

5.4.2.1 Birds

The works were restricted to the existing road curtilage and approx. 2km of overhead cable traverses habitat categorised as improved agricultural grassland and arable crop. Bird species observed in the wider area during the site visits included Buzzard (*Buteo buteo*), Rook (*Corvus frugilegus*), Kestrel (*Falco tinnunculus*) and Starling (*Sturnus vulgaris*). No Annex I bird species or species associated with the nearby Wexford Harbour and Slobs SPA or any other SPA were recorded. A detailed bird survey was not conducted as part of the ecological assessment and grid connection route and the species assemblage recorded during the site visit is typical of the survey effort and habitats present within the study area. It is likely that a greater variety of species occur within the wider landscape.

5.4.2.2 Mammals

Otter

An otter (*Lutra lutra*) survey was conducted in line with the NRA Guidelines. Otter surveys were conducted at each watercourse crossing. Potential evidence of Otter was recorded in the form of prints at watercourse 3, as described in **Error! Reference source not found.**. No evidence of Otter was recorded at any additional watercourse. It is likely that the watercourses are used by Otter as a feeding area/commuting corridor, however no spraints, holts or couches were recorded. The works are located in the existing road curtilage, improved agricultural grassland and arable crop and are therefore unlikely to have impacted on any suitable Otter habitat. Works within the agricultural fields were restricted to the erection of overhead line comprising poles between 9 and 12.5 metres in height and spaced approximately 100 metres apart. Pole base excavation and erection was carried out using a rubber wheeled or tracked excavator and there was no impact on the watercourse crossing in this section.

Badger

A badger (*Meles meles*) survey was conducted in line with the NRA Guidelines. Some potential signs of badger in the from of mammal tracks and uprooted turnips were recorded in the agricultural and arable fields traversed by the overhead line. However, no signs of latrines or badger setts was recorded. Works within the agricultural fields were restricted to the erection of overhead line comprising poles between 9 and 12.5 metres in height and spaced approximately 100 metres apart. Pole base excavation and erection was carried out using a rubber wheeled or tracked excavator.

Bat

The works are located in the curtilage of existing road and did not involve the loss or alteration of any trees or hedges in the overhead section of cable. None of the bridges along the grid connection route provided suitable cracks or crevices and were assessed as *Negligible* for roosting bats. The bridges located along the grid connection route were not be altered in any regard by the works as the construction methodologies for crossing bridges did not require any works to be carried out on the bridge structure. The cable was either installed within the road surface or else directional drilling was used, i.e. Corah Bridge under Ballycarney Stream (crossing no. 1) and the crossing of Borris Stream (crossing no. 6).

5.4.2.3 Other Fauna

Records are held by the NBDC for Annex II listed species Freshwater Pearl Mussel within the hectads pertaining to the development site. The watercourses associated with the works also had potential to support other aquatic species such as White-clawed Crayfish (*Austropotamobius pallipes*), Salmon (*Salmo salar*), Eel (*Anguilla anguilla*) and Lamprey species No in-stream works were carried out, therefore there was no impact on these watercourses or associated species.

5.4.2.4 Significance of Fauna

No EU Habitats Directive Annex species were recorded within the works area during the field surveys. Habitat exists in the wider area that would support a number of European protected species such as Otter, Bat species and Freshwater Pearl Mussel. However, these were not be impacted as a result of the small scale of the development works area and the nature of the works that were restricted to the curtilage of the road and improved agricultural grassland and arable crop.

Otters are protected under the Wildlife Acts 1976 to 2019 and are listed under Annex II and Annex IV of the Habitats Directive (92/43/EEC), which was transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011). Annex II lists species of community interest whose conservation requires the designation of Special Areas of Conservation (SACs), while those species listed under Annex IV are those in need of strict protection. The species is likely to use the recorded watercourses as feeding areas/commuting corridor. Evidence of Otter in the form of prints was observed during the site visit however no other signs of Otter were recorded. There was no impact on the species as works were confined to the existing road corridor, improved agricultural grassland and arable crop.

5.5 Likely and Significant Impacts

This section assesses the potential impacts associated with the development on ecological receptors within and surrounding the development site. The impact assessment describes the direct, indirect and cumulative impacts associated with the grid connection development on flora and fauna within the development site.

Direct impacts include the physical loss of a habitat or disturbance/degradation of a species (i.e. habitat loss, etc.). Indirect impacts include those impacts which are caused by the interaction of effects i.e. disturbance, displacement, etc.

5.5.1 Do-Nothing Scenario

Should the grid connection remain in place all habitats would continue to be used as they are at present, i.e. road and agricultural land.

5.5.2 Construction Phase

5.5.2.1 Habitat Loss

All grid connection works took place either in the curtilage of the existing road or in the case of the overhead line through agricultural lands categorized as improved agricultural grassland and arable crop. These habitats were categorized as Local Importance (lower value) and have been reinstated as part of the completed works. **No significant effects** with regard to habitat loss have occurred.

5.5.2.2 Disturbance to Fauna

Any potential for disturbance would have been minimal based on the nature of the habitats along the route, i.e. the road corridor and agricultural lands. Species including Otter, Badger and Bat were recorded during the site investigation which emphasise that any construction related impacts were short term and no significant long-term effect has occurred.

5.5.2.3 Water Quality and Aquatic Fauna

No instream works took place as part of the development. All watercourses were crossed by one of the methodologies described in Section 3.3.1.4. of the rEIAR.

The key mitigation measure during the construction phase was the avoidance of sensitive aquatic areas. The majority of the grid route is located within the paved area of existing roads and therefore resulted in no direct impacts to surface waters. Stream crossings were achieved though the placement of cable ducts above culverts and in bridge decks. Two stream crossings (no. 1 and no. 6) were achieved using a horizontal directional bore technique as the bridge deck was determined to be unsuitable to accommodate the cable ducts. No in-stream work occurred during the construction of the grid connection.

Measures were utilized to protect local surface water quality and are detailed in Section 7.4.2 of the rEIAR. The following methods and best practice measures ensured that sediment release and potential for pollution during the construction phase was minimised and reduced to insignificance:

- Minimal refuelling or maintenance of construction vehicles or plant took place along the works area.
- The plant used during construction was regularly inspected for leaks and fitness for purpose
- Plant was maintained in good working order.
- No batching of wet-cement products occurred on along the grid route works area. Ready-mixed supply of wet concrete products were used to backfill the trench per ESB specifications.
- Pre-cast elements, such as communication chambers, were used.
- No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse was allowed. No chute cleaning occurred on-site.
- Concrete pouring only occurred on dry days.
- No significant dewatering occurred during construction.
- All trenching works occurred at or very near existing ground levels with minimal ground disturbance.
- No deep foundations were required. As such there was no interruption or blocking of shallow or deep groundwater pathways below the site.
- No in-stream work occurred to facilitate stream crossings along the cable route.

Excavation activities in relation to the development were small-scale (i.e. a ~1.2m deep trench being excavated in sections) and the volume of runoff from the construction works was minimal in relation to the overall runoff to local waterbodies. The implementation of the mitigation measures discussed above prevented the release of any hydrocarbons to the environment. No instream works were carried out at any watercourse crossings. **No significant effects** have occurred as a result of the grid connection works.

5.5.2.4 Potential Introduction or spread of Invasive Alien Plant Species

Third Schedule invasive species, Bohemian Knotweed (*Fallopia bohemica*), was recorded in one area along the grid connection route on both sides of the road in the townland of Boolnadrum (approx. grid ref. E300394; N155108 to E300347; N155089). All works in this area were confined to the existing road and did not impact on this Third Schedule species. **No significant effect** in relation to invasive species has occurred.

5.5.3 Operational Phase

No works are required during the operational phase of the Grid Connection, therefore there is no potential for any ecological effects as a result of the development.

5.5.4 Decommissioning Phase

The grid connection forms an integral part of the local electricity network. Therefore, it is intended that the cables will be retained as a permanent structure and will not be decommissioned.

5.5.5 Impacts on Designated Sites

Slaney River Vally SAC (000781) is located approximately 1.5km west of the grid connection route and Wexford Harbour and Slobs SPA (004076) is located approximately 9.7km south of the grid connection route. Both sites have potential hydrological connectivity with the development site and all measures in relation to the protection of these European sites have been taken into account in the NIS. The designation for Slaney River Valley pNHA overlaps the boundary of the Slaney River Valley SAC. As a result, potential for impacts on this pNHA will have been prevented by adhering to the mitigation implemented for the protection of the SAC. Potential for impacts in the form of surface water deterioration were prevented by adhering to the mitigation described in Chapter 7 of the rEIAR.

With regard to European Sites, a remedial Natura Impact Statement was prepared to provide An Bord Pleanála with the information necessary to complete an Appropriate Assessment of the grid connection development in compliance with Article 6(3) of the Habitats Directive. As part of this assessment, the potential for the development to have an effect on any European sites in the ZOI was considered. The Appropriate Assessment concluded that:

> *"Where the potential for any adverse effect on any European Site was identified, the pathway by which any such effect may have occurred was robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within this report. The measures implemented as part of the project ensured that the construction and operation of the development did not have any adverse effect on the integrity of European sites.*
>
> *Therefore, it can be objectively concluded that the grid connection works, individually or in combination with other plans or projects, did not have an adverse effect on integrity of any European Site."*

5.6 Cumulative Impacts

The potential for the grid connection works to contribute to a cumulative impact in relation to other plans and projects was considered as provided in **Error! Reference source not found.** and in the following sections below.

5.6.1 Plans

Table 5.10 Review of plans and policies

Plans	Key Policies/Issues/Objectives Directly Related to European Sites, Biodiversity and Sustainable Development in the Zone of Influence	Assessment of development compliance with policy
Wexford County Development Plan 2013-2019	The Wexford County Development Plan 2013-2019 sets out Wexford County Council's intentions for the future development of land, including measures for the improvement of the natural and physical environment and the provision of infrastructure. The County Council have a number of policies and objectives relating to the protection, conservation and restoration natural heritage sites including specific objectives as described below: - **Objective WQ01** To protect existing and potential water resources for the county, in accordance with the EU Water Framework Directive (2000/60/EC), Bathing Water Directive (2006/7/ EC) the South-East River Basin Management Plan 2009-2015 and any updated version, the Pollution Reduction Programmes for designated shellfish waters, the provisions of Groundwater Protection Scheme for the county any other protection plans for water supply sources, with an aim to improving all water quality - **Objective WQ04** To ensure that developments permitted comply with the requirements of the EU Water Framework Directive, the relevant River Basin Management Plans and the Habitats Directive. - **Objective WQ05** To ensure that development permitted would not have an unacceptable impact on water quality and quantity, including surface water, ground water, designated source protection areas, river corridors and associated wetlands, estuarine waters, coastal and transitional waters. - **Objective AQ01** To have regard to the Air Quality Standards Regulation 2011 (S.I. No. 180 of 2011) when assessing planning applications for	The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the Natura 2000 network, protection of water quality, energy creation, air quality standards. No potential for cumulative impacts were identified in conjunction with the grid connection development.

Plans	Key Policies/Issues/Objectives Directly Related to European Sites, Biodiversity and Sustainable Development in the Zone of Influence	Assessment of development compliance with policy
	development which may have effects on air quality. - **Objective EN01** To facilitate the achievement of a secure and efficient energy supply and storage for County Wexford. - **Objective EN02** To promote County Wexford as a low carbon county by 2019 as a means of attracting inward investment and to facilitate the development of energy sources which will achieve low carbon outputs. - **Objective EN11** To promote and facilitate wind energy development in accordance with Guidelines for Planning Authorities on Wind Energy Development (Department of Environment, Heritage and Local Government, 2006) and the Wind Energy Strategy which forms part of this Plan, subject to compliance with normal planning and environmental criteria and the development management standards contained in Chapter 18. - **Objective NH01** To conserve and protect the integrity of sites designated for their habitat/wildlife or geological/geomorphological importance and prohibit development which would damage or threaten the integrity of these sites, including SACs, cSACs, SPAs, NHAs, pNHAs, Nature Reserves, and Refuges for Fauna.	
County Wexford Biodiversity Action Plan 2013-2018	The overall aim for this Biodiversity Action Plan for County Wexford is; - To protect County Wexford's Biodiversity through actions and raising awareness Relevant key 5 objectives of the Wexford Biodiversity Action Plan include: - **Objective 1** - To identify Biodiversity information and fill data gaps for the County, to prioritise habitats and species for protection and to inform conservation action and decision making	The biodiversity action plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the protection of Biodiversity. No potential for cumulative impacts were identified in conjunction with the grid connection development.

Plans	Key Policies/Issues/Objectives Directly Related to European Sites, Biodiversity and Sustainable Development in the Zone of Influence	Assessment of development compliance with policy

	- **Objective 2** - To make information on biodiversity available
	- **Objective 3** - To raise awareness across all sectors, groups and ages, for the following;
	  - (a)Wexford's Biodiversity,
	  - (b) its value
	  - (c) the issues facing it, and
	  - (d) encourage people through using various media, training, and innovative initiatives to support biodiversity conservation.
	- **Objective 4** - To promote and support best practice in biodiversity conservation, taking into account national and local priorities.
	Objective 5 - To incorporate and raise the profile of biodiversity conservation issues in the local authority's actions and policies	

5.6.2 Wind Farm Developments

This section identifies potential cumulative impacts of the grid connection together with other wind energy projects and local developments as described in Chapter 2 of the rEIAR. The grid connections connects the four separate windfarms Ballycadden, Ballynancoran, Gibbet Hill and Knocknalour Wind Farms (collectively referred to as the Crory Wind Farm Group (CWFG) to the national electricity grid at Crory ESB substation, County Wexford. These wind farms have undergone their own environmental impact assessments and any residual impacts have been taken into account as part of this assessment.

- The 4 no. wind farms that constitute the Crory Wind Farm Group (Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour) are connected to the national grid via the grid connection as discussed in Chapter 2 of the rEIAR.

5.6.3 Crory 110 kV Substation Site

The Crory 110 kV Substation has been subject to 2 no. planning applications lodged by EirGrid, on behalf of the ESB, and one application lodged by ESB between 2008 and 2010. These applications have been summarised below:

- **Pl Ref. 2008/2620**: Planning application by EirGrid for a variation to a previously approved permission under Pl Ref. 2007/0373 for the proposed Lodgewood 220 kV substation. The alterations consist of the reduction in size of station control building, the inclusion of 1 no. new 110 kV cable bay and associated structures, 4 no. lightning masts of height 20.25m, 9 no. prefabricated units and 1 no. interface kiosk. The application also proposed the relocation of 1 no. 220 kV line bay, 1 no. 220 kV transformer bay and associated portals and equipment. Conditional permission was granted by the Planning Authority on the 20th of February, 2009.
- **Pl Ref. 2010/0469**: Planning application by EirGrid for alterations to Lodgewood 220 kV substation, the alterations consist of new 110 kV cable bay, ipp interface kiosk, 25m high lightning mast, new ipp compound to include new palisade fence and gates, new internal access road and associated site works. Conditional permission was granted by the Planning Authority on the 30th of July, 2010.
- **Pl Ref. 2010/0634**: Planning application by the ESB for the development including a new 110 kV electrical transformer station, as an extension to the existing Lodgewood 220 kV substation site, consisting of control building, 3 no. 110 kV transformers, new internal access road and new palisade compound fence and gates, new bio-cycle unit with raised percolation area and new oil interceptor. The proposal also included alterations to the existing Lodgewood 220 kV electrical transformer station consisting of 3 no. 110 kV cable bays with interface kiosks, one no. 25m high lightning mast and associated site works. Conditional permission was granted by the Planning Authority on the 12th of November, 2010.

There were no further applications attached to the Crory 110 kV substation on record.

5.6.4 Other Wind Farm Sites

Within the wider area of the subject grid connection, there have been a number of planning applications lodged for wind farm developments; specifically, Castledockrell Wind Farm, Ballaman Wind Farm and Ballyduff Wind Farm. The relevant planning history of these wind farm applications is summarised below.

Ballyduff and Ballaman wind farms are connected to the national grid via a separate, single shared underground cable installed within a duct which connects to Crory 110kV substation. It is important to note that although both of these wind farms share portions of the same underground cable route and sections of the same excavated trench used by the CWFG for the subject grid connection, these two wind farms are not part of the wind farm group.

5.6.4.1 Castledockrell Wind Farm

- **Pl. Ref. 2004/1077**: Application by Castledockrell Wind Group Ltd. for the construction of a wind farm comprising of 9 no. wind turbines, with tower heights not exceeding 85m and rotor diameters not exceeding 71.5m., and ancillary buildings, incidental site works, including site roads, in the townlands of Carranroe, e.d. Castledockrell, Ballynelahillan, e.d. Castledockrell, Kilcullen, e.d. Ballindaggan, Sroughmore, e.d. Ballindaggan and Knockduff, e.d. Ballindagan. An EIS was submitted to the Planning Authority with the application. The application was withdrawn on the 25th of June, 2004.
- **Pl Ref. 2004/4702**: Application by Castledockrell Wind Group Ltd. for the construction of a wind farm comprising of 11 no. wind turbines, with tower heights not exceeding 85m and rotor diameters not exceeding 71.5m., and ancillary buildings, incidental site works, including site roads, in the townlands of Carranroe, e.d. Castledockrell, Ballynelahillan, e.d. Castledockrell, Kilcullen, e.d. Ballindaggan, Sroughmore, e.d. Ballindaggan and Knockduff, e.d. Ballindagan. An EIS was submitted to the Planning Authority with the application. Conditional permission was granted by the Authority on the 16th of March, 2005 which was subject to a 1st Party appeal to An Bord Pleanála in order to amend Condition 7 attached to the grant of permission. An Bord Pleanála decided not to amend the condition as per its powers under Section 146A of the Planning and Development Act 2000 (as amended). refused to amend.
- **Pl Ref. 2005/3945**: Application by Castledockrell Wind Group Ltd. for the construction of a 110kv sub-station and perimeter fence and incidental site works (to service Castledockrell Wind Farm). The substation will consist of a compound measuring approximately 39m x 18m, and in addition to electrical equipment, will contain a general purpose building measuring approximately 9.64m x 7.14m. Conditional planning permission was granted by the Planning Authority on the 3rd of March, 2006.
- **Pl Ref. 2007/3077**: Application by Bolamore Wind Farms Ltd. for the erection of a single wind turbine, as an extension to Castledockrell Wind Farm, and ancillary buildings, incidental site works, including site roads. The Planning Authority decided to refuse permission for the proposed development on the 11th of October 2007.
- **Pl Ref. 2008/0335**: Application by Bolamore Wind Farms Ltd. for the erection of a single wind turbine, as an extension to Castledockrell Wind Farm, and ancillary buildings, incidental site works, including site roads. The tower height will not exceed 85m and the rotor diameter will not exceed 72m. The anticipated output from the turbine will be 2.3mw. Conditional planning permission was granted by the Planning Authority for the development on the 9th of May, 2008.

The Castledockrell Wind Farm was commissioned in 2011 and is currently operational.

5.6.4.2 Ballaman Wind Farm

- **Pl Ref. 2002/3959**: Application by K. Rothwell for the erection of a wind farm consisting of 3 wind turbines and service roadways. The developer also proposed to erect an electrical transformer compound, control housing and anemometer on the same site. The Planning Authority decided to refuse permission for the proposed development on the 21st of February, 2003.
- **Pl Ref. 2003/3445**: Application by K. Rothwell for the erection of a wind farm consisting of 3 wind turbines and service roadways at Ballaman, Moneydurtlow and Tombrack townlands. The developer also applied to erect an electrical transformer compound,

control housing and anemometer. Conditional planning permission was granted by the Planning Authority for the development on the 2nd of December, 2003.
- **Pl. Ref. 2010/0733**: Application by K. and M. Rothwell for the construction for a wind farm comprising of up to 2 no. turbines, with a hub height of up to 85m and a blade length of up to 45m, and the construction of an electrical substation, site roads and associated ancillary services at Ballaman and Moneydurtlow, Tombrack. Conditional permission was granted by the Authority on the 5th of November, 2011.

The Ballaman Wind Farm was commissioned in 2013 and is currently operational.

5.6.4.3 Ballyduff Wind Farm

- **Pl. Ref. 2003/4003**: Application by C. Brennan for the construction of a wind farm comprising of 2 no. turbines not exceeding 85 metres hub height with a rotor diameter not exceeding 80 metres, and ancillary buildings and roadways at Ballyduff, Kilcomb. Conditional permission was granted by the Authority on the 16th of April, 2004. The Ballyduff Wind Farm was commissioned in 2017 and is currently operational.

5.7 Other Projects

The potential for the grid connection development to contribute to a cumulative impact on European Sites was considered. The online planning system for Wexford County Council was consulted on the 28/02/2020. Additional projects identified in the townlands listed in **Error! Reference source not found.** from the last 5 years were considered and include but are not restricted to those projects listed below.

These comprised general residential, agricultural and infrastructural developments typical of rural areas:

- Permission for retention domestic garages and retention of attic conversion to existing dwelling previously granted under planning reg no. 20071965 and associated site works (Planning Ref.: 20190720),
- Permission to erect an extension to the school including the following; 1. Single classroom extension to the rear of existing school, 2. Extend existing classroom to the rear of existing school, 3. New link corridor with office space along with associated site works (Planning Ref.: 20170169),
- Retention Of (A) Extensions To Dwelling House, (B) Existing Domestic Stores And (C) Extension To Existing Structure (Previously Used As Boarding Kennels) Together With All Ancillary Site Development Works On Site(Planning Ref.: 20170023),
- The construction of anaerobic digestion and organic fertiliser production facility, comprising of 1 no. Digester tank, 1 no. Storage tank, 1 no. Combined heat and power unit, 1 no. Flare, bio filter, agricultural feedstock storage, parking space and all associated site works and services. (Planning Ref.: 20160469),
- Permission for the construction of an anaerobic digestion facility comprising of 1 no. Reception building, 1 no. Digester tank, 3 nos. Pre storage tanks, 1 no. Storage tank, 1 no. Combined heat and power unit, 1 no. Flare, biofilter, office/toilets & control room, weighbridge, wheel wash area, access road, parking spaces, wastewater treatment system and all associated site work. The development also requires a waste facility permit under regulations 2007 (S.I. 821 of 2007 & S.I. 86 of 2008) (Planning Ref.: 20151267),
- Permission to demolish existing fire damaged dwelling house and replace it with a new dwelling and connect to existing services on site (Planning Ref.: 20180555)
- Permission to erect a dwelling with services and domestic garage (Planning Ref.: 20191167),
- Underground MV ducting and cabling linking existing and proposed substations (Planning Ref.: EXD00737),
- Permission for the erection of a dwelling house, domestic garage/ store and associated works (Planning Ref.: 20180933),

- Permission for retention for change of location of waste water treatment system (Planning Ref.: 20180299),
- Permission for retention of (a) alterations to dwelling house (b) erection of a domestic garage and store and all associated site layout alterations, that was previously granted under Pl. Reg. No 20062956 (Planning Ref.: 20171631),
- Permission for the development of a solar PV panel array comprising photovoltaic panels on ground mounted frames within a site area of 7.96 hectares , 4 no. Single storey mv substations, 1 no. Single storey DSO substation, 1 no. Single storey customer substation with 1 no. Communications pole attached , 1 no single storey spares building, boundary security fencing, CCTV, associated, electrical cabling and ducting, alteration to existing entrance to include access gates, access track and all associated ancillary development and landscaping works (Planning Ref.: 20161231),
- Erection of fully serviced dwelling house, septic tank and percolation area, domestic garage and permission to demolish outbuildings and associated site works (Planning Ref.: 20160954),
- Permission for the construction of up to 5mw solar PV farm development within a site area of up to 9.66 ha to include a single storey electrical substation building, electrical transformer/inverter station modules, solar PV panels ground mounted on steel support structures, access roads, fencing and associated electrical cabling, ducting and ancillary infrastructure (Planning Ref.: 20161097),
- Permission for a change of house and garage design from that permitted under 20151001, with services and all associated site and ancillary works (Planning Ref.: 20180631),
- Permission for retention of alterations to our dwelling as a change to that permitted under planning reference 20160249 and permission for retention of revised site boundaries and all associated works (Planning Ref.: 20180394),
- Permission to construct slatted cattle shed, concrete aprons and all associated site works in existing farmyard (Planning Ref.: 20180176),
- Permission for the construction of a fully serviced single storey dwelling incorporating domestic garage, effluent treatment system, and associated site works (Planning Ref.: 20190986),
- Permission for development consisting of one lattice type meteorological mast not exceeding 30 metres in height, underground electrical cables and associated works (Planning Ref.: 20180398),
- Underground mv ducting and cabling linking existing and proposed substations (Planning Ref.: EXD00691),
- (1) retention of (a) the usage of part of the existing building on site as car servicing and valeting garage, (b) the usage of part of an existing outbuilding on site as office accommodation, and (c) retention of the existing septic tank on site, also for (2) permission for (a) the erection of a new commercial building including offices and workshop on site, (b) the erection of a covered bunded storage shed, (c) the extension of the existing yard space for the parking of vehicles with associated surface water drainage, (d) the installation of a car wash down area hardstanding and associated drainage, interceptor and recycled water storage tank, (e) the proposed erection of fencing to boundaries of new yard area, (f) all associated new drainage and new foul percolation area to serve the site and (g) installation of a water attenuation tank to attenuate surface water from existing yard prior to discharge to existing drainage, together with all associated site works and ancillary services on site (Planning Ref.: 20190913).

In the review of the other projects that was undertaken, no connection between the sites, that could potentially result in additional or cumulative impacts was identified. Neither was any potential for different (new) impacts resulting from the combination of the various projects and plans in association with the grid connection cable route.

Given that the grid connection works were restricted to the curtilage of the road and agricultural lands, there were no impacts as a result of the works on significant habitats or species. It has been assessed that there were no cumulative impacts of the grid connection with any existing or permitted developments or any national, regional or local spatial plans, largely due to the small-scale nature and location of the grid connection works as well as their limited duration. There have been no significant cumulative effects as a result of the grid connection development.

5.8 Conclusions

In summary, the grid connection development has not had any significant impacts on any flora or fauna of significant ecological importance during the construction phase nor will it have a significant ecological impact during the operational phases of the development. This is based on the following:

- The location of the development in habitats of low ecological significance, i.e. within the existing road and in the case of the overhead line, agricultural lands.
- Absence of protected flora species and fauna species and breeding territories deemed to be of high conservation concern.
- Best practice design and control measures which have been incorporated into the design of the development and adhered to during construction works.

No significant effects on biodiversity have occurred.

6. GEOLOGY AND SOILS

6.1 Introduction

6.1.1 Background & Objectives

McCarthy Keville O'Sullivan (MKO), on behalf of ESB International, has carried out an assessment of the likely significant effects of the existing Crory Wind Farm Group Grid Connection, near Ferns, Co. Wexford, on the land, soils and geology of the receiving environment.

This chapter provides a baseline assessment of the environmental setting of the Subject Development in terms of land, soils, and geology, and discusses the potential likely significant effects of the Grid Connection. This chapter also discusses any mitigation measure that were put in place to limit any identified potentially significant impacts to soils and geology, and provides an assessment of residual impacts and significance of effects. Hydrogeology and groundwater are not discussed in this chapter as they are discussed in detail in Chapter 7 of this rEIAR.

6.1.2 Statement of Authority

McCarthy Keville O'Sullivan Ltd. (MKO) is a specialist planning and environmental consultancy. Based in Galway but working nationwide, we deliver challenging and complex projects on behalf of our clients. MKO employs over 50 people across the company's four planning, ecology, environmental and ornithology teams. Our multi-disciplinary service offering and broad range of nationwide experience add real value to our client's projects.

MKO company experience spans the full range of industry sectors, including renewable energy, commercial development, roads and transport infrastructure, ports and marinas, tourism, energy infrastructure, retail, sport and leisure, quarrying and aggregates, manufacturing, education, housing, waste management, water, telecoms and other utilities.

Our areas of expertise and experience include a wide variety of environmental topics, including geology. We routinely are involved with carrying out impact assessments for land, soils and geology for a large variety of project types.

This chapter of the rEIAR was prepared by Michael Watson and Thomas Blackwell.

Michael Watson completed an MA in Environmental Management at NUI, Maynooth in 1999. He is a Professional Geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv). Michael joined McCarthy Keville O'Sullivan Ltd. in 2014 having gained over 15 years' experience in a Cork-based environmental & hydrogeological consultancy firm. Thomas Blackwell holds both a BA in Geography and a MSc in Environmental Resource Management. Prior to taking up his position with McCarthy Keville O'Sullivan, Thomas worked as an environmental consultant in the United States.

6.1.3 Relevant Legislation

The rEIAR is prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU. The requirements of the following legislation are complied with:

- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2001 - 2018

- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive);
- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) regulations and subsequent amendments (S.I. No. 84 of 1995, S.I. No. 352 of 1998, S.I. No. 93 of 1999; S.I. No. 450 of 2000; S.I No. 538 of 2001); S.I. No. 30 of 2000 the Planning and Development Act, 2000; and S.I 600 of 2001 Planning and Development Regulations and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment;
- Planning and Development Act, 2000, as amended;
- S.I. No 296 of 2018: S.I. No. 296 of 2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of Directive 2014/52/EU into Irish law; and,
- The Heritage Act 1995, as amended

6.1.4 Relevant Guidance

The land, soils and geology chapter of this rEIAR was prepared having regard, where relevant, to guidance contained in the following documents:

- Environmental Protection Agency (2017): Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports;
- Environmental Protection Agency (2015): Draft - Advice Notes on Current Practice (in the preparation of Environmental Impact Statements);
- Environmental Protection Agency (2015): Draft – Revised Guidelines on the Information to be contained in Environmental Impact Statements;
- Environmental Protection Agency (2003): Advice Notes on Current Practice (in the Preparation of Environmental Impact Statements);
- Environmental Protection Agency (2002): Guidelines on the information to be contained in Environmental Impact Statements);
- European Commission (2017) Guidance on Screening;
- European Commission (2017) Guidance on Scoping;
- European Commission (2017) Guidance on the preparation of the Environmental Impact Assessment Report;
- Institute of Geologists Ireland (2013): Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements; and,
- National Roads Authority (2005): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.

6.2 Methodology

6.2.1 Desk Study

A desk study of the Grid Connection route and the surrounding study area was completed in October 2019. The desk study involved collecting all the relevant geological data for the Grid Connection route and study area. This included consultation with the following:

- Environmental Protection Agency database (www.epa.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 19 (Geology of Carlow-Wexford). Geological Survey of Ireland (GSI, 1994);

- Geological Survey of Ireland – 1:25,000 Field Mapping Sheets; and,
- General Soil Map of Ireland 2nd edition (www.epa.ie).

6.2.2 Walkover Survey

A visual inspection of the cable route and surrounding area was undertaken by MKO on 22nd November 2019. The purpose of the site investigation was to investigate the site for any surface indications of residual impacts to land, soils, and geology resulting from the construction of the Grid Connection cable route. Particular attention was paid to identifying any potential areas of soil erosion that might be the result of incorrect backfilling of the Grid Connection trench. No evidence of any residual impacts to land, soils, and geology was observed.

6.2.3 Impact Assessment Methodology

Using information from the desk study and data from the site investigation, an estimation of the importance of the soil and geological environment within the study area is assessed using the criteria set out in Table 6.1 (NRA, 2008).

Table 6.1. Estimation of Importance of Soil and Geology Criteria (NRA, 2008).

Importance	Criteria	Typical Example
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit. Proven economically extractable mineral resource
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying site is significant on a local scale.	Contaminated soil on site with previous heavy industrial usage. Large recent landfill site for mixed wastes. Geological feature of high value on a local scale (County Geological Site). Well drained and/or high fertility soils. Moderately sized existing quarry or pit. Marginally economic extractable mineral resource.

Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and/or soft organic soil underlying site is moderate on a local scale.	Contaminated soil on site with previous light industrial usage. Small recent landfill site for mixed Wastes. Moderately drained and/or moderate fertility soils. Small existing quarry or pit. Sub-economic extractable mineral Resource.
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying site is small on a local scale.	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.

The criteria (EPA 2017) for the assessment of impacts require that likely impacts are described with respect to their extent, magnitude, type (*i.e.* negative, positive or neutral) probability, duration, frequency, reversibility, and transfrontier nature (if applicable). The descriptors used in this environmental impact assessment are those set out in EPA (2017) Glossary of Impacts as outlined in Chapter 1 of this rEIAR. In addition, the two impact characteristics proximity and probability are described for each impact and these are defined in Table 6.2.

In order to provide an understanding of this descriptive system in terms of the geological/hydrological environment, elements of this system of description of impacts are related to examples of potential impacts on the geology and morphology of the existing environment, as listed in Table 6.3.

Table 6.2. Additional Impact Characteristics.

Impact Characteristic	Degree/ Nature	Description
Proximity	Direct	An impact which occurs within the area of the proposed project, as a direct result of the proposed project.
	Indirect	An impact which is caused by the interaction of effects, or by off-site developments.
Probability	Low	A low likelihood of occurrence of the impact.
	Medium	A medium likelihood of occurrence of the impact.
	High	A high likelihood of occurrence of the impact.

Table 6.3. Impact descriptors related to the receiving environment.

Impact Characteristics		Potential Geological/Hydrological Impacts
Quality	**Significance**	
Negative only	Profound	Widespread permanent impact on: - The extent or morphology of a designated site - Regionally important aquifers. - Extents of floodplains. -Loss of a geologically sensitive site Mitigation measures are unlikely to remove such impacts.
Positive or Negative	Very Significant/ Significant	Local or widespread time dependent impacts on: -The extent or morphology of a cSAC / ecologically important area. -A regionally important geological feature (or widespread effects to minor geological features). -Extent of floodplains. Widespread permanent impacts on the extent or morphology of a NHA/ecologically important area, Mitigation measures (to design) will reduce but not completely remove the impact – residual impacts will occur.
Positive or Negative	Moderate	Local time dependent impacts on: - The extent or morphology of a cSAC / NHA / ecologically important area. - A minor geological feature. - Extent of floodplains. Mitigation measures can mitigate the impact OR residual impacts occur, but these are consistent with existing or emerging trends
Positive, Negative or Neutral	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Positive, Negative or Neutral	Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Neutral	Imperceptible	No impacts, or impacts which are beneath levels of perception, within normal bounds of variation, or within the bounds of measurement or forecasting error.

6.3 Receiving Environment

6.3.1 Pre-existing Environment

6.3.1.1 Site Description & Topography

The grid connection cable route is a total of approximately 28 kilometres in length and passes through 18 no. townlands to the north and west of Ferns, Co. Wexford. The cable route is located primarily in public roads with short sections located in farm tracks and crossing farm fields.

The elevation of the site ranges between approximately 40m and 220m OD (metres above Ordnance Datum). The overall local topography generally slopes from north to south with an undulating topography. The dominant land use on the bordering land is agricultural with scattered one-off housing and small settlements. The location of the cable route is shown on Figure 6.1

6.3.1.2 Soils and Subsoils

According to GSI mapping (www.gsi.ie), the cable route is dominated by deep, well drained mineral soils, mainly derived from acidic parent materials (AminDW). There are also smaller areas of shallow, well drained mineral soils (AminSW), shallow, reasonably drained mineral soil derived from mainly acidic parent materials (AminSRPT), deep, poorly drained mineral soils, derived mainly from non-calcareous parent material (AminPD), and mineral alluvium (AlluvMIN) mapped along the cable route.

GSI mapping for the site indicates that the majority of the site either has bedrock at the surface (Rck) or is underlain by shale till (TLPS). There are smaller areas of undifferentiated alluvium (A) associated with river valleys. The local subsoils map is shown as Figure 6.2.

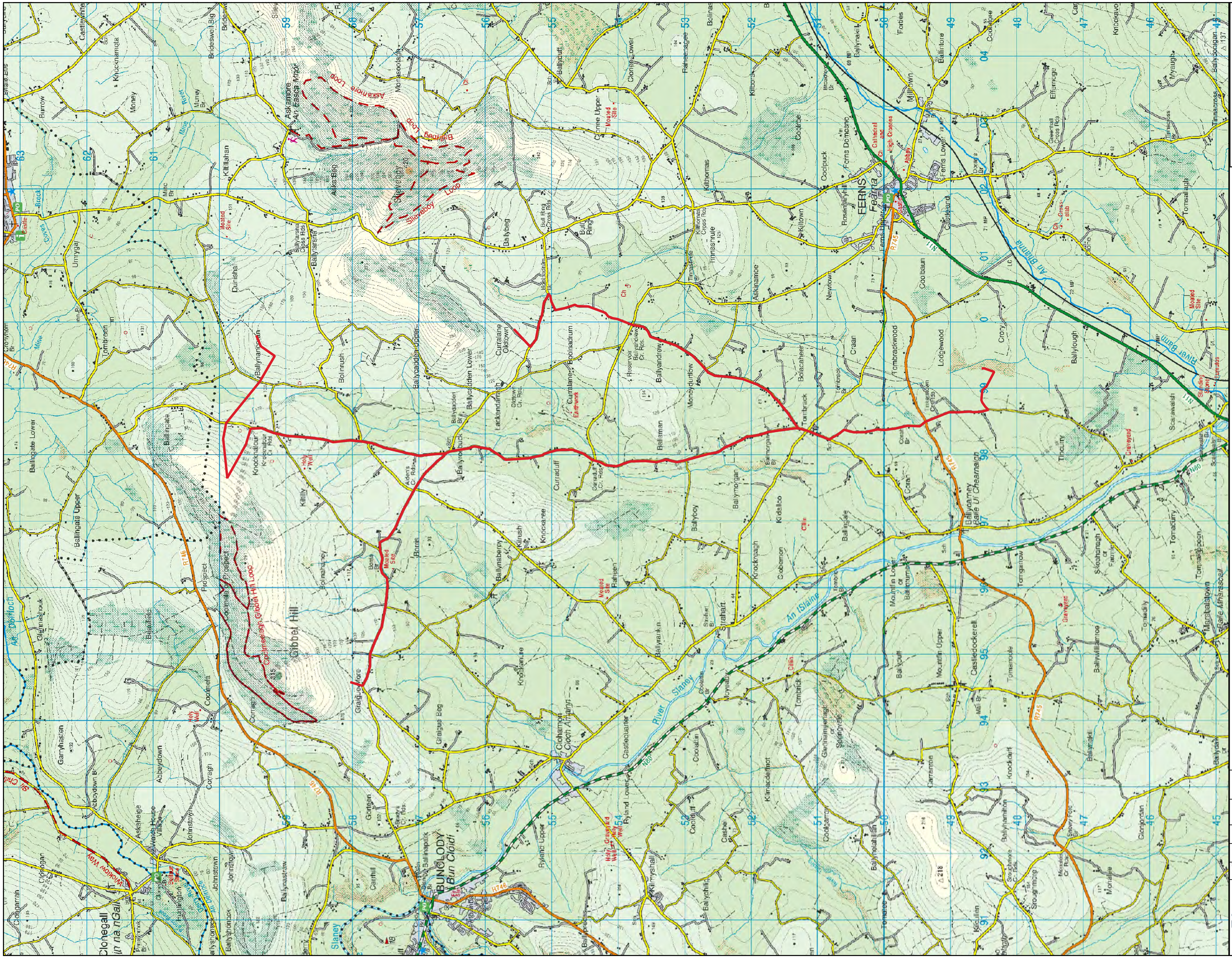
Since the Grid Connection was constructed predominantly within existing public roadway, the majority of the soils within the cable route had been previously disturbed as a result of road construction. The soils and subsoil resource at and adjacent the subject development is considered of Low value.

6.3.1.3 Bedrock Geology

Based on the GSI bedrock map of the region, the cable route is underlain by the Oaklands Formation, Ballylane Shale Formation, and Maulin Formation. The Oaklands Formation (OA) consists of green, red-purple, and buff slate and siltstone. The Ballylane Shale Formation (BY) consists of laminated green to green-grey slates and shales interbedded with or thinly laminated with green or pale-grey siltstones. The Maulin Formation (MN) consists of dark blue-grey slates and phyllites.

The Ballylane Shale Formation is classified by the GSI as a Poor Aquifer -Bedrock which is Generally Unproductive except for Local Zones (Pl). Both the Maulin Formation and the Oaklands Formation are classified by the GSI as Locally Important Aquifers - Bedrock which is Moderately Productive only in Local Zones (LI).

A bedrock geology map of the area is included as Figure 6.3. The bedrock and aquifer receptors at and adjacent the subject development is considered of Low value.



Map Legend

Grid Connection Route

Ordnance Survey Ireland Licence No. AR 0021819© Ordnance Survey Ireland/Government of Ireland

Drawing Title
Site Topography

Project Title
Crory Wind Farm Group
Grid Connection

Drawn By	Checked By
TJB	MW
Project No.	Drawing No.
190806	Figure 6.1
Scale	Date
1:50000	06.01.20

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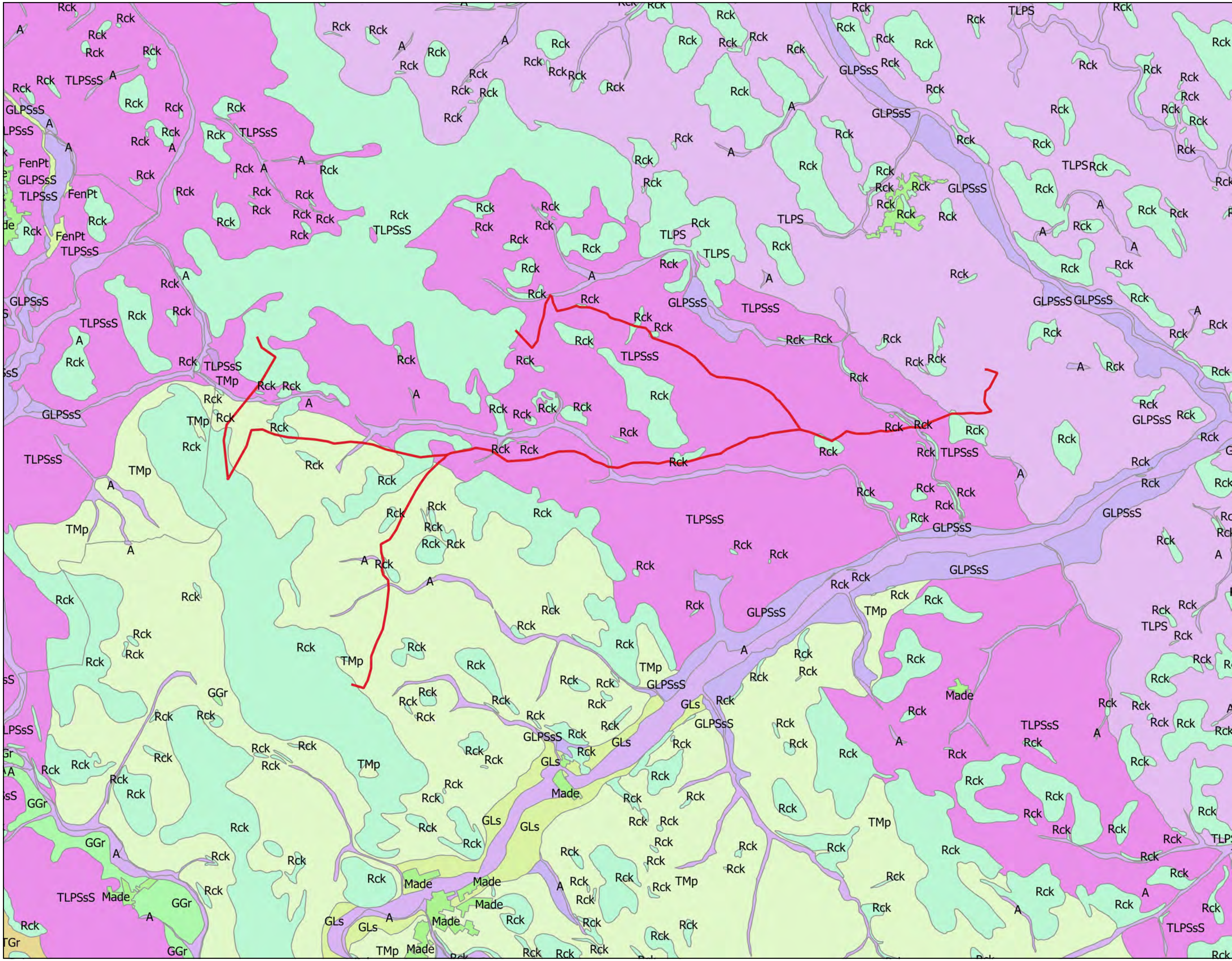

Map Legend

Grid Connection Route

Subsoils

- Alluvium (A)
- Sandstone & Shale Sands and Gravels (GLPSsS)
- Bedrock at Surface (Rck)
- Sandstone & Shale Till (TLPSsS)
- Metamorphic Till (TMp)

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Drawing Title	Subsoils
Project Title	Crory Wind Farm Group Grid Connection
Drawn By: TJB	Checked By: MW
Project No.: 190806	Drawing No.: Figure 6.2
Scale: 1:50000	Date: 06.01.20

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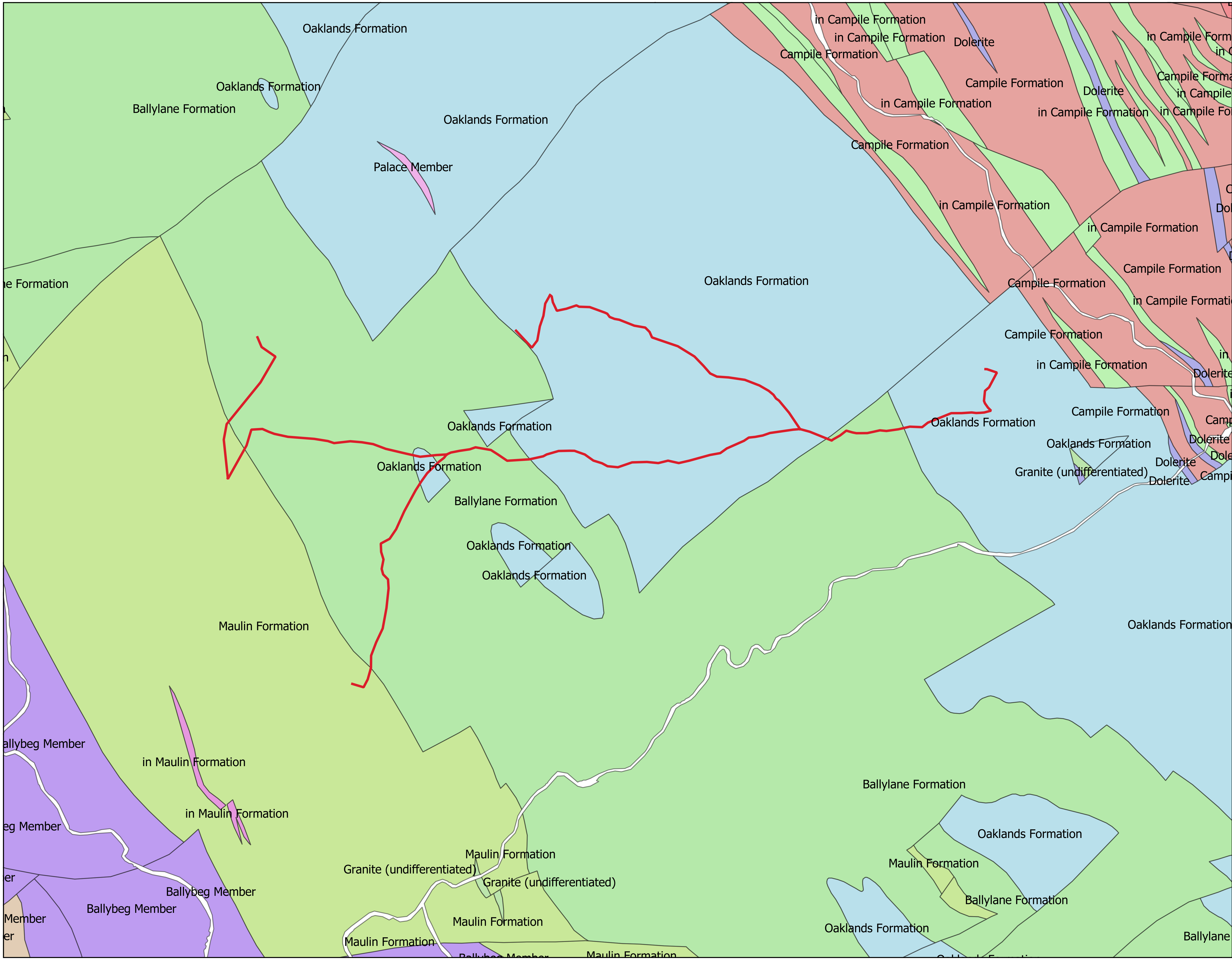

Map Legend

Grid Connection Route

Bedrock Geology

- Ballybeg Member
- Ballylane Formation
- Campile Formation
- Dolerite
- Granite (undifferentiated)
- in Campile Formation
- in Maulin Formation
- Maulin Formation
- Oaklands Formation
- Palace Member

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Drawing Title: Bedrock Geology	
Project Title: Crory Wind Farm Group Grid Connection	
Drawn By: TJB	Checked By: MW
Project No.: 190806	Drawing No.: Figure 6.3
Scale: 1:50000	Date: 06.01.20

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6.3.1.4 Geological Heritage and Designated Sites

There are no recorded Geological Heritage sites within or adjacent to the development area. The closest geological heritage site is a discordant river pattern at the River Slaney, Bunclody, which is located approximately 3.5km west of the site.

The cable route is located primarily in public roads and does not cross any designated sites. The closest Natura 2000 site is the Slaney River Special Area of Conservation (SAC) (NPWS Site Code: 000781) which is located approximately 1.7 km southeast of the cable route at its nearest point.

6.3.1.5 Soil Contamination

According to the EPA online mapping (https://gis.epa.ie/EPAMaps), there are no licenced waste facilities on or within the immediate environs of the cable route.

There are no historic mines at or in the immediate vicinity of the site that could potentially have contaminated tailings. The site walkover survey did not identify any evidence of potential soil contamination at or adjacent the subject development and there is no record from the construction phase of any environmental incidents with the potential to cause soil contamination.

6.3.1.6 Economic Geology

The GSI Online Minerals Database accessed via the Public Data Viewer shows no quarries within the development area.

The GSI online Aggregate Potential Mapping Database shows that the cable route is not located within an area mapped as being of Very High or High granular aggregate potential (i.e. potential for gravel reserves).

6.4 Characteristics of the Development

The Subject Development consists of a 20 kV cable to facilitate the connection of the existing permitted Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour windfarms to the national electricity grid as described in Chapter 3.

The underground cable route required the excavation of soil and subsoil to facilitate trenching for the cable ducts. Significant excavations were not required, and all disturbed areas were returned to their pre-construction grades.

6.5 Likely, Significant Impacts of the Development

6.5.1 Construction Phase Impacts

The potential impacts of the Subject Development and mitigation measures that were put in place to eliminate or reduce them are shown below. These relate to the construction stage. It should be noted that there is no potential for impacts on the soils and geology environment during the operational stage.

6.5.1.1 Soil and Subsoil Excavation

Excavation of existing fill, subsoil and bedrock was required to facilitate trenching for the installation of cable ducts. This resulted in a permanent relocation of soil and subsoil at most excavation locations. The excavated materials are included existing fill material, topsoil/subsoil, and some bedrock.

Mechanism: Extraction/excavation.

Receptor: Land, topsoil, subsoil and bedrock.

Potential Impact: Negative, slight, direct, likely, permanent impact on soil, subsoil and bedrock at a local level.

Mitigation Measures Implemented

- All excess material was used at the consented Ballycadden wind farm borrow pits for restoration of the pits or sent to a permitted stone / waste recovery facility at Kildavin, Bunclody, Co Wexford.

Residual Impact

The implementation of the mitigation measures discussed above resulted in a residual **Neutral, direct, imperceptible, likely, permanent impact** on topsoil, subsoils and bedrock as a result of the excavation of material for the cable trench. This conclusion was confirmed by inspection of the grid connection route in the field. No evidence of ground instability or incorrect backfilling was observed.

Significance of Effects

Based on the assessment above there were **No Significant Effects** on land, topsoil, subsoils or bedrock as a result of soil and subsoil excavation.

6.5.1.2 Contamination of Soil by Leakages and Spillages and Alteration of Soil Geochemistry

Similar to all construction sites, plant and machinery require refueling and so hydrocarbons will have been present on site. Managed incorrectly, there is the risk of spills and leaks associated with these operations impacting on land and soils.

Pathway: Topsoil, subsoil and bedrock pore space.

Receptor: Topsoil, subsoil and bedrock.

Potential Impact: Negative, direct, slight, short term, medium probability impact on topsoil, subsoils and bedrock.

Mitigation Measures Implemented

- All plant and machinery were serviced before being mobilised to site;
- No plant maintenance was completed on site, any broken down plant was removed from site to be fixed;
- Refuelling was completed in a controlled manner using drip trays at all times;
- Mobile bowsers, tanks and drums were stored in secure, impermeable storage areas away from open water;
- Only designated trained operators were authorised to refuel plant on site;
- Procedures and contingency plans were set up to deal with emergency accidents or spills; and,
- Highest standards of site management were maintained, and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during construction.

Residual Impact

The implementation of the above mitigation measures resulted in a residual **Neutral, Imperceptible, direct, short term, unlikely impact** to land, topsoil, subsoils or bedrock. There was no recorded or observed evidence of any leakages or spillages of hydrocarbons during the construction of the grid connection.

Significance of Effects

Based on the assessment above there were **No Significant Effects** on land, topsoil, subsoils or bedrock as a result of leakages or spillages.

6.5.2 Operational Phase Impacts

No impacts on soils and geology have occurred or are anticipated during the operational phase. The operational stage of the development will not involve further disturbance to the topsoil, subsoils and geology of the area. No regular maintenance work is anticipated to be required. In the event that maintenance of the grid connection is required, works would likely be brief and limited to areas around joint bays. There would be no significant impacts on soils and geology associated with any future maintenance works.

Significance of Effects

No Significant Effects on land, soils and geology environment are envisaged during the operational stage.

6.5.3 Potential Cumulative Impacts

Potential cumulative effects on geology and soils between the Subject Development and other developments in the vicinity, including all those listed in Section 2.6.2 of this rEIAR, were also considered as part of this assessment. The Ballacadden, Gibbet Hill, and Knocknalour Wind Farms were each subject to an EIS that identified mitigation measures to ensure that no significant impact to land, soils or geology would occur. Similarly, best construction practices were implemented in the construction of the single turbine Ballynancoran Wind Farm, thus limiting the potential for significant impacts. Due to the limited scale of other development in the vicinity, there is little potential for significant impacts to land, soil, and geology resulting from those developments. Therefore, **no significant cumulative impacts** on land, soils and geology environment are anticipated during the construction or operation phases of the Grid Connection.

6.5.4 Summary

Trenching resulting in the excavation of existing fill, topsoil, subsoil and bedrock was required for the installation of the Grid Connection cable ducts. This resulted in a permanent removal of subsoil and at most excavation locations. Trenching was backfilled with imported material as prescribed by ESB standards, and Wexford County Council requirements for the reinstatement of the public road.

All excess material was sent to an authorised soil and stone or waste recovery facility. Storage and handling of hydrocarbons/chemicals was carried out using best practice methods. Measures to prevent subsoil erosion during excavation and reinstatement were undertaken to prevent water quality impacts.

No impacts to soils or geology area anticipated during the operational phase.

No Significant Impacts on land, soil and geology have occurred, or will occur as a result of the construction and operation of the grid connection.

7. HYDROLOGY AND HYDROGEOLOGY

7.1 Introduction

7.1.1 Background and Objectives

MKO carried out an assessment of the likely significant and residual impacts of a grid connection between the Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour Wind Farms and the Crory 110kV substation east of Ferns, Co. Wexford, on water aspects (hydrology and hydrogeology) of the receiving environment.

The objectives of the assessment area to:

- Produce a baseline study of the existing water environment (surface and groundwater) in the area of the Development;
- Identify likely positive and negative impacts of the development on surface and groundwater during construction and operational phases of the development;
- Identify mitigation measures implemented to avoid, reduce, or offset significant negative impacts;
- Assess significant residual impacts and effects;
- Assess cumulative impacts of the Development along with other developments.

7.1.2 Statement of Authority

McCarthy Keville O'Sullivan Ltd. (MKO) is a specialist planning and environmental consultancy. Based in Galway but working nationwide, we deliver challenging and complex projects on behalf of our clients. MKO employs over 50 people across the company's four planning, ecology, environmental and ornithology teams. Our multi-disciplinary service offering and broad range of nationwide experience add real value to our client's projects.

MKO company experience spans the full range of industry sectors, including renewable energy, commercial development, roads and transport infrastructure, ports and marinas, tourism, energy infrastructure, retail, sport and leisure, quarrying and aggregates, manufacturing, education, housing, waste management, water, telecoms and other utilities.

Our areas of expertise and experience include a wide variety of environmental topics, including hydrology and hydrogeology. We routinely are involved with carrying out impact assessments for hydrology and hydrogeology for a large variety of project types.

This chapter of the rEIAR was prepared by Michael Watson and Thomas Blackwell.

Michael Watson completed an MA in Environmental Management at NUI, Maynooth in 1999. He is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv). Michael joined McCarthy Keville O'Sullivan Ltd. in 2014 having gained over 15 years' experience in a Cork-based environmental & hydrogeological consultancy firm.

Thomas Blackwell is a Senior Environmentalist with MKO with over 15 years of progressive experience in environmental consulting. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin. Prior to taking up his position with MKO in August 2019, Thomas worked as a Senior Environmental Scientist with HDR, Inc. in the United States and held previous posts with private consulting firms in both the USA and Ireland.

7.1.3 Relevant Legislation

This rEIAR is prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU.

Regard has also been taken of the requirements of the following legislation (where relevant):

- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) Regulations, and subsequent Amendments (S.I. No. 84 of 1994, S.I. No. 101 of 1996, S.I. No. 351 of 1998, S.I. No. 93 of 1999, S.I. No. 450 of 2000 and S.I. No. 538 of 2001, S.I. 134 of 2013 and the Minerals Development Act 2017), the Planning and Development Act 2000 (as amended), and S.I. 600 of 2001 Planning and Development Regulations and subsequent Amendments. These instruments implement EU Directive 85/337/EEC and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment;
- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive);
- Planning and Development Act, 2000, as amended;
- S.I. No 296 of 2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of Directive 2014/52/EU into Irish law;
- S.I. No. 293 of 1988: European Communities (Quality of Salmonid Waters) Regulations, resulting from EU Directive 78/659/EEC on the Quality of Fresh Waters Needing Protection or Improvement in order to Support Fish Life;
- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended by S.I. No. 296/2009; S.I. No. 386/2015; S.I. No. 327/2012; and S.I. No. 77/2019 and giving effect to Directive 2008/105/EC on environmental quality standards in the field of water policy and Directive 2000/60/EC establishing a framework for Community action in the field of water policy) and S.I. No. 722 of 2003 European Communities (Water Policy) Regulations which implement EU Water Framework Directive (2000/60/EC) establishing a framework for the Community action in the field of water policy and provide for implementation of 'daughter' Groundwater Directive (2006/118/EC) on the protection of groundwater against pollution and deterioration. Since 2000 water management in the EU has been directed by the Water Framework Directive (2000/60/EC) (as amended by Decision No. 2455/2011/EC; Directive 2008/32/EC; Directive 2008/105/EC; Directive 2009/31/EC; Directive 2013/39/EU; Council Directive 2013/64/EU; and Commission Directive 2014/101/EU ("WFD"). The WFD was given legal effect in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003
- S.I. No. 684 of 2007: Waste Water Discharge (Authorisation) Regulations 2017, resulting from EU Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive);S.I. No. 106 of 2007: European Communities (Drinking Water) Regulations 2007and S.I. No. 122 of 2014: European Communities (Drinking Water) Regulations 2014, arising from EU Directive 98/83/EC on the quality of water intended for human consumption (the "Drinking Water Directive") and EU Directive 2000/60/EC;
- S.I. No. 9 of 2010: European Communities Environmental Objectives (Groundwater) Regulations 2010 (as amended by S.I. No. 389/2011; S.I. No. 149/2012; S.I. No. 366/2016; the Radiological Protection (Miscellaneous Provisions) Act 2014; and S.I. No. 366/2016); and,
- S.I. No. 296 of 2009: The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (as amended by S.I. No. 355 of 2018)

7.1.4 Relevant Guidance

The water section of the rEIAR is carried out in accordance with guidance contained in the following:

- Environmental Protection Agency (2017): Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Environmental Protection Agency (September 2015): Draft - Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) where relevant;
- Environmental Protection Agency (September 2015): Draft – Revised Guidelines on the Information to be Contained in Environmental Impact Statements where relevant;
- European Commission (2017) Guidance on Screening;
- European Commission (2017) Guidance on Scoping;
- European Commission (2017) Guidance on the preparation of the Environmental Impact Assessment Report;
- Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
- National Roads Authority (2005): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016);
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note);
- PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note);
- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006); and,
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.

7.2 Methodology

7.2.1 Desk Study & Preliminary Hydrological Assessment

A desk study and preliminary hydrological assessment of the grid connection route and the surrounding area was completed in advance of the field work. This involved collection of all relevant geological, hydrological, hydrogeological and meteorological data for the area. This included consultation with the following sources:

- Environmental Protection Agency database (www.epa.ie);
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Met Eireann Meteorological Databases (www.met.ie);
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- EPA/Water Framework Directive Map Viewer (www.catchments.ie);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 19 (Geology of Carlow - Wexford). Geological Survey of Ireland (GSI, 1995);
- Geological Survey of Ireland (2003) – Ballyglass Groundwater Body Initial Characterization Report;
- OPW Flood Hazard Mapping (www.floodinfo.ie);
- Environmental Protection Agency – "Hydrotool" Map Viewer (www.epa.ie);
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie); and,
- Department of Environment, Community and Local Government on-line mapping viewer (www.myplan.ie).

7.2.2 Site Investigations

A walkover survey, including drainage mapping and water sampling, was undertaken by MKO staff on 22nd November 2019. The hydrological walkover survey involved:

- Walkover surveys and drainage mapping of the route and the surrounding area were undertaken whereby water flow directions and drainage patterns were recorded

7.2.3 Impact Assessment Methodology

Please refer to Chapter 1 of the rEIAR for details on the impact assessment methodology (EPA, 2002, 2003, 2015 and 2017). In addition to the above methodology, the sensitivity of the water environment receptors was assessed on completion of the desk study and baseline study. Levels of sensitivity which are defined in **Table 7-1** are then used to assess the potential effect that the Proposed Development may have on them.

Table 7-1: Receptor Sensitivity Criteria (Adapted from www.sepa.org.uk)

Sensitivity of Receptor	
Not sensitive	Receptor is of low environmental importance (e.g. surface water quality classified by EPA as A3 waters or seriously polluted), fish sporadically present or restricted). Heavily engineered or artificially modified and may dry up during summer months. Environmental equilibrium is stable and is resilient to changes which are considerably greater than natural fluctuations, without detriment to its present character. No abstractions for public or private water supplies. GSI groundwater vulnerability “Low” – “Medium” classification and “Poor” aquifer importance.
Sensitive	Receptor is of medium environmental importance or of regional value. Surface water quality classified by EPA as A2. Salmonid species may be present and may be locally important for fisheries. Abstractions for private water supplies. Environmental equilibrium copes well with all natural fluctuations but cannot absorb some changes greater than this without altering part of its present character. GSI groundwater vulnerability “High” classification and “Locally” important aquifer.
Very sensitive	Receptor is of high environmental importance or of national or international value i.e. NHA or SAC. Surface water quality classified by EPA as A1 and salmonid spawning grounds present. Abstractions for public drinking water supply. GSI groundwater vulnerability “Extreme” classification and “Regionally” important aquifer

7.3 Receiving Environment

7.3.1 General Site Description

The cable route is located approximately 3 kilometres west of Ferns in County Wexford at its nearest point, as illustrated in Figure 1.1. The route extends from the existing Crory 110 kV substation in the south to the Knocknalour and Ballynancoran windfarms in the north, a straight line distance of approximately 12 kms. A spur to the east extends to the Ballycadden Wind Farm and a spur to the west extends to the Gibbet Hill Wind Farm. The majority of the subject grid connection are underground cables laid in the public roads. The main exceptions are; the initial connection to the Crory substation, which comprise an underground cable which crosses two fields (a distance of approximately 500 metres); the final connection to Ballycadden Wind Farm which is an underground cable installed in a private road, a track and fields (a distance of approximately 1,000 metres); the final connection to Gibbet Hill Wind Farm – an underground cable routed across a private road, a track and fields (a distance of approximately 800 metres); and the link section between the Knocknalour and Ballynancoran Wind Farms that comprises an overhead power line across fields (a distance of approximately 2 kms). Overall, the grid connections comprise approximately 26 kms of 20 kV underground cable (the route of which is marked by road and bridge markers) and approximately 2 kms of 20 kV overhead powerline.

The grid connection cable route is located entirely within the Slaney and Wexford Harbour (12) surface water catchment. The overall elevation along the grid connection ranges between approximately 40 to 220m OD (Ordnance Datum) with a gradual increase in elevation from the Crory substation site in the south to the wind farms in the north.

7.3.2 Water Balance

Long term rainfall and evaporation data was sourced from Met Éireann. The 30-year annual average rainfall (1978 – 2007) data from the Met Éireann weather station at Rosslare, Co. Wexford are presented in **Table 7-2**. The Rosslare weather station is located approximately 40 kilometres southeast of the cable route and is the closest weather station for which long term averages are available. The Rosslare weather station closed in 2008, however it is unlikely that there has been any significant changes in rainfall since that time.

The closest synoptic station where the average potential evapotranspiration (PE) is recorded is at Mullingar, at the southern end of the proposed route. The long-term average PE for this station is 534mm/yr. This value is used as a best estimate of the site PE. Actual Evaporation (AE) at the site is estimated as 507mm/yr (which is 0.95 × PE).

Table 7-2: Local Average long-term Rainfall Data (mm)

Station		X-Coord		Y-Coord		Ht (MAOD)		Opened		Closed		
Rosslare		238400		270100		67		1956		2008		
Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Total
88	71	69	59	56	55	50	72	75	109	101	101	906

The effective rainfall (ER) represents the water available for runoff and groundwater recharge. The ER for the site is calculated as follows:

$$\text{Effective rainfall (ER)} = \text{AAR} - \text{AE}$$

$$= 906\text{mm/yr} - 507\text{mm/yr}$$

$$\text{ER} = 399\text{mm/yr}$$

Based on recharge coefficient estimates from the GSI (www.gsi.ie), an estimate of 60% recharge is taken for the majority of the cable route. North of Ballyroebuck, the recharge varies between 22.5% (for areas of moderate permeability subsoil overlain by poorly drained gley soils) and 85% (for areas with rock at the ground surface). An average recharge coefficient of 60% is taken to reflect this variation. A recharge coefficient of 60% is therefore taken as an overall average for the whole cable route. This means that 60% of the effective rainfall in the area infiltrates into the ground and becomes groundwater, the remaining 40% or the effective rainfall will runoff as surface water to rivers, lakes, streams, or the sea.

Based on this recharge coefficient, the annual recharge and runoff rates for the proposed route are estimated to be 239.4 mm/yr and 159.6mm/yr respectively. Surface Water

7.3.2.1 Regional and Local Hydrology

The entire project lies within the South Eastern River Basin District. With respect to regional hydrology, under the Water Framework Directive (WFD) the development is located entirely within the River Slaney (12) surface water catchment. The development is located in 3 no. regional surface water sub-catchments. The large majority of the grid connection is located within the Slaney_SC_060 sub-catchment with a short section in the north, around the Ballynancoran and Knocknalour wind farms, located in the Slaney_SC_040 sub-catchment. A short section of the grid connection (approximately 980 metres) at the extreme south of the cable route is located within the Bann sub-catchment (Bann [Wexford]_SC_010). A regional hydrology map is shown as Figure 7.1.

7.3.2.2 Local & Site Drainage

There are five main streams within the 3 no. subcatchments which drain the area along the grid connection route.

The Ballycarney Stream flows south-southwest for approximately 10km from its source in the townland of Ballybeg to its confluence with the River Slaney at Ballycarney. The stream has a drainage area of approximately 22 square kilometres. The grid connection route crosses the Ballycarney Stream at Corah Bridge. The route also crosses two unnamed tributaries to the Ballycarney Stream.

The Ballingale Stream flows south for approximately 11km from its source in the townland of Knocknalour to its confluence with the River Slaney at a point approximately 1km north of Ballycarney. The stream has a drainage area of approximately 22 square kilometres.. The grid connection route crosses the Ballingale Stream at just south of Curraduff Crossroads. The route also crosses three unnamed tributaries to the Ballycarney Stream.

The Borris Stream rises on the southern slopes of Gibbet Hill and flows south for approximately 6.7km from its source to its confluence with the River Slaney near Castlequarter. The stream has a drainage area of approximately 13 square kilometres.. The grid connection route crosses the Borris Stream Stream at just south of Curraduff Crossroads. The route also crosses an unnamed tributary to the Borris Stream.

The northern section of the grid connection route, including the overhead powerline section between the Knocknalour and Ballynancoran Wind Farms drains toward the Mine River. The Mine River has a drainage area of approximately 61 square kilometres and flows west from close to Shrule Crossroads to its confluence with the Derry River at Ballingate Bridge. The main channel of the Mine River is located approximately 2.5km northeast of the grid connection route, however the overhead powerline section of the route crosses an unnamed tributary between the Knocknalour and Ballynancoran Wind Farms.

The final 1km of the grid connections route before its terminus at the Crory Substation is located within the Bann [Wexford]_SC_010 subcatchment. Surface run-off from this section of the grid route flows in the direction of an unnamed tributary to the River Bann. This tributary is located approximately 250 metres east of the terminus of the grid connection cable, immediately to the east of the Crory Substation.

In addition to the streams discussed above, there are numerous roadside drains that run parallel to the grid route where it is located within the road. These drains carry surface water runoff from the road network and surrounding areas and typically discharge into the natural stream network. A local hydrology map is shown as Figure 7.2.

A summary of the sub-catchments along with relevant Proposed Development infrastructure and significant existing drainage features/routes are shown in **Table 7-3**.

Table 7-3: Summary of Regional/Local hydrology & Proposed Windfarm Infrastructure

Regional Catchments	Sub-catchment	Main Development Infrastructure	Primary Drainage Features
River Slaney	Slaney_SC_060	~23.6km of underground grid route	Ballycarney Stream Ballingale Stream Borris Stream
	Slaney_SC_040	~3.4km of grid route (~1.4km of underground cable and ~2km of overhead power line)	Unnamed tributary to Mines River
	Bann(Wexford)_010	~1km of underground grid route	Unnamed Tributary to River Bann

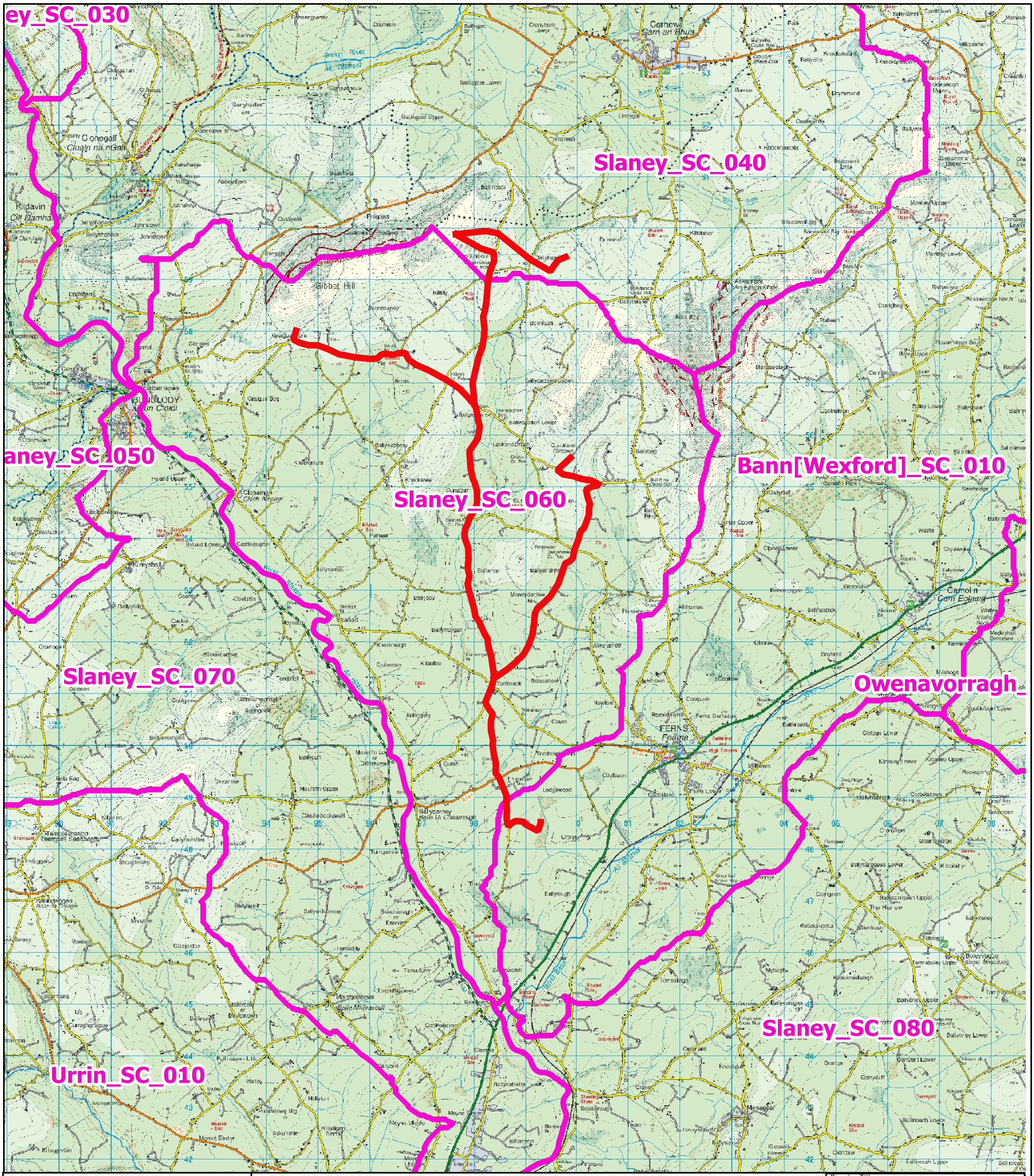
7.3.2.3 Flood Risk Identification

OPW's indicative river and coastal flood map (www.floodinfo.ie), CFRAM Preliminary Flood Risk Assessment (PFRA) maps which can be accessed at the Department of Environment, Community and Local Government on-line planning mapping (www.myplan.ie), and historical mapping (i.e. 6" & 25" base maps) were consulted to identify those areas as being at risk of flooding.

There are no flood incidents recorded along the grid connection route on OPW's indicative river and coastal flood map. Please note that not all local flooding issues are recorded on the OPW database.

The Department of Environment, Community and Local Government on-line mapping viewer (www.myplan.ie.) has areas indicated as "fluvial flooding" in the close proximity of the streams and rivers which pass along the proposed route. This mapping corresponds to the PFRA mapping which shows the extents of the indicative 100-year flood zone which relates to fluvial (i.e. river) and pluvial (i.e. rainfall) flood events. The 100-year fluvial flood zones mapped along the proposed grid route generally occur in close proximity to the stream channels themselves. Areas mapped within Fluvial Flood Zone A (1% AEP) exist along the courses of the Ballycarney Stream, Ballingale Stream, and Borris Stream. There are several small areas along the grid route which are mapped as prone to pluvial flooding.

Historical 6" and 25" maps for the proposed route were consulted to identify areas that are "prone to flooding". There are no areas within the grid route identified as prone to flooding shown in the historical mapping.



Map Legend

Grid Connection Route

WFD Sub-Catchments

N

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Drawing Title: Regional Hydrology	
Project Title: Crory Wind Farm Group Grid Connection	
Drawn By: TJB	Checked By: MH
Project No.: 190806	Drawing No.: Figure 7.1
Scale: 1:100000	Date: 04.01.2020

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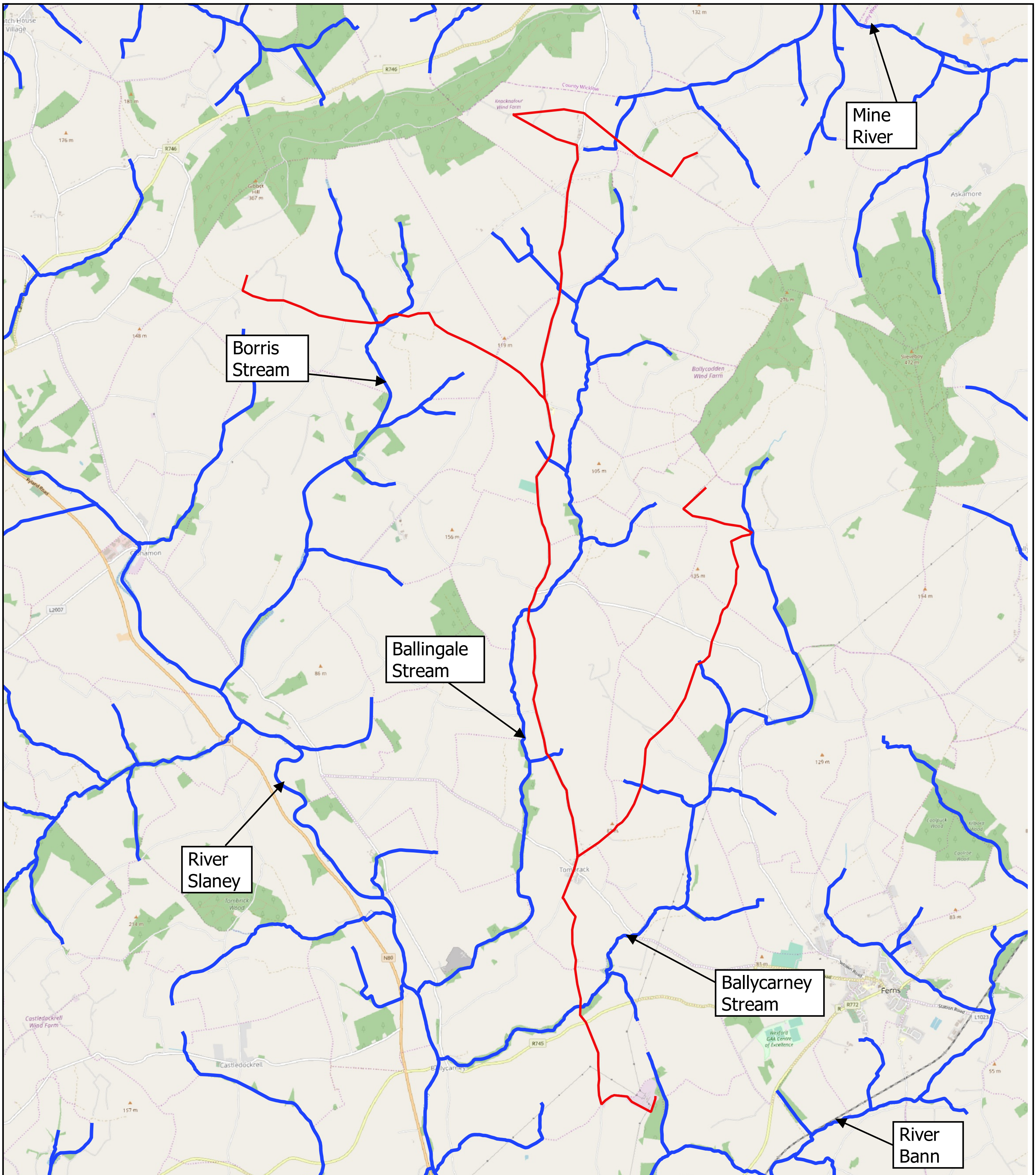

Map Legend

Grid Connection Route

WFD Streams

N

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Drawing Title: Local Hydrology	
Project Title: Crory Wind Farm Group Grid Connection	
Drawn By: TJB	Checked By: MH
Project No.: 190806	Drawing No.: Figure 7.1
Scale: 1:60000	Date: 04.01.2020

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7.3.2.4 Surface Water Hydrochemistry

The Environmental Protection Agency's (EPA) Quality Rating System (Q-Rating) is a biotic index used to rate the ecological quality of streams and rivers. The rating system assigns streams a Q-Value of between 1 and 5, with 1 indicating bad ecological quality and 5 indicating the highest ecological quality. The latest Q-rating data for EPA monitoring points are available for 9 no. locations on streams that are crossed by the cable route along the proposed grid route.

There are four points located along the Ballycarney Stream_020. A Q3 rating was achieved at Station RS12B070700 located approximately 1.8 river kilometres downstream of the cable route at the confluence with the Slaney River. The stream achieved a Q3-4 at Tombrack Bridge (Station RS12B070500) approximately 1.1 river kilometres upstream of the cable route crossing point. A Q3-4 rating was achieved at Station RS12B070400 approximately 800m east of the cable route spur for the Ballycadden Wind Farm. Finally, the stream achieved a Q4 at Tinnashrule Bridge (Station RS12B070300) approximately 1.3 kilometres east of the cable route.

There are four relevant monitoring points located along the Ballingale Stream_010. A Q3 rating was achieved at Station RS12B060300 located at Ballycadden Bridge approximately 350 metres east of the cable route at Ballyroebuck. The stream achieved a Q4 at the cable route crossing point approximately 200 metres south of Curraduff Crossroads (Station RS12B060500). A Q3-4 rating was achieved at Station RS12B070600, approximately 200m west of the cable route southwest of Ballaman. Finally, the stream achieved a Q3-4 at Ballymorgan Bridge (Station RS12B070700) approximately 680 metres northwest of Tombrack.

A single point (Station RS12B050200) on the Borris Stream (Slaney)_010 is located approximately 1.7 river kilometres downstream of the Gibbet Hill cable route spur. The stream achieved a Q4 rating at this location.

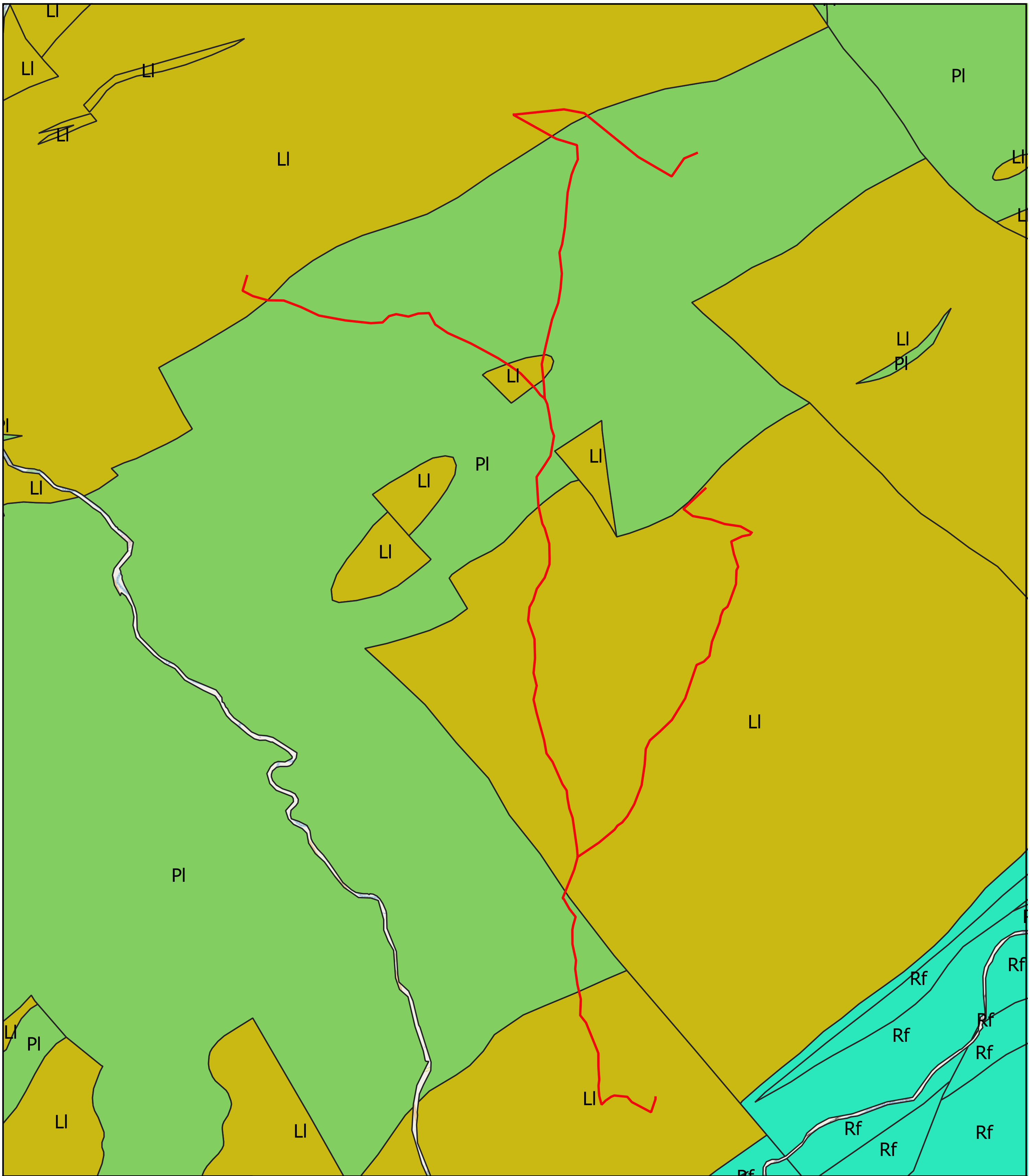
7.3.3 Groundwater

7.3.3.1 Hydrogeology

Based on the GSI bedrock map of the region, the cable route is underlain by the Oaklands Formation, Ballylane Shale Formation, and Maulin Formation. The Oaklands Formation (OA) consists of green, red-purple, and buff slate and siltstone. The Ballylane Shale Formation (BY) consists of laminated green to green-grey slates and shales interbedded with or thinly laminated with green or pale-grey siltstones. The Maulin Formation (MN) consists of dark blue-grey slates and phyllites.

The Ballylane Shale Formation is classified by the GSI as a Poor Aquifer -Bedrock which is Generally Unproductive except for Local Zones (Pl). Both the Maulin Formation and the Oaklands Formation are classified by the GSI as Locally Important Aquifers - Bedrock which is Moderately Productive only in Local Zones (LI). A bedrock aquifer map is shown as Figure 7.3.

The grid connection cable route is underlain by the Ballyglass Ground Water Body (GWB) as delineated by the EPA/GSI. The groundwater flow paths in the Ballyglass GWB are generally considered to be short and likely only extend as far as the closest surface water body. Due to the generally unproductive nature of this groundwater resource little work has been done on the Ballyglass GWB, however it is likely that the effective thickness of the aquifer may be only 15 to 30 metres. Estimated transmissivities can be considered to range from 1 – 10m^2/day. A regional groundwater body map is provided as Figure 7.4.



Map Legend

Grid Connection Route

Bedrock Aquifers

Locally Important Aquifer
- Bedrock which is Moderately Productive only in Local Zonest (LI)

Poor aquifer
- bedrock which is generally unproductive except for local zones (PI)

Regionally Important Aquifer
- Fissured bedrock (Rf)

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Drawing Title: Bedrock Aquifers	
Project Title: Crory Wind Farm Group Grid Connection	
Drawn By: TJB	Checked By: MH
Project No.: 190806	Drawing No.: Figure 7.3
Scale: 1:60000	Date: 04.01.2020

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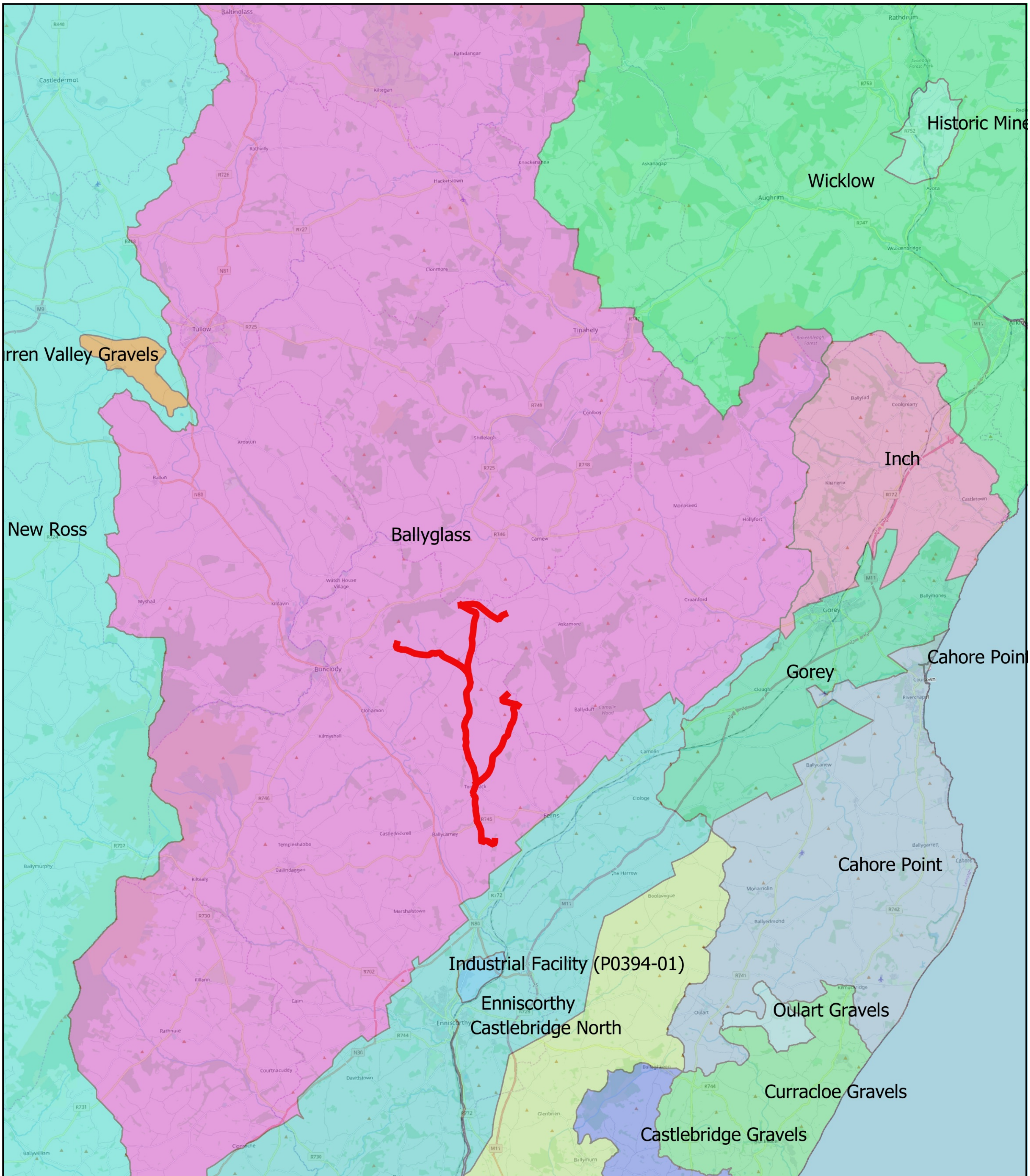

Map Legend

- Grid Connection

Groundwater Bodies

- Ballyglass
- Burren Valley Gravels
- Cahore Point
- Castlebridge Gravels
- Castlebridge North
- Curracloe Gravels
- Enniscorthy
- Gorey
- Inch
- Industrial Facility (P0394-01)
- New Ross
- Wicklow

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Drawing Title	Groundwater Bodies
Project Title	Crory Wind Farm Group Grid Connection
Drawn By: TJB	Checked By: MH
Project No.: 190806	Drawing No.: Figure 7.4
Scale: 1:250000	Date: 04.01.2020

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7.3.3.2 Groundwater Vulnerability

Groundwater Vulnerability is generally mapped as High to Extreme across the area of the proposed grid route, with extensive areas also mapped by the GSI as having bedrock at or near the surface.

7.3.3.3 Groundwater Hydrochemistry

There is no groundwater hydrochemistryy data for the proposed grid route site and groundwater sampling would generally not be undertaken for this type of development in terms of rEIAR reporting as groundwater quality impacts, or discharges to groundwater would not be anticipated.

Based on data from the Initial Characterisation Report on the Ballyglass GWB, "EPA sampling shows the groundwater to be soft and have a low electrical conductivity: 94 – 266 (µs/cm)".

7.3.4 Water Framework Directive Water Body Status & Objectives

The Water Framework Directive (WFD) establishes a framework for the protection of ground and surface waters and their dependent habitats and wildlife. Under the directive the EPA is working to classify all waterbodies in the State and to assign a risk status to each of them. The overall objective of the WFD is for all waterbodies to achieve a minimum of "Good" water quality status.

Local Groundwater Body and Surface Water Body status and risk result are available from (www.catchments.ie).

7.3.4.1 Groundwater Body Status

Groundwater Body (GWB) status information is available (www.catchments.ie). Refer to Figure 7.4 for the location and extent of local groundwater body.

The Ballyglass GWB (IE_SE_G_011) which underlies the grid connection cable route currently has a water quality classification of "Good". The Ballyglass GWB is assigned a 'Review' risk status based on the quantitative status and chemical status of the GWB. This refers to the risk of deteriorating or being at less than Good status in the future.

7.3.4.2 Surface Water Body Status

Local Surface water Body status and risk result are available from (www.catchments.ie).

The grid connection route site is located within the Slaney_SC_060 sub-catchment, the Slaney_SC_040 sub-catchment, and the Bann [Wexford]_SC_010 sub catchment. Within these subcatchments the grid connection route either crosses, or potentially drains to a number of streams. These grid connection route crosses the Ballycarney Stream, the Ballingale Stream, the Borris Stream, and a number of unnamed tributaries to these streams. The cable route also crosses an unnamed tributary to the Mine River. To the south of Tinkerstown Cross Roads, surface drainage from the grid connection site would ultimately drain to an unnamed tributary of the River Bann.

Wihin the Slaney_SC_060 subcatchment the Ballycarney Stream currently has a "Poor" WFD water quality status in the reach from water quality monitoring station RS12B070400 downstream to the Slaney River. Upstream of station RS12B070400 the Ballycarney Stream currently has a "Moderate" WFD water quality status. The entire Ballycarney Stream has been assigned an "At Risk" WFD risk status. Also within the Slaney_SC_060 subcatchment, the Ballingale Stream upstream of Curraduff has a "Poor" WFD water quality status and is assigned an "At Risk" WFD risk status. The Ballyingale

Stream downstream of Curraduff is classified as having a “Moderate” water quality status and has a “Not At Risk” WFD risk Status. The Borris Stream is classified as having a “Moderate” water quality status and a “Not At Risk” WFD Risk Status. The main environmental pressure on the waters in this subcatchment is agriculture. There is a long term downward trend in water quality in these streams.

The Mine River within the Slaney_SC_040 subcatchment is classified as having a “Good” water quality status and an “At Risk” WFD risk status. Agriculture is the main environmental pressure applicable to the Mine River.

The Bann river, which is located south of the cable route, within the Bann [Wexford]_SC_010 subcatchment is classified as having a “Moderate” water quality status and an “At Risk” WFD risk status. Environmental pressures applicable to the River Bann include agriculture and urban waste

7.3.5 Designated Sites & Habitats

Designated sites include National Heritage Areas (NHAs), Proposed National Heritage Areas (pNHAs) Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSAC) and Special Protection Areas (SPAs). The Proposed Development site is not located within any designated conservation-site. Designated sites in proximity to the proposed development site are shown in Figure 5.1.

The Proposed Development site is not located within any designated site. However, the Slaney River Valley SAC (000781) is located approximately 1.5km west of the grid connection route and Wexford Harbour and Slobs SPA (004076) is located approximately 9.7km south of the grid connection route. Both sites have potential hydrological connectivity with the development. The designation for Slaney River Valley pNHA overlaps the boundary of the Slaney River Valley SAC. As a result, potential for impacts on this pNHA will have been prevented by adhering to the mitigation implemented for the protection of the SAC. Potential for impacts in the form of surface water deterioration were prevented by adhering to the mitigation described in Section 7.4 of this rEIAR.

7.3.6 Water Resources

A search of the Geological Survey of Ireland (GSI) well database (www.gsi.ie) indicates that there are a number of wells mapped in the vicinity of the grid connection route. The GSI well database is not exhaustive and it is most likely that other private wells exist along the proposed route. However, due to the shallow nature of the trench excavation, impacts on groundwater levels or groundwater flow towards these wells did not occur. Measures that were implemented to protect groundwater quality along the cable route are outlined in Section 7.4 below.

7.3.7 Receptor Sensitivity

Due to the nature of the grid route and substation development, being near surface construction activities, impacts on groundwater are generally negligible and surface water is generally the main sensitive receptor assessed during impact assessments. The primary risk to groundwater at the site would be from cementitious materials, hydrocarbon spillage and leakages. These are common potential impacts on all construction sites (such as road works and industrial sites). All potential contamination sources would have been carefully managed at the site during the construction phase of the development and mitigation measures were put in place to deal with these potential minor impacts.

Based on criteria set out in Table 9.1, groundwater along the majority of the grid route can be classed as Sensitive to pollution because groundwater vulnerability is classified as high to extreme, and the bedrock aquifer is classified as Locally Important. However, due to the shallow nature of the grid connection route along with the nature of the proposed route (i.e. along existing roads) no significant interactions with the hydrogeological regime would have occured during the cable installation works.

Surface waters such as the Ballycarney Stream, Borris Stream, and Ballingale stream are very sensitive to potential contamination. These rivers are tributaries to the River Slaney and are known to be of trout and Atlantic salmon potential.

The designated site that are hydraulically connected (surface water flow paths only) to the proposed grid route is the Slaney River Valley SAC. This designated site can be considered very sensitive in terms of potential impacts due to the presence of Annex II species and their associated habitats (see Chapter 5 of this rEIAR).

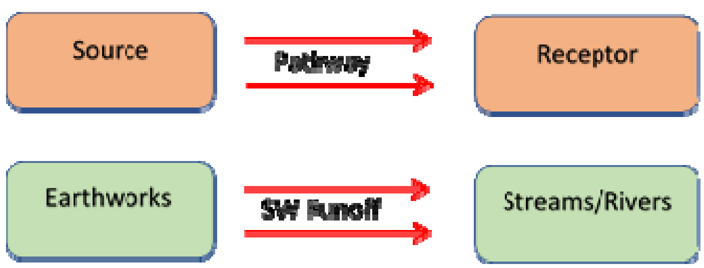
Mitigation measures were put in place during the construction phase of the development to ensure the protection of all downstream receiving waters. Implementation of these mitigation measures ensured that surface runoff was of a high quality and therefore did not impact on the quality of downstream surface water bodies. Implemented mitigation measures are outlined in Section 7.4. No additional drainage works were implemented at the site, thereby avoiding changes to flow volumes leaving the site.

7.4 Likely, Significant Impacts and Mitigation Measures Implemented

The potential impacts of the Development and mitigation measures that were put in place to eliminate or reduce them are set out below.

7.4.1 Overview of Impact Assessment Process

The conventional source-pathway-target model (see below, top) was applied to assess potential impacts on downstream environmental receptors (see below, bottom as an example) as a result of the grid connection cable.



Where potential impacts are identified, the classification of impacts in the assessment follows the descriptors provided in the Glossary of Impacts contained in the following guidance documents produced by the Environmental Protection Agency (EPA):

- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2017); and,
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003).

The description process clearly and consistently identifies the key aspects of any potential impact source, namely its character, magnitude, duration, likelihood and whether it is of a direct or indirect nature.

In order to provide an understanding of the stepwise impact assessment process applied below, we have firstly presented below a summary guide that defines the steps (1 to 7) taken in each element of the impact assessment process (refer to **Table 7-4**). The guide also provides definitions and descriptions of the assessment process and shows how the source-pathway-target model and the EPA impact descriptors are combined.

Using this defined approach, this impact assessment process is then applied to all construction and operation activities which have the potential to generate a source of significant adverse impact on the geological and hydrological/ hydrogeological (including water quality) environments.

Table 7-4: Impact Assessment Steps

Step 1	Identification and Description of Potential Impact Source: This section presents and describes the activity that brings about the potential impact or the potential source of pollution. The significance of effects is briefly described.	
Step 2	Pathway / Mechanism:	The route by which a potential source of impact can transfer or migrate to an identified receptor. In terms of this type of development, surface water and groundwater flows are the primary pathways, or for example, excavation or soil erosion are physical mechanisms by which a potential impact is generated.
Step 3	Receptor:	A receptor is a part of the natural environment which could potentially be impacted upon, e.g. human health, plant / animal species, aquatic habitats, soils/geology, water resources, water sources. The potential impact can only arise as a result of a source and pathway being present.
Step 4	Pre-mitigation Impact:	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impact before mitigation is put in place.
Step 5	Proposed Mitigation Measures:	Control measures that will be put in place to prevent or reduce all identified significant adverse impacts. In relation to this type of development, these measures are generally provided in two types: (1) mitigation by avoidance, and (2) mitigation by engineering design.
Step 6	Post Mitigation Residual Impact:	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impacts after mitigation is put in place.
Step 7	Significance of Effects:	Describes the likely significant post mitigation effects of the identified potential impact source on the receiving environment.

7.4.2 Construction Phase

7.4.2.1 Earthworks (Removal of Vegetation Cover, Excavations and Stock Piling) Resulting in Suspended Solids Entrainment in Surface Waters

Construction phase activities that required earthworks resulting in removal of vegetation cover/ road pavement material and excavation of mineral subsoil (where present) are detailed in the Development Description Chapter (Chapter 3). Potential sources of sediment laden water included:

- Stockpiled excavated material providing a point source of exposed sediment; and,
- Construction of the grid connection cable trench resulting in entrainment of sediment from the excavations during construction;

These activities had the potential to result in the release of suspended solids to surface watercourses and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies. However, given the relatively small, localised scale of the works (i.e a ~1.2m deep trench being excavated in sections), the volume of runoff from the construction works was minimal in relation to the overall runoff to local waterbodies.

Pathways: Drainage and surface water discharge routes.

Receptors: Down-gradient rivers and dependant ecosystems.

Pre-Mitigation Potential Impact: Indirect, negative, significant, temporary, likely impact.

Implemented Mitigation Measures:

The key mitigation measure during the construction phase was the avoidance of sensitive aquatic areas. The majority of the grid route is located within the paved area of existing roads and therefore resulted in no direct impacts to surface waters. Stream crossings were achieved though the placement of cable ducts above culverts and in bridge decks. One stream crossing was achieved using a horizontal directional bore technique as the bridge deck was determined to be unsuitable to accommodate the cable ducts. No in-stream work occurred during the construction of the grid connection.

Construction of the grid connection was completed in compliance with the conditions of the road opening licence for the work, and under the supervision of ESB. Best construction practices were adhered to throughout the construction phase of the development.

Residual Impact

The implementation of the mitigation measure discussed above successfully prevented the release of any significant quantity of suspended solids to surface watercourses. There was no recorded discharge of suspended solids to surface watercourses during the construction phase. Therefore, there was **No Residual Impact** on downstream waters resulting from earthworks during the construction phase.

Significance of Effects:

Based on the analysis above there were **No significant effects** on surface water quality resulting from earthworks during the construction phase of the project.

7.4.2.2 Potential Impacts on Groundwater Levels and Local Well Supplies During Excavation works

Dewatering of deep excavations have the potential to impact on local groundwater levels. No groundwater level impacts are likely to have occurred from the construction of the grid connection underground cabling trench due to the shallow nature of the excavation (i.e. ~1.2m). No dewatering of the trench was required.

Pathway: Groundwater flowpaths.

Receptor: Groundwater levels.

Pre-mitigation Potential Impact: None.

Implemented Mitigation Measures

There was no impact on groundwater, therefore no mitigation measures were required.

Residual Impact

There were **No Impacts** on groundwater levels or local well supplies occurred during the construction phase of the project.

Significance of Effects

Construction of the project resulted in **No Significant Effects** on groundwater.

7.4.2.3 Potential Release of Hydrocarbons during Construction and Storage

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk to groundwater, surface water and associated ecosystems, and to terrestrial ecology. The accumulation of small spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. It is also a nutrient supply for adapted micro-organisms, which can rapidly deplete dissolved oxygen in waters, resulting in death of aquatic organisms.

Pathway: Groundwater flowpaths and grid route/road drainage network.

Receptor: Groundwater and surface water.

Pre-Mitigation Potential Impact:

Indirect, negative, slight, short term, likely impact to local groundwater quality.

Indirect, negative, significant, short term, unlikely impact to surface water quality.

Implemented Mitigation Measures:

Mitigation measures implemented to avoid release of hydrocarbons at the site were as follows:

- Minimal refuelling or maintenance of construction vehicles or plant took place along the works area.

- The plant used during construction was regularly inspected for leaks and fitness for purpose
- Plant was maintained in good working order.

Residual Impact:

The implementation of the mitigation measures discussed above prevented the release of any hydrocarbons to the environment. There was therefore **No Residual Impacts** to ground or surface waters associated with the construction of the project.

Significance of Effects

Based on the analysis above there were **No Significant Effects** on surface water or groundwater quality during the construction phase.

7.4.2.4 Release of Cement-Based Products

Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. A pH range of $\geq 6 \leq 9$ is set in S.I. No. 293 of 1988 Quality of Salmonid Water Regulations, with artificial variations not in excess of $\pm$ 0.5 of a pH unit. Entry of cement-based products into the site drainage system, into surface water runoff, and hence to surface watercourses or directly into watercourses represents a risk to the aquatic environment. Batching of wet concrete on site and washing out of transport and placement machinery are the activities most likely to generate a risk of cement-based pollution.

Pathway: Drainage network.

Receptor: Surface water

Pre-Mitigation Potential Impact: Indirect, negative, moderate, short term, likely impact to surface water.

Implemented Mitigation Measures -*Mitigation by Avoidance:*

The following mitigation measures were implemented:

- No batching of wet-cement products occurred on along the grid route works area. Ready-mixed supply of wet concrete products were used to backfill the trench per ESB specifications.
- Pre-cast elements, such as communication chambers, were used.
- No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse was allowed. No chute cleaning occurred on-site.
- Concrete pouring only occurred on dry days.

Residual Impact

There is no evidence of the release of any cement based products during the construction phase. Therefore, there was **No Residual Impact** to surface waters from cement based products.

Significance of Effects

Based on the analysis above, there were **No Significant Effects** on surface water quality.

7.4.2.5 Potential Hydrological Impacts on Designated Sites

Slaney River Valley SAC (000781) is located approximately 1.5km west of the grid connection route and Wexford Harbour and Slobs SPA (004076) is located approximately 9.7km south of the grid connection route. Both sites have potential hydrological connectivity with the development site and all measures in relation to the protection of these European sites have been taken into account in the NIS. The designation for Slaney River Valley pNHA overlaps the boundary of the Slaney River Valley SAC. As a result, potential for impacts on this pNHA will have been prevented by adhering to the mitigation implemented for the protection of the SAC. Potential for impacts in the form of surface water deterioration were prevented by adhering to the mitigation described in below.

The designated sites discussed above are located down gradient of the grid route.

Pathway: Surface water flowpaths.

Receptor: Down-gradient water quality and designated sites.

Pre-Mitigation Potential Impact: Indirect, negative, slight, short term, likely impact.

Impact Assessment & Implemented Mitigation Measures:

As the designated sites mentioned above are topographically below the level of the proposed grid route, mitigation measures needed to be put in place during the construction phase, as surface waters from sections of the proposed grid route will potentially drain towards these areas.

Mitigation measures are outlined in Section 7.4.2.1 to Section 7.4.2.4 above were implemented to provide the necessary protection to these hydrologically sensitive areas.

Those mitigation measures, which included drainage control measures, sediment control measures, and mitigation measures related to spills/chemical releases ensured that the quality of runoff from along the grid route during construction remained good. Therefore, there was no potential for significant direct or indirect impacts on designated sites.

The hydrological regime locally was not affected by the proposed works and so the regime of the designated sites was not affected.

- No significant dewatering occurred during construction.
- All trenching works occurred at or very near existing ground levels with minimal ground disturbance.
- No deep foundations were required or are proposed. As such there was no interruption or blocking of shallow or deep groundwater pathways below the site.
- No in-stream work occurred to facilitate stream crossings along the cable route.
- No batching of wet-cement products occurred on along the grid route works area.
- Ready mixed supply of wet concrete products were used to backfill the trench per ESB specifications.
- No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse was allowed.
- No chute cleaning occurred on-site.
- Concrete pouring only occurred on dry days.

Residual Impact

The implementation of the mitigation measures discussed above successfully blocked the pathway for impacts to downstream designated sites. Observations in the field revealed no evidence of any impacts to surface waters or designated sites. There were **No Residual Impacts** on designated sites.

Significance of Effects

Based on the analysis above there were **No Significant Effects** on designated sites

7.4.3 Operational Phase

There will be no soil disturbance or use of machinery during the operation phase of the grid connection. Furthermore, since there was no deep excavation associated with the project there is no potential for impacts on groundwater flow during the operation phases Therefore, **No Impacts** are envisaged during the operational phase.

7.4.4 Cumulative Impacts

The hydrological impact assessment undertaken above in this chapter outlines that significant effects are unlikely due to the localized nature of the construction works. The Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour Wind Farms, as well as the grid connection route that serves them are located entirely within the River Slaney surface water catchment and therefore the potential for hydrological cumulative impacts does exist.

However, the actual cumulative impacts arising from the construction of the wind farms and the grid connection route are negligible for the following reasons:

- The Ballycadden, Gibbett Hill, and Knocknalour wind farms were constructed in accordance with the mitigation measures set out in their respective Environmental Impact Statements. The prescribed mitigation measures, construction best practices, and construction monitoring ensured that there were no significant impacts on downstream water bodies.
- Best construction practices were implemented for the Ballynancoran Wind Farm resulting in no significant impacts to downstream water bodies.
- The potential for surface water quality impacts arising during the construction of the grid connection route was negligible as no crossing in-stream works occurred and also the majority of the work was along existing roads. There is no evidence of any negative impacts to surface water as a result of the construction of the grid connection.
- There are no impacts associated with the operational phase of the wind farms or the grid connection.

Based on the factors discussed above, **No Significant Cumulative Effects** within the River Slaney surface water catchment have occurred, or are anticipated as a result of the construction or operation of the wind farms and the grid connection route.

8. AIR AND CLIMATE

8.1 Introduction

This chapter identifies, describes and assesses the potential significant direct and indirect effects on air quality and climate arising from the construction, and operation of the subject development.

The subject development is located approximately 3 kilometres west of Ferns in County Wexford at its nearest point, as illustrated in Figure 2.9. The route extends from the existing Crory 110 kV substation in the south to the Knocknalour and Ballynancoran windfarms in the north, a straight line distance of approximately 12 kms. A spur to the east extends to the Ballycadden Wind Farm, and a spur to the west extends to the Gibbet Hill Wind Farm. The total length of the grid connection is 28 kilometres of which 26 kilometres are underground, predominantly located within the curtilage of the public road, and 2 kilometres are overhead line. A full description of the subject development is provided in Section 3 of this rEIAR.

Due to the non-industrial nature of the subject development and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for preparing this Remedial Environmental Impact Assessment Report (rEIAR). It is likely that air quality in the existing environment is good, since there are no major sources of air pollution (e.g. heavy industry) in the vicinity of the site.

The operation of the grid connection has no direct emissions. Some minor indirect emissions associated with the construction of the grid connection include vehicular and dust emissions. Emissions from the construction, operation and decommissioning phases of the project are addressed in Section 10.1.5.

8.1.1.1 Relevant Guidance

The air quality and climate section of this rEIAR is carried out in accordance with the 'EIA Directive' as amended by Directive 2014/52/EU and having regard, where relevant, to guidance listed in Section 1.8.1 of Chapter 1: Introduction.

8.1.1.2 Statement of Authority

This chapter of the rEIAR was prepared by Michael Watson and Thomas Blackwell. Michael Watson completed an MA in Environmental Management at NUI, Maynooth in 1999. He is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv). Michael joined McCarthy Keville O'Sullivan Ltd. in 2014 having gained over 15 years' experience in a Cork-based environmental & hydrogeological consultancy firm. Thomas Blackwell is a Senior Environmentalist with MKO with over 15 years of progressive experience in environmental consulting. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin. Prior to taking up his position with MKO in August 2019, Thomas worked as a Senior Environmental Scientist with HDR, Inc. in the United States and held previous posts with private consulting firms in both the USA and Ireland.

8.2 Air Quality

8.2.1 Air Quality Standards

In 1996, the Air Quality Framework Directive (96/62/EC) was published. This Directive was transposed into Irish law by the Environmental Protection Agency Act 1992 (Ambient Air Quality Assessment and

Management) Regulations 1999. The Directive was followed by four Daughter Directives, which set out limit values for specific pollutants:

- The first Daughter Directive (1999/30/EC) deals with sulphur dioxide, oxides of nitrogen, particulate matter and lead.
- The second Daughter Directive (2000/69/EC) addresses carbon monoxide and benzene. The first two Daughter Directives were transposed into Irish law by the Air Quality Standards Regulations 2002 (SI No. 271 of 2002).
- A third Daughter Directive, Council Directive (2002/3/EC) relating to ozone was published in 2002 and was transposed into Irish law by the Ozone in Ambient Air Regulations 2004 (SI No. 53 of 2004).
- The fourth Daughter Directive, published in 2007, deals with polyaromatic hydrocarbons (PAHs), arsenic, nickel, cadmium and mercury in ambient air.

The Air Quality Framework Directive and the first three Daughter Directives have been replaced by the Clean Air for Europe (CAFE) Directive (Directive 2008/50/EC on ambient air quality), which encompasses the following elements:

- The merging of most of the existing legislation into a single Directive (except for the Fourth Daughter Directive) with no change to existing air quality objectives.
- New air quality objectives for PM2.5 (fine particles) including the limit value and exposure concentration reduction target.
- The possibility to discount natural sources of pollution when assessing compliance against limit values.
- The possibility for time extensions of three years (for particulate matter PM10) or up to five years (nitrogen dioxide, benzene) for complying with limit values, based on conditions and the assessment by the European Commission.

Table 8.1 below sets out the limit values of the CAFE Directive, as derived from the Air Quality Framework Daughter Directives. Limit values are presented in micrograms per cubic metre (µg/m3) and parts per billion (ppb). The notation PM10 is used to describe particulate matter or particles of ten micrometres or less in aerodynamic diameter. PM2.5 represents particles measuring less than 2.5 micrometres in aerodynamic diameter.

The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). These Regulations supersede the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and the Ambient Air Quality Assessment and Management Regulations 1999 (S.I. No. 33 of 1999).

Table 8.1 Limit values of Directive 2008/50/EC, 1999/30/EC and 2000/69/EC (Source: EPA)

Pollutant	Limit Value Objective	Averaging Period	Limit Value ($\mu g/m^3$)	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
Sulphur dioxide (SO_2)	Protection of Human Health	1 hour	350	132	Not to be exceeded more than 24 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Protection of human health	24 hours	125	47	Not to be exceeded more than 3 times in a calendar year	1st Jan 2005

Sulphur dioxide (SO_2)	Protection of vegetation	Calendar year	20	7.5	Annual mean	19th Jul 2001
Sulphur dioxide (SO_2)	Protection of vegetation	1st Oct to 31st Mar	20	7.5	Winter mean	19th Jul 2001
Nitrogen dioxide (NO_2)	Protection of human health	1 hour	200	105	Not to be exceeded more than 18 times in a calendar year	1st Jan 2010
Nitrogen dioxide (NO_2)	Protection of human health	Calendar year	40	21	Annual mean	1st Jan 2010
Nitrogen monoxide (NO) and nitrogen dioxide (NO_2)	Protection of ecosystems	Calendar year	30	16	Annual mean	19th Jul 2001
Particulate matter 10 (PM_{10})	Protection of human health	24 hours	50	-	Not to be exceeded more than 35 times in a calendar year	1st Jan 2005
Particulate matter 2.5 ($PM_{2.5}$)	Protection of human health	Calendar year	40	-	Annual mean	1st Jan 2005
Particulate matter 2.5 ($PM_{2.5}$) Stage 1	Protection of human health	Calendar year	25	-	Annual mean	1st Jan 2015
Particulate matter 2.5 ($PM_{2.5}$) Stage 2	Protection of human health	Calendar year	20	-	Annual mean	1st Jan 2020
Lead (Pb)	Protection of human health	Calendar year	0.5	-	Annual mean	1st Jan 2005
Carbon Monoxide (CO)	Protection of human health	8 hours	10,000	8,620	-	1st Jan 2005
Benzene (C_6H_6)	Protection of human health	Calendar Year	5	1.5	-	1st Jan 2010

The Ozone Daughter Directive 2002/3/EC is different from the other Daughter Directives in that it sets target values and long-term objectives for ozone rather than limit values. Table 8.2 presents the limit and target values for ozone.

Table 8.2 Target values for Ozone Defined in Directive 2008/50/EC

Objective	Parameter	Target Value for 2010	Target Value for 2020
Protection of human health	Maximum daily 8 hour mean	120 mg/m^3 not to be exceeded more than 25 days per calendar year averaged over 3 years	120 mg/m^3
Protection of vegetation	AOT_{40} calculated from 1 hour values from May to July	18,000 mg/m^3.h averaged over 5 years	6,000 mg/m^3.h
Information Threshold	1 hour average	180 mg/m^3	-
Alert Threshold	1 hour average	240 mg/m^3	-

AOT_{40} is a measure of the overall exposure of plants to ozone. It is the sum of the excess hourly concentrations greater than 80 µg/m^3 and is expressed as µg/m^3 hours.

8.2.1.1 Dust

There are no statutory limits for dust deposition in Ireland. However, EPA guidance suggests that a soiling of 10 mg/m2/hour can generally be considered as posing a soiling nuisance. This equates to 240 mg/m2/day. The EPA recommends a maximum daily soiling level of 350 mg/m2/day when measured according to the TA Luft Standard 2002.

Construction dust can be generated from many on-site activities such as excavation and backfilling. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust, i.e. soil, sand, overburden, etc and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Construction traffic movements also have the potential to generate dust.

8.2.2 Receiving Environment

The subject development is located approximately 3 kilometres west of Ferns in County Wexford at its nearest point, as illustrated in Figure 2.9 The grid connection is located in a working rural landscape, away from large settlements. Current land-use on the subject development site comprises primarily transport, as the majority of the subject works will be restricted to the curtilage of the existing roads throughout its length. The grid connection is approximately 28 kilometers in length. Approximately 20 kilometres of the cable route consists of OHL crossing farmland between the Knocknalour and Ballynancoran wind farms. The remaining approximately 26 kilometers of the route is located within the curtilage of the existing road network or within the existing road networks of the wind farms. On the lands adjacent to the route and within the wider area, agriculture and some one-off rural housing comprise the primary land-uses.

The Environmental Protection Agency (EPA) has designated four Air Quality Zones for Ireland:

- Zone A: Dublin City and environs
- Zone B: Cork City and environs

- Zone C: 16 urban areas with population greater than 15,000
- Zone D: Remainder of the country.

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the Framework Directive and Daughter Directives. The site of the subject development lies within Zone D, which represents rural areas located away from large population centres.

8.2.3 Likely, Significant Impacts on Air Quality and Associated Mitigation Measures

8.2.3.1 Construction Phase

8.2.3.1.1 *Dust*

The potential for dust emissions from the cable connection works are related to excavations and vehicle movements. These emissions are considered imperceptible given the small scale of the works areas and the temporary and transient nature of the work.

Mitigation Measures Implemented

The roads adjacent the site were regularly inspected for cleanliness, and cleaned as necessary. The transport of soils or other material, which has significant potential to cause dust, was undertaken in tarpaulin-covered vehicles.

Residual Impact

The likely residual impact was a **imperceptible, neutral, and temporary.**

Significance of Effects

Based on the analysis above there was **No Significant Effect** on air quality.

8.2.3.1.2 *General Air Quality*

Some minor emissions associated with construction vehicles and plant will have occurred during the construction phase of the development. Any potential temporary negative impact was not significant and was restricted to the active construction area and the duration of the construction phase of the subject development in general. This had the potential to have a temporary, slight, negative impact.

Mitigation Measures Implemented

All construction machinery was maintained in good operational order while on-site, minimising any emissions that occurred.

Residual Impact

By maintaining construction equipment in good operational order emissions were minimised to the greatest extent practicable. The likely residual impact was **imperceptible, neutral, and temporary.**
Significance of the Effects

Based on the analysis above there was **No Significant Effect** on air quality associated with the construction of the grid connection.

8.2.3.2 Operational Phase

8.2.3.2.1 *Dust and Emissions*

There will be no impacts associated with dust or vehicle emmissions during the operational phase of the development. The underground electricity cabling has a positive effect on air quality during its operational phase as it facilitates the transmission of renewable energy, thereby reducing the emissions associated with traditional energy generation from fossil fuels. Therefore, there is a **likely, long term, slight positive effect** on air quality as a result of the operational phase of the project.

8.2.3.2.2 *Human Health*

Underground cabling and overhead wires are not recognised sources of pollution. The construction of these elements is not an activity that falls within any thresholds requiring Environmental Protection Agency licensing under the Environmental Protection Agency Licensing Act 1992, as amended. As such, the subject development is not considered to have any ongoing significant emissions to air and no subsequent potential for human health effects. The underground electricity cabling has a positive effect on air quality during its operational phase as it facilitates the transmission of renewable energy, thereby reducing the emissions associated with traditional energy generation from fossil fuels. Therefore, there is a **likely, imperceptible, positive, long term effect** on human health as a result of the operational phase of the project.

8.3 Climate

8.3.1 Climate Change and Greenhouse Gases

Climate change is one of the most challenging global issues facing us today and is primarily the result of increased levels of greenhouse gases in the atmosphere. These greenhouse gases come primarily from the combustion of fossil fuels in energy use. Changing climate patterns are thought to increase the frequency of extreme weather conditions such as storms, floods and droughts. In addition, warmer weather trends can place pressure on animals and plants that cannot adapt to a rapidly changing environment. Moving away from our reliance on coal, oil and other fossil fuel-driven power plants is essential to reduce emissions of greenhouse gases and combat climate change.

8.3.1.1 Greenhouse Gas Emission Targets

Ireland is a Party to the Kyoto Protocol, which is an international agreement that sets limitations and reduction targets for greenhouse gases for developed countries. It is a protocol to the United Nations Framework for the Convention on Climate Change. The Kyoto Protocol came into effect in 2005, as a result of which, emission reduction targets agreed by developed countries, including Ireland, are now binding.

Under the Kyoto Protocol, the EU agreed to achieve a significant reduction in total greenhouse gas emissions in the period 2008 to 2012. Ireland's contribution to the EU commitment for the period 2008 – 2012 was to limit its greenhouse gas emissions to no more than 13% above 1990 levels.

8.3.1.1.1 *Doha Amendment to the Kyoto Protocol*

In Doha, Qatar, on 8th December 2012, the "Doha Amendment to the Kyoto Protocol" was adopted. The amendment includes:

- New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from 1 January 2013 to 31 December 2020;

- A revised list of greenhouse gases (GHG) to be reported on by Parties in the second commitment period; and
- Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period.

During the first commitment period, 37 industrialised countries and the European Community committed to reduce GHG emissions to an average of five percent against 1990 levels. During the second commitment period, Parties committed to reduce GHG emissions by at least 18 percent below 1990 levels in the eight-year period from 2013 to 2020; however, the composition of Parties in the second commitment period is different from the first.

Under the protocol, countries must meet their targets primarily through national measures, although market based mechanisms (such as international emissions trading can also be utilised).

8.3.1.1.2 *COP21 Paris Agreement*

COP21 was the 21st session of the Conference of the Parties (COP) to the United Nations Convention. Every year since 1995, the COP has gathered the 196 Parties (195 countries and the European Union) that have ratified the Convention in a different country, to evaluate its implementation and negotiate new commitments. COP21 was organised by the United Nations in Paris and held from 30th November to 12th December 2015.

COP21 closed on 12th December 2015 with the adoption of the first international climate agreement (concluded by 195 countries and applicable to all). The twelve-page text, made up of a preamble and 29 articles, provides for a limitation of the temperature rise to below 2°C above pre-industrial levels and even to tend towards 1.5°C. It is flexible and takes into account the needs and capacities of each country. It is balanced as regards adaptation and mitigation, and durable, with a periodical ratcheting-up of ambitions.

8.3.1.1.3 *Emissions Projections*

In 2016, the EPA published an update on Ireland's Greenhouse Gas Emission Projections to 2020. Ireland's target is to achieve a 20% reduction of non-Emissions Trading Scheme (non-ETS) sector emissions, i.e. agriculture, transport, residential, commercial, non-energy intensive industry and waste, on 2005 levels, with annual binding limits set for each year over the period 2013 – 2020.

Greenhouse gas emissions are projected to 2020 using two scenarios; 'With Measures' and 'With Additional Measures'. The 'With Measures' scenario assumes that no additional policies and measures, beyond those already in place by the end of 2014 are implemented. The 'With Additional Measures' scenario assumes implementation of the 'With Measures' scenario in addition to full achievement of Government renewable and energy efficiency targets for 2020, as set out in the National Renewable Energy Action Plan and the National Energy Efficiency Action Plan.

The EPA Emission Projections Update notes the following key trends:

- Ireland's non-Emissions Trading Scheme (ETS) emissions are projected to be 6% and 11% below 2005 levels in 2020 under the 'With Measures' and 'With Additional Measures' scenarios, respectively. The target for Ireland is a 20% reduction.
- Ireland is projected to exceed its annual binding limits in 2016 and 2017 under both scenarios, 'With Measures' and 'With Additional Measures'.
- Over the period 2013 – 2020, Ireland is projected to cumulatively exceed its compliance obligations by 12 Mt CO_2 (metric tonnes of Carbon Dioxide) equivalent under the 'With Measures' scenario and 3 Mt CO_2 equivalent under the 'With Additional Measures' scenario.

The EPA report states that "Failure to meet 2020 renewable and energy efficiency targets will result in Ireland's emission levels moving even further from its emission reduction targets". The report also concludes:

- The latest projections estimate that by 2020 non-ETS emissions will be at best 11% below 2005 levels compared to the 20% reduction target. Emission trends from agriculture and transport are key determinants in meeting targets, however emissions from both sectors are projected to increase in the period to 2020.
- It is clear that Ireland faces significant challenges in meeting emission reduction targets for 2020 and beyond. ('Greenhouse Gas Emission Projections to 2020 – An Update', EPA, 2016).

8.3.1.1.4 *Progress to Date*

The 'Europe 2020 Strategy' is the EU's agenda for growth and jobs for the current decade. The Europe 2020 Strategy targets on climate change and energy include:

- Reducing greenhouse gas (GHG) emissions by at least 20% compared with 1990 levels;
- Increasing the share of renewable energy in final energy consumption to 20%; and
- Moving towards a 20% increase in energy efficiency.

Regarding progress on targets, the 'Europe 2020 indicators – climate change and energy' report provides a summary of recent statistics on climate change and energy in the EU.

In 2014, EU greenhouse gas emissions, including emissions from international aviation and indirect carbon dioxide (CO_2) emissions, were down by 23% when compared with 1990 levels. However, regarding the progress of individual Member States, and Ireland in particular, the Europe 2020 indicators include the following statements:

- 24 countries are on track to meet their GHG targets, except Austria, Belgium, **Ireland** and Luxembourg.
- Luxembourg emitted the most GHG per capita in the EU in 2014 ... followed by Estonia, **Ireland**, the Czech Republic and the Netherlands.
- In 2014, France, the Netherlands, the United Kingdom and **Ireland** were farthest from reaching their national targets.

While the EU as a whole is projected to exceed it's 2020 target of reducing GHG emissions by 20%, Ireland is currently one of the countries project to miss its national targets.

8.3.2 Climate of the Receiving Environment

Ireland has a temperate, oceanic climate, resulting in mild winters and cool summers. The Met Éireann weather station at Rosslare, Co. Wexford, is the nearest weather and climate monitoring station to the subject development site that has meteorological data recorded for the 30-year period from 1978 - 2007. The monitoring station is located approximately 40 kilometres southeast of the grid connection route. Meteorological data recorded at Rosslare over the 30-year period from 1978 - 2007 is shown in Table 8.7 overleaf. The wettest months are October, November, and December. July is usually the driest month. August is the warmest month with a mean daily temperature of 15.7° Celsius.

Table 8-3 Data from Met Éireann Weather Station, Rosslare, Co. Wexford 1978 to 2007

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
TEMPERATURE (degrees Celsius)													
Mean daily max	8.8	8.5	9.9	11.3	13.6	16.3	18.3	18.5	16.8	14.0	11.3	9.5	13.1
Mean daily min	4.2	4.1	5.1	6.3	8.6	11.0	12.7	12.9	11.6	9.3	6.7	5.2	8.1
Mean temperature	6.5	6.3	7.5	8.8	11.1	13.6	15.5	15.7	14.2	11.6	9.0	7.4	10.6
Absolute max.	14.1	14.1	15.8	17.9	22.3	25.5	26.2	25.9	22.0	21.5	16.7	14.0	26.2
Absolute min.	-4.4	-3.7	-2.5	-0.1	-0.3	4.7	6.7	7.0	4.0	1.3	-2.5	-3.0	-4.4
Mean num. of days with air frost	1.5	1.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.1	4.8
Mean num. of days with ground frost	9.4	8.3	6.0	3.5	0.7	0.1	0.0	0.0	0.0	0.7	3.7	7.4	39.8
RELATIVE HUMIDITY (%)													
Mean at 0900UTC	85.7	85.4	85.1	82.1	81.4	82.1	82.6	83.6	84.3	85.3	86.3	86.4	84.2
Mean at 1500UTC	80.8	79.0	77.8	76.1	77.2	77.7	77.2	76.9	77.1	78.7	80.2	82.2	78.4
SUNSHINE (Hours)													
Mean daily duration	2.0	2.6	3.7	5.7	6.9	6.2	6.3	6.0	4.8	3.4	2.4	1.8	4.3
Greatest daily duration	8.2	10.0	11.6	13.4	15.4	15.7	15.6	14.0	12.6	10.5	8.6	7.2	15.7
Mean num. of days with no sun	10.1	8.0	5.4	2.7	1.7	2.0	1.5	1.9	2.7	6.3	8.2	11.0	61.4

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
RAINFALL (mm)													
Mean monthly total	88.4	70.8	69.1	59.1	55.7	54.9	49.9	71.6	75.0	109.3	100.9	100.8	905.5
Greatest daily total	42.7	32.0	42.2	32.0	29.4	31.6	41.4	89.2	42.2	88.6	43.8	48.9	89.2
Mean num. of days with >= 0.2mm	17	15	16	13	13	12	12	13	13	17	17	17	175
Mean num. of days with >= 1.0mm	12	11	11	9	9	9	8	9	9	13	12	13	125
Mean num. of days with >= 5.0mm	6	5	4	4	3	3	3	4	4	7	6	7	56
WIND (knots)													
Mean monthly speed	12.4	12.2	11.9	11.2	10.9	9.7	9.5	9.4	10.6	11.5	11.4	12.2	11.1
Max. gust	71	76	66	75	66	50	54	54	64	96	74	80	68.8
Max. mean 10-minute speed	43	44	42	52	40	38	41	36	47	56	48	50	44.8
Mean num. of days with gales	1.4	1.2	0.5	0.8	0.2	0.1	0.2	0.1	0.2	0.6	0.9	1.0	7.1
WEATHER (Mean No. of Days With:)													
Snow or sleet	1.7	2.3	1.0	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.6	6.2
Snow lying at 0900UTC	0.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Hail	1.2	1.0	1.9	1.3	0.8	0.2	0.1	0.1	0.1	0.4	0.7	0.9	8.7
Thunder	0.2	0.1	0.2	0.2	0.7	0.9	0.8	0.6	0.4	0.6	0.3	0.3	5.2

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Fog	1.8	2.2	3.6	3.7	2.9	4.1	4.4	3.4	2.8	1.6	1.7	1.7	33.9

8.3.3 Likely, Significant Impacts on Climate and Associated Mitigation Measures

8.3.3.1 Construction Phase

The use of machinery during the construction development will have resulted in the emission of greenhouse gases. Operations such as the transport of equipment and materials as well as construction personnel are typical examples of machinery use. This impact is considered to be imperceptable, given the insignificant quantity of greenhouse gases that will have been emitted. This likely resulted in a short-term imperceptible negative impact.

Mitigation Measures Implemented

All construction machinery was maintained in good operational order while on-site, minimising any emissions that occurred.

Residual Impact

By maintaining construction equipment in good operational order emissions of greenhouse gasses were minimised to the greatest extent practicable. The residual impact was a likely a **short term, imperceptible, negative impact** on climate

Significance of the Effects

Based on the analysis above there was **No Significant Effect** on climate associated with the construction of the grid connection.

8.3.3.2 Operational Phase

The grid connection will result in no greenhouse gas emission and has a **Slight, Indirect, Positive Effect** on climate during its operational phase through the transmission of electricity from a renewable source to the national grid.

8.4 Cumulative Impact Assessment

Potential cumulative effects on air quality and climate between the subject development and other projects in the vicinity were also considered as part of this assessment. The projects considered as part of the cumulative effect assessment are described in Section 2.9 of this rEIAR.

8.4.1 Dust

The electrical grid connection cable connects the Ballycadden, Knocknalour, Gibbet Hill, and Ballynancoran wind farms to the Crory Substation and from there to the National Grid. Therefore, the potential for cumulative air quality impacts and associated effects between the wind farms and the cable route does exist. In general, dust emissions associated with construction projects of these types occur low to the ground and are therefore limited in their geographical spread.

Dust emissions from the wind farm construction phases were mitigated through the use of good construction practices so emissions from these sources were negligible. Dust emissions from the cable connection were also negligible given the small scale of the works. Therefore, there was **No Significant**

Cumulative Effects on air quality in terms of dust emissions associated with the construction of the grid connection and the wind farms.

The potential for cumulative dust emissions associated with the other projects and plans described in Section 2.3.2 of this rEIAR are negligible due to the limited scale and nature of the projects. Therefore, there was **No Significant Cumulative Effects** on air quality in terms of dust emissions associated with the construction of the grid connection and the other projects and plans described in Section 2.3.2 of this rEIAR.

There is no potential for dust emissions associated with the operational phase of the project, therefore there are no cumulative impacts associated with the operational phase.

8.4.2 General Air Quality

The construction of the underground cabling, and the permitted wind farms required plant items which consume fossil fuels and therefore will have led to a minor level of air emissions cumulatively. Construction of the subject development and the permitted wind farms resulted in a **likely, cumulative, imperceptible, neutral, short term effect** on air quality.

However, the operating wind farms generate energy from a renewable source. The wind farms, by providing an alternative to electricity derived from coal, oil or gas-fired power stations, result in emission savings of oxides of nitrogen (NO_x), and sulphur dioxide SO_2. This has a long-term, significant positive effect.

The cable grid connection allows the wind farms to connect to the national grid, and so replace energy generated by conventional fossil-fuels plants. The cumulative impacts arising from the construction of the wind farms, and the grid connection therefore have a **long term, significant, positive effect** on air quality.

8.4.3 Human Health

The cumulative impacts arising from the construction of the wind farms and the grid connection are expected to have a positive effect on air quality, as described above. This in turn may have a **slight, long-term, positive effect** on human health.

8.4.4 Climate

The construction of the grid connection, the Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour wind farms and all of the other projects described in Section 2.9 of this rEIAR, required plant items which consume fossil fuels and therefore will have led to a minor level of air emissions cumulatively.

The wind farms generate energy from a renewable source. Therefore, by providing an alternative to electricity derived from coal, oil or gas-fired power stations, they result in emission savings of carbon dioxide (CO_2). This is expected to have a long-term significant positive impact.

The grid connection cable allows the wind farms to connect to the national grid, and so replace energy generated by conventional fossil-fuels plants. The cumulative impacts arising from the construction of the wind farms and the grid connection are therefore expected to have a **long-term, significant positive effect** on climate change.

9. NOISE AND VIBRATION

9.1 Introduction

This section of the Remedial Environmental Impact Assessment Report (rEIAR) evaluates the likely significant and residual impacts of the Crory Wind Farm Group grid connection in terms of noise and vibration during both the Construction and Operational phases. A full description of the subject development is provided in Chapter 3 of the rEIAR. There are numerous existing residential noise sensitive locations within 100m of the subject development. In addition to the residential receptors, there are two primary schools located adjacent to the grid connection route.

9.1.1 Statement of Authority

This chapter of the rEIAR was prepared by Michael Watson and Thomas Blackwell. Michael Watson completed an MA in Environmental Management at NUI, Maynooth in 1999. He is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv). Michael joined McCarthy Keville O'Sullivan Ltd. in 2014 having gained over 15 years' experience in a Cork-based environmental & hydrogeological consultancy firm. Thomas Blackwell is a Senior Environmentalist with MKO with over 15 years of progressive experience in environmental consulting. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin. Prior to taking up his position with MKO in August 2019, Thomas worked as a Senior Environmental Scientist with HDR, Inc. in the United States and held previous posts with private consulting firms in both the USA and Ireland.

9.2 Methodology

The likely noise and vibration impacts associated with the subject development have been determined in the following sections in terms of the construction and operational phases. Noise and vibration impacts during the construction phase have been estimated based on the types of machinery typically employed in the construction of grid connection cable duct work.

There are no mandatory noise limits for construction noise in Ireland. Account must be taken of the technical feasibility of the proposed project, the trade-off between the noise level and the duration of the noise exposure when setting criteria for construction noise.

For the construction of the grid connection, reference has been made to the TII Guidance document Guidelines for the Treatment of Noise and Vibration in National Road Schemes (TII, 2004) for appropriate criteria. The TII guidelines define construction noise limits to be applied to the façade of dwellings. Whilst this document is specifically intended for the purposes of New National Road Schemes, considering the grid connection consists of a long linear scheme, and in the absence of other national guidelines relating to the specific development under consideration, the guidelines are relevant to determine the potential noise impacts of the proposed grid connection. These maximum noise levels are set out in Table 9.1.

Table 9.1 Maximum Permissible Noise Levels at the Façade of Dwellings during Construction

Days and Times[1]	Noise Levels (dB re. $2x10^{-5}$ Pa)	
	$L_{Aeq(1hr)}$	L_{Amax}
Monday to Friday 07:00 to 19:00hrs	70	80
Monday to Friday 19:00 to 22:00hrs	60	65
Saturdays 08:00 to 16:30hrs	65	75
Sundays & Bank Holidays 08:00 to 16:30hrs	60	65

9.3 Likely Significant Impacts, Associated Mitigation Measures, and Residual Effects

9.3.1 Construction Phase

9.3.1.1 Noise

A variety of items of plant were used during the Construction Phase. These included dump trucks, Heavy Goods Vehicles (HGV's), tracked excavators and generators, in addition to other general construction equipment. Due to the nature of the activities undertaken, there was potential for noise impacts at nearby noise sensitive properties.

The associated construction works occurred for short durations at varying distances from Noise Sensitive Locations (NSLs), at various locations along the route. Typical road maintenance type construction equipment was used in the construction of the subject development. Based on the type of construction equipment used, and the nature of the works undertaken, the likely worst-case associated effects at the nearest NSLs associated with the grid connection route construction phase were likely to have been Negative, Not Significnat, and Temporary.

In relation to noise during the construction phase, a precautionary approach has been adopted and Chapter 9 demonstrates that although the construction works of the underground cabling gave rise to noise impacts on sensitive receptors in the area, these noise effects were temporary in nature as the works moved along the underground cable route.

Mitigation Measures Implemented

Best practice measures for noise and vibration control were adhered to onsite during the construction phase of the development in order to mitigate the slight short-term negative effect associated with this phase of the development. The measures include:

- Working methods: construction noise was controlled by restricting construction work to the specified working hours.
- Plant was selected taking account of the characteristics of noise emissions from each item. All plant and machinery used on the site complied with E.U. and Irish legislation in relation to noise emissions.
- Operation of plant: all construction operations complied with guidelines set out in British Standard documents 'BS 5338: Code of Practice for Noise Control on Construction and Demolition Sites' and 'BS5228: Part 1: 1997: Noise & Vibration Control on Construction

[1] *Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.*

and Open Sites'. The correct fitting and proper maintenance of silencers and/or enclosures, the avoidance of excessive and unnecessary revving of vehicle engines, and the parking of equipment in locations that avoid possible effects on noise-sensitive locations was employed.

Residual Impacts

The likely residual impact was **slight, of negative and temporary effect** on sensitive noise receptors as a result of the construction phase of the project. Although the construction works of the grid connection likely gave rise to noise effects on sensitive receptors in the area, these effects were temporary in nature as the works moved along the underground cable route.

Significance of Effects

Based on the analysis above there were **No Significant Effects** associated with the construction phase of the project.

9.3.1.2 Vibration

Due to the limited nature of the construction activities that were undertaken in the construction of the subject development significant vibration effects did not occur.

The likely impact from vibration during the construction phase was **temporary, imperceptible, and of neutral effect**.

9.3.2 Operational Phase

There is no noise or vibration generated by the grid connection during the operation phase. Therefore, there are no noise or vibration impacts associated with this phase of the project. The associated effects are **Neutral, Imperceptible and Long Term**

9.3.3 Cumulative Impacts

Due to the very short duration, and low level of noise impacts at any one location during the construction phase of the development there was negligible potential for cumulative impacts between the grid connection and the projects described in Section 2.9 of this rEIAR, including the construction of the Ballycadden, Gibbett Hill, Knocknalour, and Ballynancoran wind farms. Therefore, the likely cumulative impacts associated with the construction phase of the project and the projects described in Section 2.9 of this rEIAR was **not significant, of neutral and temporary** effect.

Since the operation of the grid connection does not result in any noise or vibration impacts there are **No Significant Cumulative Effects** associated with the operation phase.

10. LANDSCAPE AND VISUAL IMPACT

10.1 Introduction

This chapter of the Remedial Environmental Impact Assessment Report (rEIAR) addresses the landscape and visual effects of the substation and electricity cabling for the Crory Wind Farm Group (CWFG) Grid Connection in Co. Wexford. The grid connection consists of a medium voltagle 20kV underground cable that connects four separate, permitted wind farms; Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour, to the existing Crory 110kV substation.

The emphasis in this chapter is on the likely significant effects of the proposal. It covers the assessment methodology, a description of the subject development and the existing landscape as well as landscape policy and relevant guidance. It includes a description of the Co. Wexford Council's landscape policy and the landscape in which the subject development site is located.

The landscape in this area is described in terms of its existing character, which includes a description of landform, landcover, and landscape sensitivity to change. The potential effects of both landscape and visual terms are then assessed.

10.1.1 Statement of Authority

This section of the rEIAR has been prepared by Audrey Williams and assisted by Joanna Mole. Audrey Williams is a Graduate Landscape Architect and Landscape and Visual Impact Assessment Specialist with McCarthy Keville O'Sullivan Ltd. with two years professional working experience in both private and educational teaching practices from Canada and Sweden. Audrey holds a Bachelor of Landscape Architecture (BLA) from Canada. Prior to taking up her position with McCarthy Keville O'Sullivan Ltd. in January 2020, Audrey held previous positions as a landscape architecture research assistant at the Swedish University of Agriculture Sciences, as well as a landscape architecture technician for HKLA in Canada. Since joining MKO, Audrey has been involved in a range of projects including wind energy, extraction industry and landscape concept designs.

Joanna Mole, is a Landscape and Visual Impact Assessment Specialist and Chartered Landscape Architect with McCarthy Keville O'Sullivan Ltd. with over 15 years of experience in both private practice and local authorities. Joanna holds a BSc (Hons) in Landscape Design and Plant Science from Sheffield University, a Postgraduate Diploma in Landscape Architecture from Leeds Beckett University and a MSc in Renewable Energy Systems Technology from Loughborough University. Joanna is a Chartered Landscape Architect with specialist knowledge in Landscape and Visual Impact assessments for projects ranging from individual houses to large windfarms, solar farms, cycle route design and landscape contract management. Joanna holds chartered membership of the British Landscape Institute since 1998 and has been an examiner for the British Landscape Institute professional practice exam. Joanna was also aided by Michael Watson, a qualified Environmental Scientist and environmental consultant with 18 years' experience of EIA and LVIA.

10.1.2 Subject Development Description

The development consists of a 20kV cable to facilitate the connection of the existing permitted Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour Wind Farms to the national electricity grid. The cable connects to the existing Crory 110kV Substation in townland of Tincurry, Co. Wexford. Approximately 26 km of the grid connection route consists of underground cable, predominantly in the public roadway. Approximately 2km of the route is overhead line, between the Knocknalour and Ballynancoran Wind Farms.

The grid connection works involved excavation of a trench to the minimum depth required to safely accommodate insulated 20kV power cables; approximately 1.3 metres. The cable ducting was laid in the trench according to the construction methodologies outlined in Section 3.3 of this rEIAR, then backfilled and re-surfaced. The subject works was restricted to existing road and farm track infrastructure and grass margins throughout its entire length, with the exception of a short section across agricultural fields adjacent to the Crory Substation.

The four separate wind farms, consisting of a total of 21 turbines became operational at different times in 2012 and 2013. The wind farms are connected to the national electricity grid by a medium voltage 20 kV underground grid connection cable (with a short section of OHL), which runs from the wind farms to Crory 110 kV substation. The grid connection works were undertaken by the wind farm developers, ESBN and/or their agents, under the supervision of ESBN. The grid connection infrastructure is now under the operational control of ESBN. The construction and operation of the wind farms and grid connection were approved by the Commission for Energy Regulation (CER) through the issuing of Authorisation to Construct Consents and Generating Licenses.

An application for leave to apply for substitute consent for the grid connection was made following a determination by ABP in July 2016 (ABP Refs: RL 3408/09/10/11) that the provision of grid connections from the Crory 110 kV substation to the Ballycadden, Gibbet Hill, Knocknalour and Ballynancoran wind farms is not exempted development. The Board granted leave to apply for substitute consent on the 26th of June, 2019 (ABP-301989-18) and directed that a remedial Environmental Impact Assessment and a remedial Natural Impact Statement be prepared and included with the application.

10.2 Methodology and Assessment Criteria

10.2.1 Guidance/Reference Documents

In 2000, the Department of the Environment and Local Government (DoELHG) published *'Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities'*, which recommended that all local authorities adopt a standardised approach to landscape assessment for incorporation into development plans and consideration as part of the planning process. This document remains in Draft.

Ireland signed and ratified the European Landscape Convention (ELC) in 2002. This introduced a pan-European concept that centres on the quality of landscape protection, management and planning. The Department of Arts, Heritage and the Gaeltacht has published a National Landscape Strategy for Ireland in 2015. The strategy aims to ensure compliance with the ELC and contains six main objectives, including undertaking a National Landscape Character Assessment and developing landscape policies.

Certain sections of this rEIAR have been based on the landscape character assessment guidelines presented in the DoELHG document outlined above, but the landscape and visual impact assessment was carried out with reference to the Guidelines for Landscape and Visual Impact Assessment (GLVIA) published in the UK by the Landscape Institute/Institute of Environmental Management and Assessment, in 2013. A range of other guidelines were also consulted during the preparation of this landscape and visual impact assessment, which include:

- *Guidelines for Landscape and Visual Impact Assessment* (The Landscape Institute/Institute of Environmental Management and Assessment, UK, 2013).
- *Photography and photomontage in landscape and visual impact assessment* (Landscape Institute Advice Note 01/11, 2011).
- *EPA Guidelines on the information to be contained on Environmental Impact Statements* (EPA 2002).
- *EPA Advice Notes on Current Practice in the preparation of Environmental Impact Statements* (EPA, 2003).

- *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports'* (EPA, August 2017).
- *Wexford County Development Plan 2013* (Wexford County Council, 2013).

10.2.2 Baseline Landscape and Visual Information

As part of this assessment, an initial desk study was undertaken which identified relevant policies and guidelines, both at national and local level. This includes policies on landscape and landscape character, designated landscapes, and protected views. The site and study area are described in terms of landscape character types as identified in 'Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities' (DoELHG, 2000), while the surrounding landscape within 100 meters of the site is described with reference to landscape character as well as other landscape designations contained in the Wexford County Council Development Plan. In addition, a field visit was undertaken to assess the landscape character and elements both on the site itself and in the wider landscape.

10.2.2.1 Scope and Definition of Landscape and Visual Impact (LVIA) Study Area

For the purposes of this rEIAR, where the 'subject development site' or 'the site' is referred to in the LVIA, this relates to the primary study area for the subject development, as delineated in red on the rEIAR figures (maps). The subject development site is discussed in some detail in terms of its landscape character.

However, the landscape and visual baseline mapping and viewpoint selection are based on a wider study area, consisting of all the area within 4 kilometres from the development site boundary. This area for which the baseline maps and viewpoint locations are produced and is referred to as the Landscape and Visual Impacts (LVIA) Study Area or 'study area'.

10.2.3 Nature and Visibility of the Permitted Development

Due to the nature of the existing underground cabling, the grid connection will not have a new detrimental visual impact on the existing landscape. The majority of the grid connection is underground and therefore cannot be seen. The above ground section of the grid connection is a one pole above ground electrical line, that is similar in nature to the common electricity connections found across the countryside. Therefore, it is not necessary to use additional tools such as ZTV maps and photomontages to assess the potential visibility. The visibility was ascertained by site a visit in November 2019 as well as a review of the drawings and details of the subject development.

A series of images were taken at the location of the road that connects the subject substation and along the existing permitted underground cable route and these are included in Section 10.5 below.

10.2.4 Assessment of Potential Impacts

Clearly documented methods based on the GLVIA guidelines are used to arrive at an assessment. As part of these, landscape and visual sensitivity is considered balanced with the magnitude of the effect to assess the significance of likely landscape and visual effects. Further details on the impact assessment methodology are presented in Section 10.6.

10.2.5 Assessing Landscape Effects

The potential landscape effects of the subject development are informed by the nature of the proposal, a desk study and site visits. The methodology uses qualitative methods to arrive at an assessment, which is based on the Landscape and Landscape Assessment (2000) guidelines as well as the GLVIA (2013). Landscape and Visual Impact Assessment, though related, can be described separately. Descriptions below are based on the GLVIA (2013).

10.2.5.1 Landscape Effects

This can be described as changes which affect the landscape as a resource. This includes how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects, and its landscape character. Landscape effects also relate to changes in the structure of the landscape. Under the GLVIA (2013), the assessment of likely significant effects on landscape receptors includes a judgement on both the sensitivity of the receptor as well as magnitude of the change.

10.2.5.2 Assessing Landscape Sensitivity

Landscape Sensitivity, which is described in the GLVIA (2013) as a combination of the landscape's susceptibility to change as well as the value attached to the landscape, is defined in Table 10-1 below. Susceptibility to change can be described as the ability of the landscape receptor (either the overall character or quality of the landscape, or a particular landscape feature), to accommodate the subject development without undue consequences for the maintenance of the baseline (existing) landscape situation, and/or the achievements of landscape planning policies and strategies. Landscape value is a combination of values which are assessed in the landscape baseline, combining any formal landscape designations with the criteria included in Table 10-1 below.

10.2.5.3 Assessing Magnitude of Change

This is then combined with the magnitude of the effects shown in

Table 10-1 Assessing Landscape Sensitivity

Susceptibility of landscape to change	Description and example criteria
High	Landscapes where the overall landscape character or condition is highly susceptible to change and where the landscape receptor has a low ability to accommodate the subject development without undue consequences for the maintenance of the landscape character and achieving planning policies/strategies. Other susceptible landscapes include those or areas with highly distinctive landscape features and clear cultural associations. Landscapes and landcover which shows low evidence of human influence can be more susceptible.
Medium	Landscapes where the overall landscape character has a moderate ability to accommodate the subject development without undue consequences for the maintenance of the landscape character and the achievement of planning policies/strategies. These landscapes may have locally distinctive landscape features and have local cultural or heritage associations. These landscapes tend to have some clear evidence of human influence and include land uses which result in variation and changes to the landcover.
Low	Landscapes where the overall landscape character has a strong ability to accommodate the subject development without undue consequences to the maintenance of its landscape character or the achievement of planning policies/strategies. This includes landscapes where human influence is

Susceptibility of landscape to change	Description and example criteria
	clearly evident, there are not distinctive landscape features, cultural or heritage associations and land uses subject this landscape to a high level of change.
Value attached to Landscape elements	**Description and example criteria**
High	Landscapes which are designated as high value in the development plan or areas designated at a national or international level.
Medium	Landscapes where value is not formally designated but are of value as good examples of high quality, intact landscapes and are areas deemed to be of relatively high scenic quality. Landscapes that contain some rare elements, include areas which are wild or have a sense of naturalness, strong cultural associations or which have recreational value.
Low	Landscapes which are not formally designated and considered as modified. Areas which do not have particularly scenic qualities, do not include rare elements or landscape features and do not have strongly evident cultural or heritage associations.

Table 10-2, which is a combination of the visual presence - size and scale - of the change, the extent of the area to be affected, and the duration and reversibility of the effect. Significance is then arrived at by combining the magnitude and sensitivity judgements.

Table 10-1 Assessing Landscape Sensitivity

Susceptibility of landscape to change	Description and example criteria
High	Landscapes where the overall landscape character or condition is highly susceptible to change and where the landscape receptor has a low ability to accommodate the subject development without undue consequences for the maintenance of the landscape character and achieving planning policies/strategies. Other susceptible landscapes include those or areas with highly distinctive landscape features and clear cultural associations. Landscapes and landcover which shows low evidence of human influence can be more susceptible.
Medium	Landscapes where the overall landscape character has a moderate ability to accommodate the subject development without undue consequences for the maintenance of the landscape character and the achievement of planning policies/strategies. These landscapes may have locally distinctive landscape features and have local cultural or heritage associations. These landscapes tend to have some clear evidence of human influence and include land uses which result in variation and changes to the landcover.
Low	Landscapes where the overall landscape character has a strong ability to accommodate the subject development without undue consequences to the maintenance of its landscape character or the achievement of planning policies/strategies. This includes landscapes where human influence is

Susceptibility of landscape to change	Description and example criteria
	clearly evident, there are not distinctive landscape features, cultural or heritage associations and land uses subject this landscape to a high level of change.
Value attached to Landscape elements	**Description and example criteria**
High	Landscapes which are designated as high value in the development plan or areas designated at a national or international level.
Medium	Landscapes where value is not formally designated but are of value as good examples of high quality, intact landscapes and are areas deemed to be of relatively high scenic quality. Landscapes that contain some rare elements, include areas which are wild or have a sense of naturalness, strong cultural associations or which have recreational value.
Low	Landscapes which are not formally designated and considered as modified. Areas which do not have particularly scenic qualities, do not include rare elements or landscape features and do not have strongly evident cultural or heritage associations.

Table 10-2 Assessing Magnitude of Landscape Effects

Magnitude of Change	Description
High	Major loss or alteration of key landscape elements with an effect on the overall landscape character, resulting in a high degree of change to the aesthetics of the landscape. Changes will be evident over a wide geographical area.
Medium	Some loss or alteration of landscape elements resulting in some change to landscape character and aesthetics. This includes landscapes where there is a moderate effect on the overall landscape character but does not affect key characteristics.
Low	Minor loss of or change to landscape elements. These changes do not affect the overall landscape character or key elements. Changes to the overall aesthetics of the landscapes are low and limited in their geographical extent.

10.2.6 Assessing Visual Effects

Visual effects relate to changes in views and visual amenity of the surroundings of individuals or groups of people. These may result from changes in content and character of views as a result in changes to the landscape. The significance of the effect on visual receptors is a combination of the sensitivity of the receptor as well as the magnitude of the change.

The assessment of visual effects is based on views shown in the viewpoints as well as actual visibility from other locations.

It should be noted that in assessing visual effects, there are different types of visual effects:

- *Visual obstruction: This occurs when there is an impact on a view which blocks the view.*
- *Visual intrusion: This occurs when there is an impact on a view, but which does not block the view.*

Due to the nature of the development only visual intrusion is anticipated.

10.2.6.1 Assessing Magnitude and Sensitivity

Visual receptor sensitivity, as defined in

Table 10-3, depends on the occupation or activity of the observers as well as the extent to which the attention is focused on views and visual amenity, according to the GLVIA Guidelines (2013). Value of the visual receptor is a combination of values assessed in the landscape baseline, combining any formal landscape designations with the criteria such as those included in Table 10-1. This is then combined with the magnitude of the effect, see

Table 10-4, which is a combination of scale of the change, the extent of the area to be affected and the duration and reversibility of the effect.

The assessment of the likely significant visual effect for each viewpoint is based on the criteria mentioned above and methodology described below.

Table 10-3 Assessing Visual Receptor Sensitivity

Susceptibility of visual receptor	Description and example criteria
High	These include viewers at designated views or landscapes. Viewers such as residents which are focussed to a large extent on the development due to location in close proximity; viewers at well-known heritage or popular tourist or recreational areas, viewers along scenic or tourist routes
Medium	These include viewers who may have some susceptibility to a change in view, such as those from views which are not designated but may have local recreational uses or those travelling along routes or at view which are considered moderately scenic.
Low	These include viewers engaged in activities where the focus is not on the landscape or view. These including those travelling along a busy route, viewers at work or engaged in sport not related to views or experience of the landscape.
Value attached to Landscape elements	**Description and example criteria**
High	Protected views from designated landscapes of national or international importance and views indicated on tourist/cultural publications. Also, views considered of high scenic quality, naturalness, tranquillity or include rare elements in the view.

Susceptibility of visual receptor	Description and example criteria
Medium	Views which are not designated, but which include panoramic views or views judged to be of some scenic quality demonstrating some sense of naturalness, tranquillity or containing some rare element in the view.
Low	Views which are not designated, and which are not judged to be panoramic views, of particular scenic quality as described above. These are views which have no distinctive features.

Table 10-4 Assessing Magnitude of Visual Effects

Magnitude of Change	Description
High	Instances where the subject development results in a large-scale change of the view and its composition or contrasts significantly with its surroundings. This includes viewpoints where the subject development is fully or almost fully visible over a large proportion of the view or is at close proximity to the viewer. The effects are long term or permanent and have a low level of reversibility.
Medium	Viewpoints where the subject development results in a moderate level of change of the view and or contrasts moderately with its surroundings. This includes viewpoints where the development is partially visible over a medium proportion of the view and which are not in close proximity to the development.
Low	Viewpoints where the subject development results in a low level of change in the view and its composition or contrasts insignificantly with its surroundings. This includes viewpoints where the development is partially or barely visible and over a small proportion of the view and includes viewpoints at a distance from the subject development.

10.2.6.2 Viewpoints (Photo Locations)

The identification of viewpoint locations is an important step in the process of visual impact assessment. The photo locations were selected following guidance contained in the GLVIA Guidelines (2013) however in the case of this development, the infrastructure is currently in place and so photos were captured from all along the route. The selection of photo locations is designed to give a representative range of views of the subject development and show the visible effects of both the above ground and underground cable lines.

10.2.6.3 Landscape and Visual Impact Assessment

Table 3.3 in Section 3.7 of the Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports', (EPA, August 2017), reproduced here as Table 10-5 below, shows the standard definitions, which have been used for the determination of effects in this Landscape and Visual Impact Assessment Chapter. Values will be ascribed visual effects in viewpoints arising from the subject development in terms of quality, significance and duration in line with the EPA guidance, while extent, probability and type will form part of the viewpoint descriptions.

Table 10-5 Impact Classification Terminology (EPA, 2017)

Impact Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment.
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative	A change which reduces the quality of the environment.
Significance	Imperceptible	An effect capable of measurement but without significant consequences.
	Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging trends.
	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound	An effect which obliterates sensitive characteristics.
Duration and Frequency	Momentary Effects	Effects lasting from seconds to minutes.
	Brief Effects	Effects lasting less than a day.
	Temporary Effects	Effects lasting less than a year.
	Short-term	Effects lasting one to seven years.
	Medium-term	Effects lasting seven to fifteen years.
	Long-term	Effects lasting fifteen to sixty years.
	Permanent	Effects lasting over sixty years.
	Reversible Effects	Effects that can be undone.
	Frequency	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)

Impact Characteristic	Term	Description
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.
	Residual	Degree of environmental change that will occur after the subject mitigation measures have taken effect.
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents.
	'Worst Case'	The effects arising from a development in the case where mitigation measures substantially fail.

10.3 Landscape Baseline: Landscape Policy Context

The subject Wind Farm grid connection is situated in Co. Wexford. Approximately 26 km of the grid connection route consists of underground cable, predominantly in the public roadway. Approximately 2km of the route is overhead line, between the Knocknalour and Ballynancoran wind farms. A description of the Co. Wexford development plan will be reviewed in this chapter. Please note that the existing grid connection is located c.250m south of Co. Wicklow at its closest point and has been disused further in chapter 2 of this report in order to undertake a comprehensive assessment of all relevant policy applicable to the subject development.

10.3.1 Wexford County Development Plan 2013-2017

The Wexford County Development Plan 2013 – 2019, hereafter referred to as the WCDP, is the principal instrument that is used to manage change in land use in the County. The Plan sets out the Council's intentions for the future development of land, including measures for the improvement of the natural and physical environment and the provision of infrastructure. It is important to note that the Council, as noted within the WCDP, intends to take a positive approach to development, unless there are '*strong, persuasive justifications for doing so having regard to European, national and regional policies'*. With reference to the above sections of this Chapter, justification of the appropriateness and strategic need of the subject grid connection is considered to have been adequately demonstrated, and furthermore, in compliance with European, national and regional policies and objectives.

The WCDP addresses a wide range of interrelated economic, social and environmental issues which share the same underlying themes of sustainable development and adapting to climate change. Within the WCDP, sustainable development has been defined as '*development which meets the needs of the present generation without compromising the ability of future generations to meet their own needs*'. Key considerations in assessing sustainable development include, but not limited to:

- The conservation of natural resources;
- Protection of the natural environment;
- Environmentally friendly patterns of development;
- Energy efficiency; and
- High quality design.

10.3.1.1 General Landscape Policy

The WCDP acknowledges that the county's landscapes offer a significant economic asset and sets out a broad aim to '*promote and enable appreciation of the county's landscapes and to minimise adverse visual impacts on these landscapes in the interests of the common good*'. However, as referenced below, the Council also appreciates that there is need for a balanced approach to ensure that future sustainable development within particular landscapes.

> *"The aim of the Strategy will be to put in place a framework to achieve a balance between active management, forward planning and the protection of Ireland's internationally renowned landscape as a physical, economic and cultural asset."*

10.3.1.2 Landscape Character Assessment

A Landscape Character Assessment 2013 – 2019 (LCA) was undertaken by the Council to ensure that change to Wexford's landscape can be sustainably managed. The subject grid connection is located partly within designated "Uplands" (northern areas) and partly within designated "Lowlands" (southern areas) of the county. Relevant to these classification in the context of the development is **Objective L03**, '*To ensure that developments are not unduly obtrusive in the landscape, in particular in the Upland, River Valley and Coastal landscape units and on or in the vicinity of Landscapes of Greater Sensitivity*'. The 'Uplands' and 'Lowlands' classified landscapes, as defined below, as provided within the LCA:

- **Uplands**
  This landscape, which extends along the north-western and northern parts of the county, contains concentrations of more elevated and steeper land, ridges and skylines, which are very prominent in the overall landscape of the county and are generally more sensitive to development. This landscape unit has limited capacity to absorb development. Commercial wind farms have become a recent addition in recent years.
- **Lowlands**
  The Lowland area generally comprises gently undulating lands and relates to extensive areas of the county. This landscape has characteristics which provide it with a higher capacity to absorb development without causing significant visual intrusion although care still needs to be taken on a site by site basis, particularly to minimise the
  risks of developments being visually intrusive.

Areas of Greater Sensitivity

The County Development Plan (CDP) contains designations of four landscape character units that include; Uplands, Lowlands, River Valley and Coastal, and the Landscapes of Greater Sensitivity. The Landscapes of Greater Sensitivity are identified in the CDP as "*landscapes that present features in the landscape and seascape which have the most visual interest and prominence, and which are generally more sensitive to development.*"

The Landscapes of Greater Sensitivity are highlighted in the county's LCA and include:

- Sensitive hills and ridges
- Water bodies; Lady's Island, Tucumshin Lake, Ballyteigue Burrow, Bannow Bay, and Wexford Harbour
- Islands; Saltees Islands and Keeragh Islands
- Coastal promontories; Forlom Point (Kilmore Quay), Carnsmore Point, Rosslare Point, Kimichael Point and Cahore Point
- The Hooks Peninsula
- Screens Hills

- Wexford Slobs and Inish and Ballyteige Slobs

It is important to note that the subject grid connection is not routed within or in proximity to any 'Landscapes of Greater Sensitivity' (LGS). The closest LGS is Carrigroe Hill, which is c. 9 km from the 110 kV Crory substation.

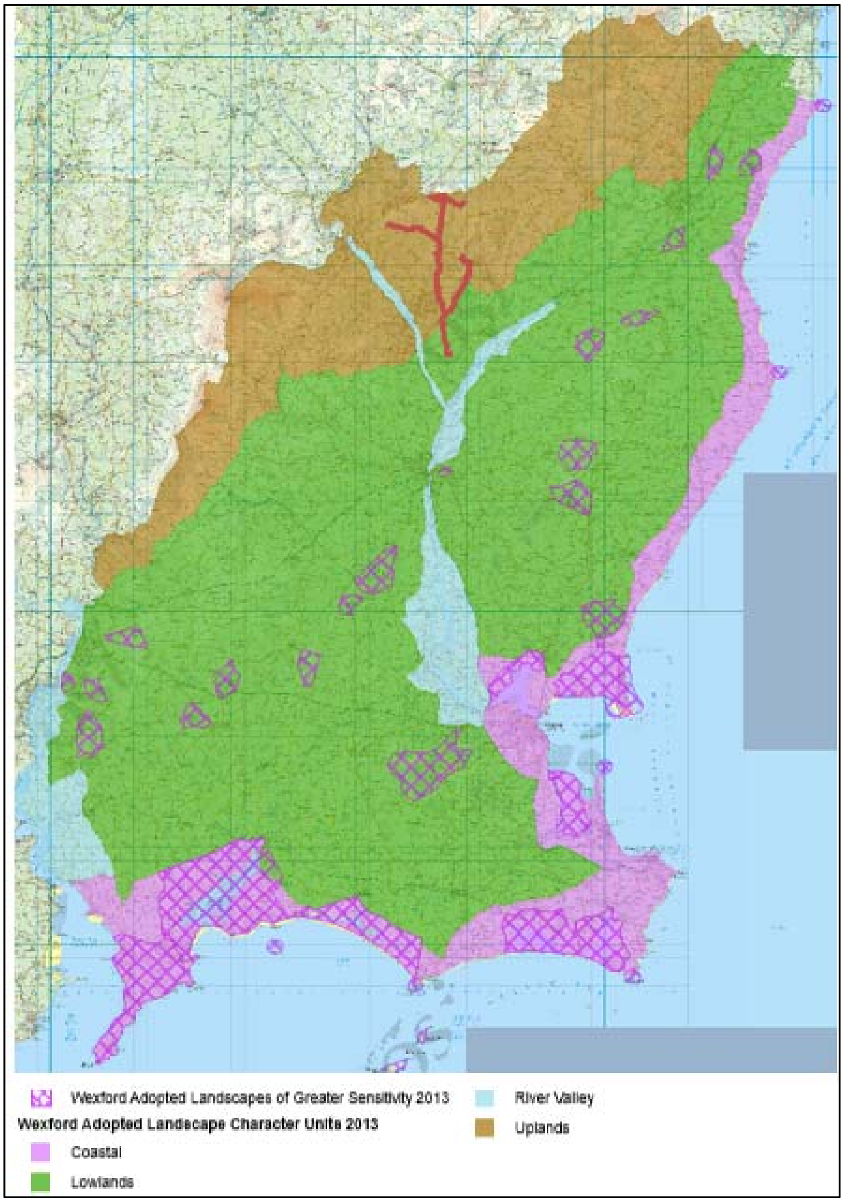


Figure 10.1 Landscape Character Assessment 2013 – 2019
Note: 'Red line' indicative of subject grid connection
Source: Wexford County Council

There is no evidence that the subject grid connection has interfered with any protected landscape character, views or prospects as the majority of the development is located underground. While the overhead section of the subject grid connection is located in the designated 'Uplands' area, historic assessment of the grid connection by An Bord Pleanála (ABP RL 3408/09/10/11) has effectively screened out its potential for significant impacts, as noted below:

"While the overhead section of the grid connections is located in the designated Uplands in the current Wexford County Development Plan it could not, in my view, be considered to interfere with this landscape character. As previously indicated this section comprises 3 no. cables strung to single wooden poles, similar in nature to the common electricity connections found across the countryside."

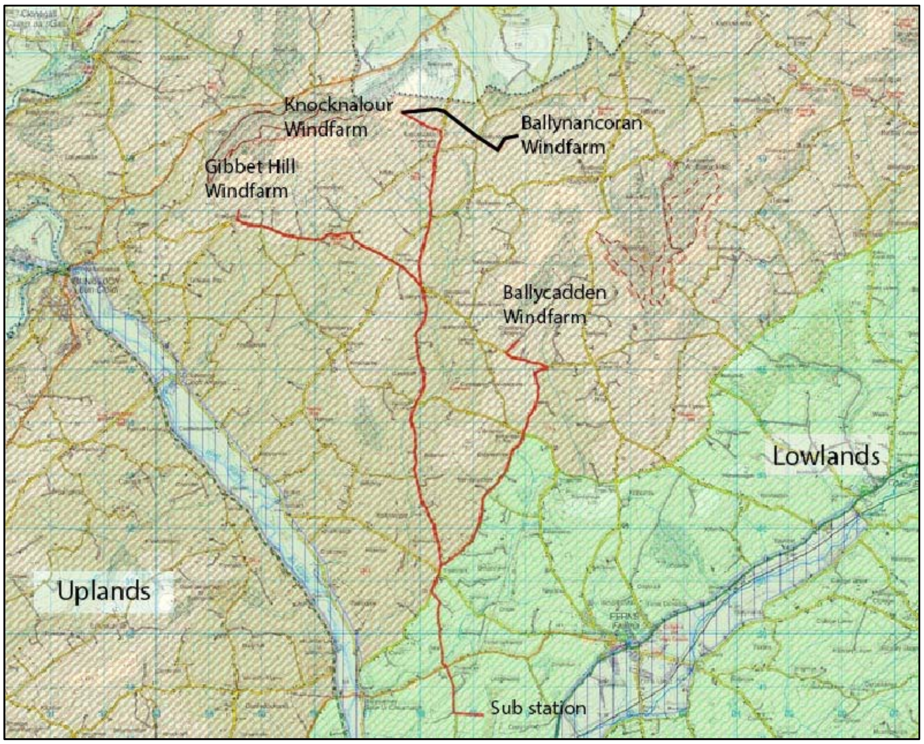


Figure 10.2 Grid connection location showing above ground cable line as highlighted in black.

The permitted cable route is mapped above in Figure10.3 to indicate how the cable route runs along the existing roadway from the substation. The red line shows the cable line that runs underground, and the black line is the above ground portion of the cable line that runs from the Knocklour Wind Farm to the Ballynancoran Wind Farm. The permitted cable map is placed over the WCDP Map of Landscape Characteristics to indicate where the cable line sits in regards to the designated landscape characteristics.

10.3.1.3 Scenic Routes and Protected Views

The Co. Wexford Development Plan sets out several scenic views and routes. The closest scenic trail lies in Coolmelagh, about 3.2km from the above ground cable route at Knocknalour Wind Farm. See figure 2.4 below for the Co Wexford DP Cycle and Trails Map.

10.3.1.4 Walking Routes and Cycleways

The below image shows the Co. Wexford Walking Trails map with the grid connection outlined in pink. There is one cycle route that cross over the subject underground cable route, shown in the Co. Wexford Walking and Trails map. This includes the existing cycle route along the R745 roadway east of Ferns. This section of the subject grid connection is underground and might have had a slight impact on the existing roadway during construction but this would have been temporary.

Figure 10.3 Grid connection location with regards to the Co. Wexford walking and bike trail map as highlighted in pink

10.4 Visibility of the Permitted Development

Following the desktop study, site visits were carried out to assess the visibility of the site from the surrounding area. This informs the visual baseline study, indicates the areas which have potential visibility and the choice of viewpoint locations.

10.5 Landscape Baseline: Landscape Character

Landscape character refers to the distinct and recognisable pattern of elements that occurs consistently within a particular type of landscape and how this is perceived. It reflects certain combinations of geology, landform, soils, vegetation, land use and human settlement, creating the particular sense of place found in different areas. The identification of landscape character as outlined in the DoEHLG Guidelines (2000) comprises the identification of primarily physical units (areas defined by landform and landcover) and, where appropriate, of visual units.

10.5.1 Topography

The entire project lies within the South Eastern River Basin District. The topography of the site is mostly flat, arable land with a substantial amount of one-off housing. The site slopes southeast towards the river basin with the highest section of the grid connection at the Knocknalour wind farm.

Representative photographs of the current conditions along the completed Grid Connection route are provided as Plates 10-1 to 10-2, below to indicate the existing topography and landcover.

Plate 10-1 View of roadway from Kocknalour Wind farm, indicating the above ground visible power lines and one-off housing.

The above ground cable route runs adjacent to the road and does not impede the view of the existing landscape as the cable is similar in nature to the common electricity connections found across the countryside.

Plate 10-2 View of current condition of underground Grid Connection Route, facing north towards Tinkerstown Crossroads.

The underground cable line runs below the surface of the road and therefore cannot be seen. This line continues north under the roadway from the substation towards the Ballycadden, Gibbet Hill and Knocknalour Wind Farms, from which it then becomes an overhead line from Knocknalour to Ballynancoran Wind Farm.

10.5.2 Landcover

Landcover is the term used to describe the combinations of vegetation and land-use that cover the land surface. It comprises the more detailed constituent parts of the landscape and encompasses both natural and man-made features.

The area surrounding the Grid Connection route is characterised by good quality arable land with a substantial amount of one-off housing. The majority of the subject Grid Connection are underground cables laid in the public roads. The main exceptions are; the initial connection to the Crory substation, which comprise an underground cable which crosses two fields (a distance of approximately 500 metres); the final connection to Ballycadden Wind Farm which is an underground cable installed in a private road, a track and fields (a distance of approximately 1,000 metres); the final connection to Gibbet Hill Wind Farm – an underground cable routed across a private road, a track and fields (a distance of approximately 800 metres); and the link section between the Knocknalour and Ballynancoran Wind Farms that comprises an overhead power line across fields (a distance of approximately 2 kms). Overall, the Grid Connections comprises approximately 26 kms of 20 kV underground cable (the route of which is marked by road and bridge markers) and approximately 2 kms of 20 kV overhead powerline.

Plate 10-3 View of Ballycadden Wind Farm facing north.

The Ballycadden Wind Farm lies within the north eastern section of the grid connection, a landscape characterized by agricultural land and slight rolling hills.

Plate 10-4 View of 20kV Kocknalour Wind farm, indicating the above ground visible power lines.

The above ground cable line that connects the Knocklalour Wind Farm and Ballynancoran Wind Farm is connected using the cable line that is similar in nature to the common electricity connections found across the countryside.

Plate 10-5 View of existing cable road post that runs under the small road that connects the south substation to the cable route.

From the entrance of the substation, the underground cable line runs north under the roadway towards the four wind farms. The underground cable line is marked along the roadway with the cable road post as shown in the above image.

10.5.3 Site Drainage

The entire project lies within the South Eastern River Basin District. The site slopes southeast towards the river basin with the highest section of the site at the Kocknalour wind farm. Land-use in the vicinity of study area is predominantly agriculture.

There are five main streams within the 3 no. subcatchments which drain the area along the grid connection route that are further detailed in Chapter 7 of this report.

Plate 10-6 View of existing watercourse that runs parallel to the grid connection from Ballycadden Wind farm.

The underground cable line that runs over a water way as seen above, runs through the bridge under the existing roadway. Therefore, no visual impact to the existing landscape is made.

10.5.4 Landscape Value and Sensitivity of the Proposed Development Site

To determine the landscape value and sensitivity of the proposed development site the landscape issues pertaining to the site have been summarised in Table 10-6 below. These in turn were then summed up in a landscape value and landscape sensitivity classification of Low, Moderate and High for the proposed development site.

Table 10-6 Features of Landscape Value

Feature	Description
Landscape Designations	There are limited designations within the study are and none on the site itself. These designations are discussed in detail in Section 10.3 above. The subject grid connection is not routed within or in proximity to any 'Landscapes of Greater Sensitivity' (LGS). There are no scenic routes within the study area. There is no evidence that the subject grid connection has interfered with any protected landscape character, views or prospects as the majority of the development is located underground.
Landscape Quality/Condition	The subject development site is a road corridor and while it passes through various attractive landscapes the road itself is not considered of high quality from a landscape perspective.

Feature	Description
Aesthetic Qualities	While the surrounding landscape has many aesthetic qualities, the road corridor that constitutes the proposed development site does not.
Wildness/naturalness	The road and adjacent agricultural area within the subject grid connection site is not characterised by wildness or naturalness.
Recreation Value	The site itself is not a recreation area. There is one existing cycle route that crosses one junction of the R745.

Due to the issues summarised in Table 10-6 above the landscape value and landscape sensitivity of the subject development site are both deemed Low.

10.6 Likely and Significant Effects and Associated Mitigation Measures

10.6.1 'Do-Nothing' Scenario

The existing grid connection is already constructed and operational, under the "Do Nothing" scenario the grid connection infrastructure will remain unchanged and continue to provide a connection from the windfarms to the national grid. There is no potential for additional environmental impacts associated with this scenario. The existing grid connection route was designed to provide the most efficient and least environmentally impactful connection to the national grid by using the existing road infrastructure. Retaining the existing grid connection has been determined to have the least environmental impacts.

Removal of the existing infrastructure has the potential for significant impacts to the environmental receptors. Furthermore, the existing grid connection route and design were optimised to result no significant impacts to the environment. It is considered that any alternative grid connection route would likely result in significantly greater environmental impacts than the current route. Furthermore, the existing grid connection is predominantly located underground within the public road network thus minimising landscape and visual impacts.

10.6.2 Construction Phase Effects

10.6.2.1 Landscape Effects

The subject development is not routed within or in proximity to any 'Landscapes of Greater Sensitivity' (LGS), *landscapes and seascapes which have the most visual interest and prominence, and which are generally more sensitive to development*. The closest LGS is Carrigroe Hill, which is approx. 9 km from the 110 kV Crory substation.

The landscape effects during the construction phase of the subject underground and over ground cabling is likely to have been imperceptible, temporary, and transient in nature. The works took place within a landscape which is not considered sensitive. This combined with the small scale of the works means that there is no residual effect associated with the construction phase.

Residual Impact

Based on the assessment above the residual impacts are considered **Temporary, Imperceptible, Negative**. There have been no residual landscape effects associated with the subject development.

Assessment of the Effects
Based on the assessment above the construction phase landscape effects are considered **Not Significant**.

10.6.2.2 Visual Effects

The visual effects during the construction phase of the permitted underground and over ground cabling is likely to have been imperceptible, temporary, and transient in nature. The works took place predominantly within the road corridor and so the visual receptors are not considered to be sensitive to change. This combined with the small scale of the works means that there are no residual effects associated with the construction phase.

There is no evidence that the subject grid connection has interfered with any protected landscape character, views or prospects as the majority of the development is located underground.

Residual Impact
Based on the assessment above it is considered that this is a **Temporary, Imperceptible, Negative** visual impact. There have been no residual visual effects associated with the subject development.

Assessment of the Effects
Based on the assessment above the construction phase visual effects are considered **Not Significant**.

10.6.3 Operational Phase Effects

The operational phase of the project consists of the continued transmission of electricity from the wind farms to the Crory substation along the grid connection as an integral part of the National Grid. Periodic maintenance of the grid connection may be required but is anticipated to be brief, infrequent and not likely to result in any significant landscape or visual effects.

10.6.3.1 Landscape Effects

There has been no impact on landscape associated with the underground section of the subject development. The landscape effect of the overhead line is minimal, with the effect being mainly visual. The over-ground pole sets and wires are not of sufficient scale or uniqueness to impact on the wider landscape. The overall effect of the overhead lines on the landscape character of the wider areas is considered to be Long Term, Imperceptible effect.

Residual Impact
Based on the assessment above it is considered that this is a **Permanent, Imperceptible, Negative** landscape impact. There have been no significant residual landscape effects associated with the subject development.

Assessment of the Effects
Based on the assessment above the operational phase landscape effects are considered **Not Significant**.

10.6.3.2 Visual Effects

The underground cabling is located within the existing road corridor and there are no operational effects associated with this. The overhead line component is similar in nature to the common electricity connections found across the Irish countryside and is not incongruous or dominant in its current position. The sensitivity of the receiving environment and receptors is considered low and so the effect is considered to be a long term, imperceptible effect.

There is no evidence that the overhead grid connection has interfered with any protected landscape character, views or prospects.

The road corridors in which underground cable was constructed have been fully reinstated, leaving no visible above-ground evidence of the subject works, other than required safety markers, that have the potential to give rise to any operational phase effects.

Residual Impact

Based on the assessment above it is considered that this is a **Permanent, Imperceptible, Negative** visual impact. There have been no residual visual effects associated with the subject development.

Assessment of the Effects

Based on the assessment above the construction phase visual effects are considered **Not Significant**.

10.6.3.3 Decommissioning Phase

The subject grid connection is a part of the electricity transmission network, and therefore the requirement for decommissioning is not foreseen.

10.6.4 Cumulative Landscape and Visual Effect Assessment

The cumulative effect assessment includes the subject development in addition to the Ballycadden, Ballynancoran, Gibbet Hill, and Knocknalour Windfarms and their associated infrastructure.

Potential cumulative landscape and visual effects of the subject development and all other plans and projects listed in Section 2.9 of this rEIAR are minor given the nature, duration, scale and location of the subject development.

The potential cumulative impact is considered to be limited due to the unobtrusive nature of the visual components of the subject development and the sensitivity of the landscape and visual receptors. There is a long term, imperceptible effect cumulatively with other existing and proposed developments in the area.

11. ARCHAEOLOGY AND CULTURAL HERITAGE

11.1 Introduction

This archaeological and cultural heritage chapter was prepared by Tobar Archaeological Services. It presents the results of an archaeological and cultural heritage impact assessment. The project consists of a planning application for substitute consent for the connection of the consented Crory wind farm group to the national electricity grid. The grid connection is via an existing underground cable and some short sections of overhead line.

The purpose of this chapter is to assess the potential effects of the development on the surrounding archaeological, architectural and cultural heritage landscape. The assessment is based on a detailed desktop review of the available cultural heritage and archaeological data to identify areas of archaeological/architectural/cultural significance or potential, likely to be impacted by the development. An assessment of potential effects, including cumulative effects, is presented.

11.1.1 Planning Background and Proposed Development

An application is being made to An Bord Pleanala for substitute consent for the Crory wind farm group grid connection. The Crory Wind Farm Group (hereafter referred to as "CWFG") is located west of Ferns in County Wexford. It consists of Ballycadden Wind Farm, Ballynancoran Wind Farm, Gibbet Hill Wind Farm and Knocknalour Wind Farm. The four separate wind farms, consisting of a total of 21 turbines became operational at different times in 2012 and 2013. The wind farms are connected to the national electricity grid by a medium voltage 20 kV underground grid connection cable (with a short section of OHL), which runs from the wind farms to Crory 110 kV substation. The grid connection works were undertaken by the wind farm developers, ESBN and/or their agents, under the supervision of ESBN.

A full description of all elements of the development is presented in Chapter 3.

11.1.2 Statement of Authority

This section of the EIAR has been prepared by Miriam Carroll and Annette Quinn of Tobar Archaeological Services. Miriam and Annette both graduated from University College Cork in 1998 with a Masters degree in Methods and Techniques in Irish Archaeology. Both directors are licensed by the Department of Culture, Heritage and the Gaeltacht to carry out excavations and are members of the Institute of Archaeologists of Ireland. Annette Quinn and Miriam Carroll have been working in the field of archaeology since 1994 and have undertaken numerous projects for both the private and public sectors including excavations, site assessments (EIAR) and surveys. Miriam Carroll and Annette Quinn are directors of Tobar Archaeological Services which has been in operation for 17 years.

11.1.3 Legislation and Guidelines

11.1.3.1 Current Legislation

Archaeological monuments are safeguarded through national and international policy, which is designed to secure the protection of the cultural heritage resource. This is undertaken in accordance with the provisions of the European Convention on the Protection of the Archaeological Heritage (Valletta Convention). This was ratified by Ireland in 1997.

Both the National Monuments Acts 1930 to 2004 and relevant provisions of the Cultural Institutions Act 1997 are the primary means of ensuring protection of archaeological monuments, the latter of which includes all man-made structures of whatever form or date. There are a number of provisions under the National Monuments Acts which ensure protection of the archaeological resource. These include the Register of Historic Monuments (1997 Act) which means that any interference to a monument is illegal under that Act. All registered monuments are included on the Record of Monuments and Places (RMP).

The Record of Monuments and Places (RMP) was established under Section 12 (1) of the National Monuments (Amendment) Act 1994 and consists of a list of known archaeological monuments and accompanying maps. The Record of Monuments and Places affords some protection to the monuments entered therein. Section 12 (3) of the 1994 Amendment Act states that any person proposing to carry out work at or in relation to a recorded monument must give notice in writing to the Minister (Environment, Heritage and Local Government) and shall not commence the work for a period of two months after having given the notice. All proposed works, therefore, within or around any archaeological monument are subject to statutory protection and legislation (National Monuments Acts 1930-2004).

Under the Heritage Act (1995) architectural heritage is defined to include 'all structures, buildings, traditional and designed, and groups of buildings including street-scapes and urban vistas, which are of historical, archaeological, artistic, engineering, scientific, social or technical interest, together with their setting, attendant grounds, fixtures, fittings and contents...'. A heritage building is also defined to include 'any building, or part thereof, which is of significance because of its intrinsic architectural or artistic quality or its setting or because of its association with the commercial, cultural, economic, industrial, military, political, social or religious history of the place where it is situated or of the country or generally'.

11.1.3.1.1 *Granada Convention*

The Council of Europe, in Article 2 of the 1985 Convention for the Protection of the Architectural Heritage of Europe (Granada Convention), states that 'for the purpose of precise identification of the monuments, groups of structures and sites to be protected, each member State will undertake to maintain inventories of that architectural heritage'. The Granada Convention emphasises the importance of inventories in underpinning conservation policies.

The NIAH was established in 1990 to fulfill Ireland's obligations under the Granada Convention, through the establishment and maintenance of a central record, documenting and evaluating the architectural heritage of Ireland. Article 1 of the Granada Convention establishes the parameters of this work by defining 'architectural heritage' under three broad categories of Monument, Groups of Buildings, and Sites:

- Monument: all buildings and structures of conspicuous historical, archaeological, artistic, scientific, social or technical interest, including their fixtures and fittings;
- Group of buildings: homogeneous groups of urban or rural buildings conspicuous for their historical, archaeological, artistic, scientific, social or technical interest, which are sufficiently coherent to form topographically definable units;
- Sites: the combined works of man and nature, being areas which are partially built upon and sufficiently distinctive and homogenous to be topographically definable, and are of conspicuous historical, archaeological, artistic, scientific, social or technical interest.

The Council of Europe's definition of architectural heritage allows for the inclusion of structures, groups of structures and sites which are considered to be of significance in their own right, or which are of significance in their local context and environment. The NIAH believes it is important to consider the architectural heritage as encompassing a wide variety of structures and sites as diverse as post boxes, grand country houses, mill complexes and vernacular farmhouses.

11.1.3.2 Wexford County Development Plan 2013-2019

The relevant policies and objectives of Wexford County Council regarding archaeology and built heritage were consulted. Those pertaining to archaeology and built or architectural heritage include the following.

11.1.3.2.1 *Archaeology*

Objective AH01

To conserve and protect archaeological sites, monuments (including their settings), underwater archaeology and objects within the jurisdiction of Wexford County Council including those listed on the Record of Monuments and Places, the Register of Historic Monuments or newly discovered sub-surface archaeological remains.

Objective AH02

To protect the heritage of groups of important national monuments, inclusive of their contextual setting and interpretation, in the operation of development management.

Objective AH03

To fully consider the protection of archaeological heritage when undertaking, approving or authorising development. In considering such protection the Council will have regard to the advice and recommendations of the National Monuments Service and the principles set out in Framework and Principles for the Protection of the Archaeological Heritage (Department of Arts, Heritage, Gaeltacht and the Islands, 1999).

Objective AH04

To require an archaeological assessment for development that may, due to its size, location or nature, have a significant effect upon archaeological heritage and to take appropriate measures to safeguard this archaeological heritage. In all such cases the Planning Authority shall consult with the National Monuments Service in the Department of Arts, Heritage and the Gaeltacht.

Objective AH05

To promote a presumption in favour of preservation in-situ of archaeological remains and settings when dealing with proposals for development that would impact upon archaeological sites and/or features. Where preservation in-situ is not possible the Council will consider preservation by record in appropriate circumstances.

Objective AH06

To protect historic and archaeological landscapes, including battlefields, and promote access to such sites provided that this does not threaten the feature.

11.1.3.2.2 *Built Heritage*

Objective PS01

To protect the architectural heritage of County Wexford and to include structures considered to be of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest in the Record of Protected Structures.

Objective PS02

To protect the curtilage of Protected Structures or proposed Protected Structures from any works which would cause loss of, or damage to, the special character of the structure and loss of or damage to, any structures of heritage value within the curtilage or attendant grounds of the structure.

Objective PS07

To ensure that applications in relation to Protected Structures include an architectural heritage assessment/architectural impact assessment report. This report should assess the implications of the development on the character of the structure and the area in which it is located. This should be prepared in accordance with Appendix B of Architectural Heritage Protection- Guidelines for Planning Authorities (DEHLG, 2004) and any subsequent drafts.

Objective PS11

To ensure that elements of the architectural heritage of the county, such as historic gardens, stone walls, ditches and street furniture that make a positive contribution to the built heritage, are retained.

Objective G01

To preserve and enhance the county's graveyards through improved management and access and community stewardship and to provide historical information at each location and promote the unique character of each of the burial grounds to the surrounding residents and property owners.

11.1.4 Location and Topography

The Crory Wind Farm Group is located north-west of Ferns in County Wexford. The grid connections to the wind farm group comprise approximately 26kms of 20kV underground cable (the route of which is marked by road and bridge markers) and approximately 2kms of 20kV overhead powerline. The majority of the subject grid connections are underground cables laid in the public roads. extends from the Crory 110 kV substation in the south to the Knocknalour and Ballynancoran windfarms in the north, a straight line distance of approximately 12 kms. A spur to the east extends to the Ballycadden Wind Farm and a spur to the west extends to the Gibbet Hill Wind Farm. The area in general is characterised by good quality arable land with a substantial amount of one-off housing.

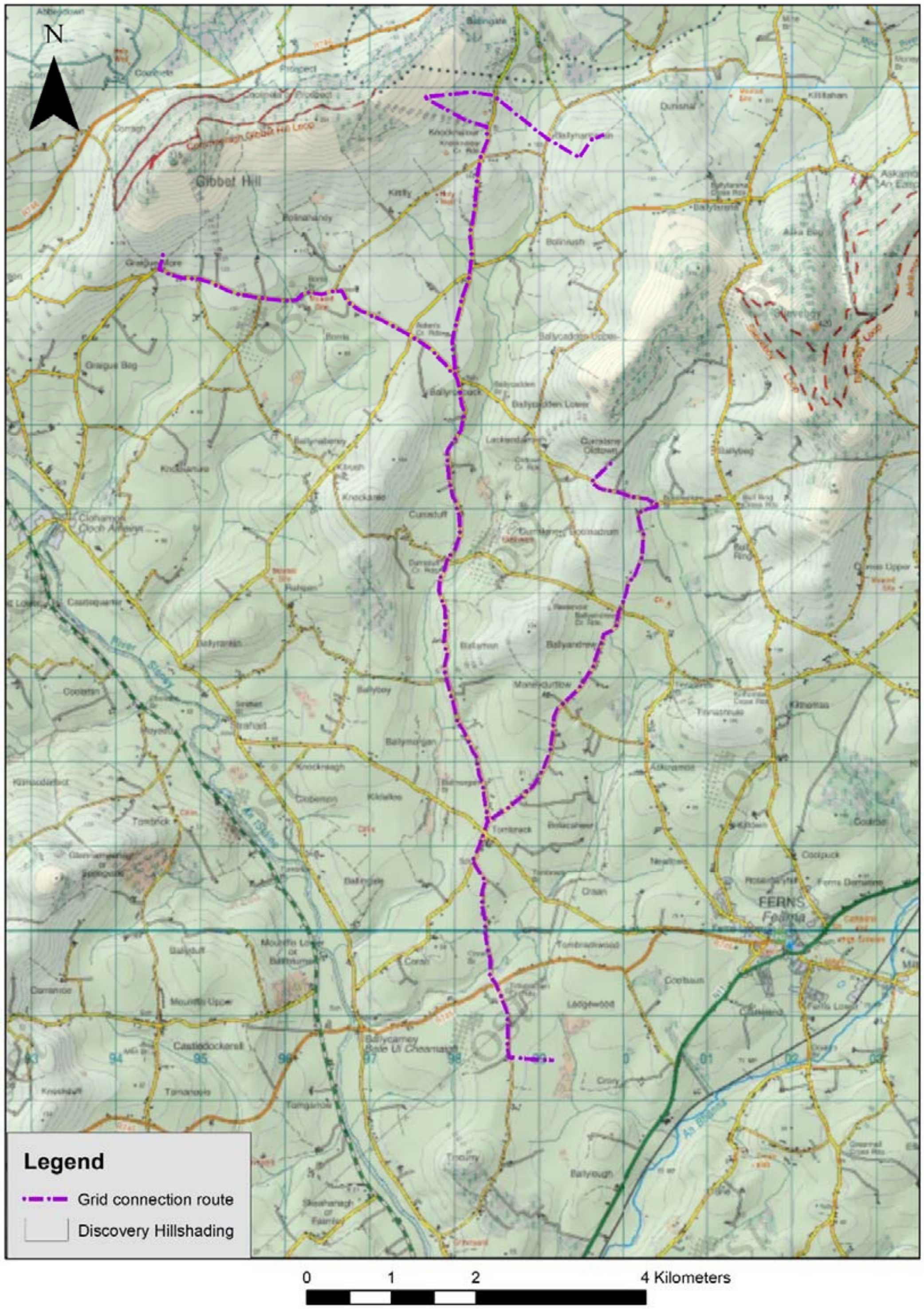


Figure 11.1: Site location map showing grid connection route.

11.2 Methodology

The assessment of the archaeology, architecture and cultural heritage of the development area included GIS mapping and desk-based research. A desk-based study of the proposed development site was undertaken in order to assess the archaeological, architectural and cultural heritage potential of the area and to identify constraints or features of archaeological/cultural heritage significance within or near to the grid connection route.

11.2.1 Geographical Information Systems

GIS is a computer database which captures, stores, analyses, manages and presents data that is linked to location. GIS is geographic information systems which includes mapping software and its application with remote sensing, land surveying, aerial photography, mathematics, photogrammetry, geography and tools that can be implemented with GIS software. A geographic information system (GIS) was used to manage the datasets relevant to the archaeological and architectural heritage assessment and for the creation of all the maps in this section of the report. This involved the overlaying of the relevant archaeological and architectural datasets on georeferenced aerial photographs and road maps (ESRI), where available. The integration of this spatial information allows for the accurate measurement of distances of a development from archaeological and cultural heritage sites and the extraction of information on 'monument types' from the datasets. Areas of archaeological or architectural sensitivity may then be highlighted in order to mitigate the potential negative effects of a development on archaeological, architectural and cultural heritage.

11.2.2 Desktop Assessment

A primary cartographic source and base-line data for the archaeological assessment was the consultation of the Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP) for County Wexford. All known recorded archaeological monuments are indicated on 6 inch Ordnance Survey (OS) maps and are listed in the aforementioned records. The 1st (1837-1842) and 2nd (1888-1913) edition OS maps for the area were also consulted as were aerial photographs.

The primary source and base-line data for the architectural assessment was the consultation of the Record of Protected Structures (RPS) and the National Heritage of Architectural Heritage(NIAH) for County Wexford. Consultation of the historic mapping assisted in the recording of previously unknown architectural heritage features deemed to be of cultural heritage significance.

The following sources were consulted for this assessment:

- The Record of Monuments and Places (RMP)
- The Topographical Files of the National Museum of Ireland
- First edition Ordnance Survey maps (OSI.ie)
- Second edition Ordnance Survey maps (OSI.ie)
- Third edition Ordnance Survey Map (Record of Monuments and Places for County Wexford)
- Down Survey maps for County Westmeath (www.downsurvey.tcd.ie)
- Aerial photographs (copyright of Ordnance Survey Ireland (OSI.ie)
- Database of Irish Excavation Reports
- Wexford County Development Plan 2013-2019
- National Inventory of Architectural Heritage (NIAH)

11.2.2.1 Record of Monuments and Places

A primary cartographic source and base-line data for the assessment was the consultation of the Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP) for County Wexford. All known recorded archaeological monuments are indicated on 6 inch Ordnance Survey (OS) maps and are listed in these records. The SMR/RMP is not a complete record of all monuments as newly discovered sites may not appear in the list or accompanying maps. In conjunction with the consultation of the SMR and RMP the electronic database of recorded monuments (www.webgis.archaeology.ie/historicenvironment) was also consulted.

11.2.2.2 Cartographic Sources and Aerial Photography

The 1st (1837-1842) edition and 2nd (1888-1913) edition OS maps for the area were consulted, where available, as was OSI aerial photography on OSI.ie. The Down Survey maps for this area of County Wexford were also consulted.

11.2.2.3 Topographical Files - National Museum of Ireland

Details relating to finds of archaeological material and monuments in numerous townlands in the country are contained in the topographical files held in the National Museum of Ireland. The files were consulted on www.heritagemaps.ie.

11.2.2.4 Archaeological Inventory Series

Further information on archaeological sites may be obtained in the published County Archaeological Inventory series prepared by the Department of Culture, Heritage and the Gaeltacht. The archaeological inventories present summarised information on sites listed in the SMR/RMP and include detail such as the size and location of particular monuments as well as any associated folklore or local information pertaining to each site. The inventories, however, do not account for all sites or items of cultural heritage interest which are as yet undiscovered.

11.2.2.5 County Development Plan

The Wexford County Development Plan 2013- 2019 was consulted for the schedule of buildings (Record of Protected Structures) and items of cultural, historical or archaeological interest which may be affected by the proposed wind farm. The townlands through which the grid connection extends were entered into the list of protected structures in the development plan to assess the proximity and potential impact of the proposed development on such structures. The development plan also outlines policies and objectives relating to the protection of the archaeological, historical and architectural heritage landscape of County Wexford.

11.2.2.6 Database of Irish Excavation Reports

The database of Irish excavations contains annual summary accounts of all excavations carried out under license. The database is available on line at www.excavations.ie and includes excavations from 1985 to 2019. This database was consulted as part of the desktop research for this assessment to establish if any archaeological excavations had been carried out within or near to the development area.

11.2.2.7 National Inventory of Architectural Heritage (NIAH)

This source lists some of the architecturally significant buildings and items of cultural heritage and is compiled on a county by county basis by the Department of Culture, Heritage and the Gaeltacht. The

NIAH database was consulted for all townlands within and adjacent to the study area. The NIAH survey for Wexford has been published and was downloaded on to the base mapping for the development. The National Inventory of Architectural Heritage (NIAH) is a state initiative under the administration of the Department of Culture, Heritage and the Gaeltacht and established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999.

The purpose of the NIAH is to identify, record, and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently as an aid in the protection and conservation of the built heritage. NIAH surveys provide the basis for the recommendations of the Minister for the Department of Culture, Heritage and the Gaeltacht to the planning authorities for the inclusion of particular structures in their Record of Protected Structures (RPS). The published surveys are a source of information on the selected structures for relevant planning authorities. They are also a research and educational resource. It is hoped that the work of the NIAH will increase public awareness and appreciation of Ireland's architectural heritage. Record of Monuments and Places

11.2.3 Assessment of Likely Significant Effects

The likely effects on the existing archaeological and cultural heritage environment are assessed using the criteria as set out in the EPA guidelines (2017). The following terminology is used when describing the likely effects of the proposed development from a Cultural Heritage perspective.

11.2.3.1 Types of Impact

Direct impacts arise where an archaeological heritage feature or site is physically located within the footprint of the development whereby the removal of part, or all of the feature or site is thus required.

Indirect impacts may arise as a result of subsurface works undertaken outside the footprint of the development, secondary environmental change such as a reduction in water levels and visual impacts.

Cumulative Impacts arise when the addition of many impacts create a larger, more significant impact.

Residual Impacts are the degree of environmental changes that will occur after the proposed mitigation measures have been implemented.

11.2.3.1.1 *Magnitude of Effects (Significance)*

- Profound: Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise where an archaeological site is completely and irreversibly destroyed.
- Very Significant: An effect which by its character, magnitude, duration or intensity significantly alters most of the sensitive aspect of the environment.
- Significant: An effect which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. An effect like this would be where part of a site would be permanently impacted upon, leading to a loss of character, integrity and data about an archaeological site.
- Moderate: A moderate effect arises where a change to an archaeological site is proposed which though noticeable, is not such that the integrity of the site is compromised and which is reversible. This arises where an archaeological site can be incorporated into a modern day development without damage and that all procedures used to facilitate this are reversible.
- Slight: An effect which causes changes in the character of the environment which are not high or very high and do not directly impact or affect an archaeological site.

- Not Significant: An effect which causes noticeable changes in the character of the environment but without significant consequences.
- Imperceptible: An effect on an archaeological site capable of measurement but without noticeable consequences.

11.3 Existing Environment

11.3.1 Archaeological Heritage along the Grid Connection Route

Archaeological heritage includes all recorded archaeological monuments listed in the RMP/SMR maps and also includes newly discovered archaeological sites. These monuments are addressed separately for clarity. National Monuments are those recorded monuments which are in the ownership / guardianship of the Minister for Culture, Heritage and the Gaeltacht (DCHG). They are frequently referred to as being in 'State Care'. Archaeological heritage also includes sites which are subject to a preservation order.

The existing grid connection route extends from the consented wind farms primarily along public roads before terminating at the existing Crory 110kV substation. The grid connection extends through eighteen townlands as follows (from north to south): Knocknalour, Ballynancoran, Kiltilly, Graiguemore, Bolinahaney/Borris, Ballyroebuck, Curraduff, Ballaman, Curralane Oldtown, Boolnadrum, Ballyandrew, Moneydurtlow. Bolacaheer, Tombrack, Corah, Ballycarney, Tincurry.

11.3.1.1 National Monuments

11.3.1.1.1 *Monuments in State Care or subject to a Preservation Order*

No national monuments in State Care or those subject to a Preservation Order are located along the existing grid connection route. The nearest National Monuments are those in the town of Ferns including Ferns Castle (NM No. 521) and Ferns Cathedral, church and high crosses (NM No. 133) over 3km to the east of the southern end of the route, and Clone Church (NM No. 665) which is c. 2.5km to the south-east of the existing Crory substation (Figure 11.2).

11.3.1.1.2 *Recorded Archaeological Monuments*

No recorded monuments are located within 100m of the existing grid connection route. The nearest monuments are shown in Figure 11.3 below.

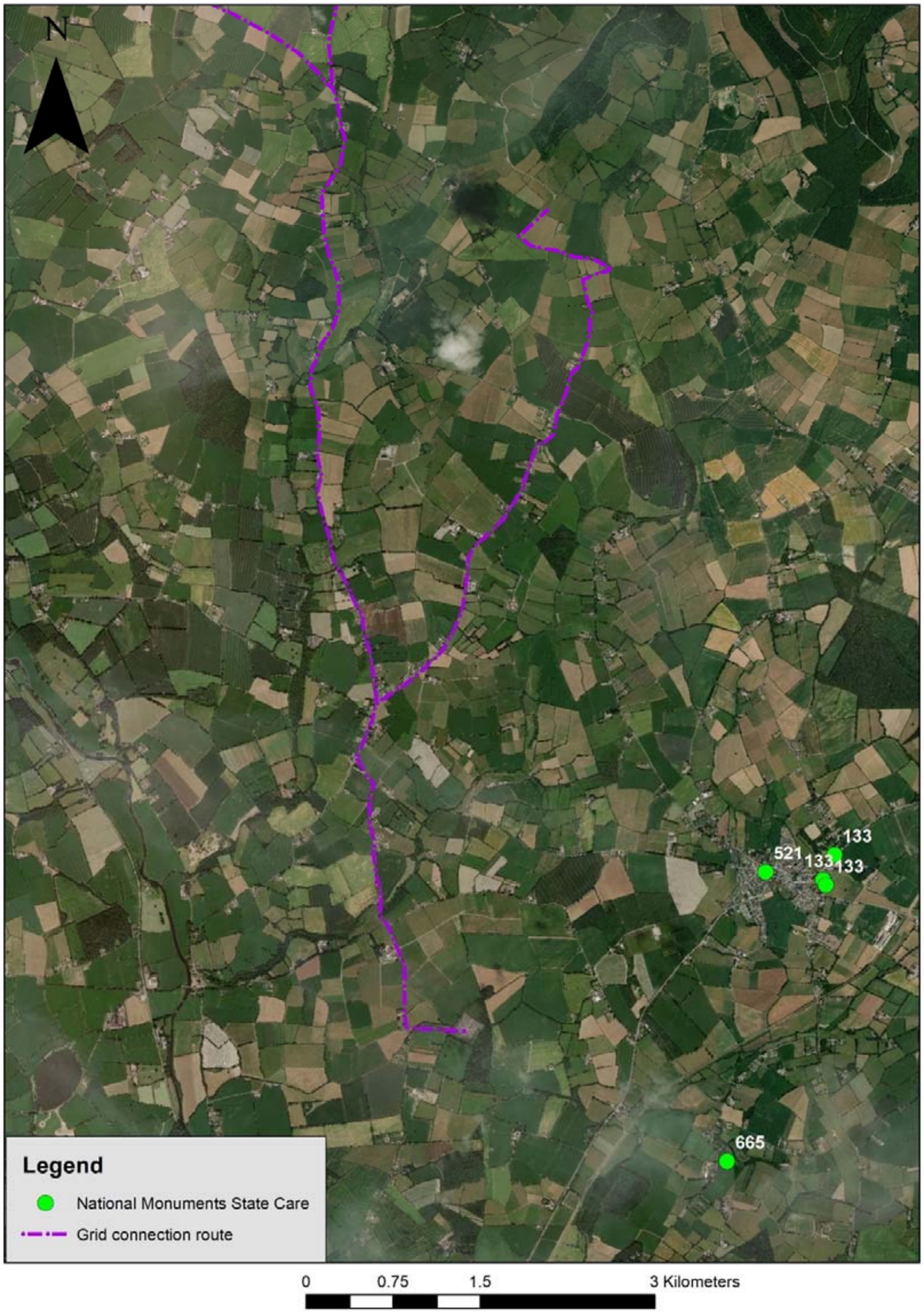


Figure 11.2: National monuments in State Care in relation to existing grid connection route.

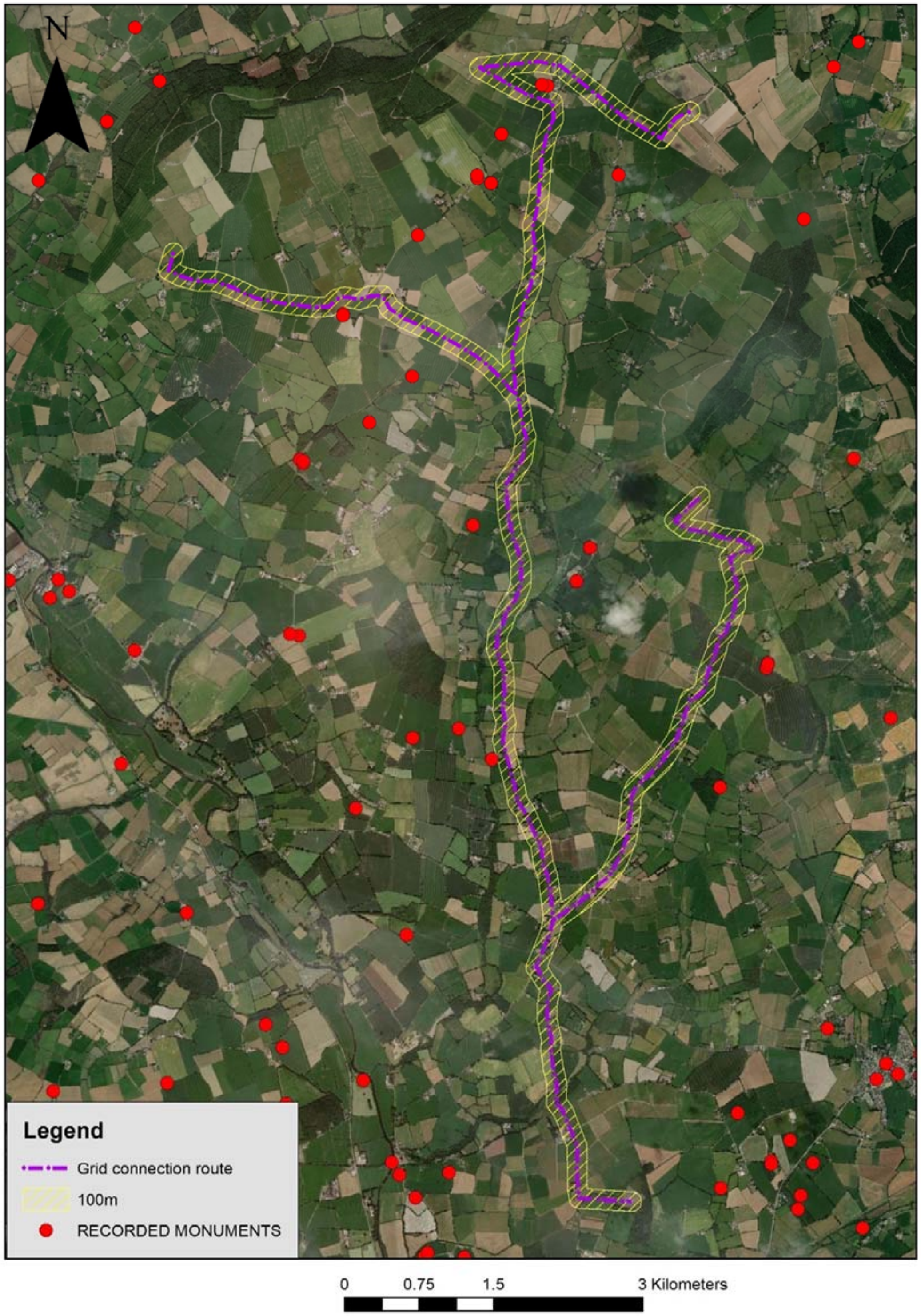


Figure 11.3: Recorded monuments in relation to existing grid connection route. Note none within 100m.

11.3.1.2 Archaeological investigations undertaken along the proposed grid connection route

Each townland including through which the existing grid connection route extends was checked in the database of Irish excavations to ascertain if any archaeological investigations were undertaken in the area. The following results were returned.

2010:766 - Gibbet Hill, Graiguemore, Bolinahaney and Kiltilly, Wexford

County: Wexford Site name: Gibbet Hill, Graiguemore, Bolinahaney and Kiltilly

Sites and Monuments Record No.: N/A   Licence number: 10E0507

Author: Gill McLoughlin, Irish Archaeological Consultancy Ltd, 120b Greenpark Road, Bray, Co. Wicklow.

Site type: No archaeological significance

ITM: E 694640m, N 658896m

Monitoring of site investigations and topsoil-stripping was required as a condition of planning with regard to proposed site investigations to be carried out at Gibbet Hill Wind Farm, Co. Wexford. Monitoring of a total of 54 test-pits at the proposed locations of six wind turbines was carried out between 13 and 17 December 2010 and nothing of archaeological significance was noted. Monitoring of topsoil-stripping during construction is expected to take place during 2011.

2011:627 - KILTILLY, Wexford

County: Wexford Site name: KILTILLY

Sites and Monuments Record No.: N/A   Licence number: 11E441

Author: Emmet Stafford

Site type: Monitoring

ITM: E 697020m, N 658303m

Monitoring of groundworks associated with the construction of a single dwelling were undertaken during December 2011. The site is located across a public road from WX010-001, an enclosure site which may be a demolished ringfort. The public road that defined the southern boundary of the proposed development site separated the area of construction activity from the enclosure site to the south. No features or deposits of archaeological potential were uncovered during the monitoring of construction-related groundworks at the site.

2012:623 - Graigue More/Kiltilly/Coolmela or Prospect, Wexford

County: Wexford Site name: Graigue More/Kiltilly/Coolmela or Prospect

Sites and Monuments Record No.: N/A   Licence number: 10E0507 ext.

Author: Faith Bailey

Site type: No archaeological significance

ITM: E 694640m, N 658896m

A programme of monitoring carried out in the townlands of Graigue More, Kiltilly and Coolmela or Prospect, Co. Wexford in response to the development of the Gibbet Hill Wind Farm. Monitoring of site investigations and topsoil stripping was required as a condition of planning. Monitoring was also recommended in the Environmental Impact Statement (Bailey 2008). A further assessment was undertaken in 2010 in order to assess a revision in the access routes (Bailey 2010). In 2010 monitoring of the excavation of site investigation pits at the development area was carried out by Gill McLoughlin (Excavations 2010, No. 766, 10E0507). Nothing of archaeological significance was identified during the course of these works.

Monitoring was carried out within the wind farm site intermittently over a number of days between April and September 2012. Each turbine site, crane platform and parts of the access roads were stripped of topsoil, using a toothless bucket under supervision. No features of archaeological significance were identified.

11.3.1.3 Topographical Museum Files

The topographical files dataset on www.heritagemaps.ie was consulted for find spots along or in the vicinity of the existing grid connection route. No such finds spots are recorded.

11.3.2 Architectural and Cultural Heritage along the grid connection route

11.3.2.1 NIAH and Protected Structures

The dataset of the Record of Protected Structures for County Wexford is not currently available as a GIS digital dataset. A dataset was requested from Wexford County Council. The dataset was not available at the time of writing consequently, the list of Protected Structures as presented in Volume 2 of the Wexford County Development Plan was consulted for such structures which may be located in the vicinity of the existing grid connection. The Protected Structures in Volume 2 of the CDP are not mapped and do not contain any grid references therefore a constraints map of Protected Structures could not be compiled from the information contained within the list. It should be noted, however, that the majority of the structures listed in Volume 2 of the CDP are also listed in the NIAH. In this regard the majority of the NIAH structures mapped and discussed in this assessment are likely to be included in the RPS and should be read as such.

One structure listed in the NIAH for County Wexford (Reg. 15701005) is located within 100m of the existing grid connection and is listed in Table 11-1 below and shown in Figure 11.4. It is also listed in the Record of Protected Structures in Vol. 2 of the CDP (RPS No. WCC1046).

Table 11-1: NIAH structures within 100m of the existing grid connection

NIAH /RPS NO.	DATE	RATING	TD.	Structure	NOW IN USE AS	DISTANCE (M)
15701005/ WCC1046	1700 - 1839	R	Ballyroebuck	Farm house	Farm house	26

The house comprises a structure which would have been at a remove from the ground works associated with the grid connection. It is described on the NIAH website (www.buildingsofireland.ie) as follows:

Description

Detached five-bay single-storey farmhouse with half-dormer attic, extant 1839, on a rectangular plan originally three- or four-bay single-storey with half-dormer attic. Extended, pre-1904, producing present composition. Reroofed, —. Now disused. Replacement pitched artificial slate roof with ridge tiles, red brick Running bond chimney stacks having stepped capping supporting terracotta pots, and uPVC rainwater goods on rendered slate flagged eaves. Rendered, ruled and lined battered walls. Square-headed door opening with concealed dressings framing glazed timber panelled door. Square-headed window openings with rendered sills, and concealed dressings framing two-over-two timber sash windows having part exposed sash boxes. Set back from line of road with rendered piers to perimeter having pyramidal capping supporting wrought iron double gates.

Appraisal

A farmhouse representing an integral component of the domestic built heritage of County Wexford with the architectural value of the composition suggested by such attributes as the compact plan form; the feint battered silhouette; the somewhat disproportionate bias of solid to void in the massing compounded by the diminishing in scale of the openings on each floor producing a graduated visual impression; and the high pitched roof: meanwhile, aspects of the composition clearly illustrate the continued linear development of the farmhouse in the later nineteenth century. Having been well maintained, the elementary form and massing survive intact together with substantial quantities of the original fabric, thus upholding the character or integrity of the composition. Furthermore, adjacent outbuildings (extant 1904) continue to contribute positively to the group and setting values of a neat self-contained ensemble making a pleasing visual statement in a rural street scene.

Plate 11.1: NIAH 15701005 /RPS WCC1046.

A second Protected Structure, Charlesfort House (RPS WCC1045, NIAH 15701006), is situated just in excess of 100m from the existing grid connection route at Ballaman townland (see section 11.3.2.2 and 11.3.2.3 below).

Plate 11.2: NIAH 15701006 / RPS WCC1045, Charlesfort House.

Figure 11.4: NIAH structure within 100m of existing grid connection route.

11.3.2.2 NIAH Garden Survey

The existing grid connection route extends through the demesne associated with Charlesfort House which is also listed in the NIAH garden survey. The demesne, house and gardens are depicted on the 1st edition OS map (see section 11.3.2.3 below). The house is both a Protected Structure and listed in the NIAH.

Figure 11.5: Historic garden associated with Charlesfort House in relation to the existing grid connection.

11.3.2.3 Review of Cartographic Sources

A review of the available historic cartographic sources for the area including the available Down Survey barony maps (1655-1658), and first and second edition OS maps was undertaken for any items of architectural or cultural heritage merit which may not appear in any records such as the NIAH or RPS.

The Down survey Barony map for Scarwalsh through which the grid connection extends was reviewed. A description of the barony in the mid-17th century is provided as follows:

The Barony of Scarwelch in the County of Wexford Is bounded on the east and south east with the Barrony of Gory on the south and south west with the Barronyes of Ballagheene and Bantry and the River Wren and Knaggin on the west and northwest with a long range of mountains and the brook of Clodagh and Dirry running between the Counties of Catherlagh and the County of Wexford and on the North with the County of Wicklow. The soyle in generall is equal (if not exceeding) any in the County of Wexford for fruitfulness well stored with wood and water. The River Slane runs almost through the middle of it. It hath very few castles and houses and those ruined. It contains these ensuing parishes viz: Cloyne, Fearnes, part of Carnow, Killrush, Macoyne and Templeshanvogh.

The available parish maps were also reviewed and in general do not show many features such as houses or castles. The map and associated terrier for Kilrush and Carnowe parishes notes the presence of a castle and church at 'Burrish, Kiltilly and Knocktory' which would seem to refer to 'Borris Castle' which is also indicated on the 1st edition OS map (1837-1842). The existing grid connection extends along the north side of Borris townland, c. 150m north of the aforementioned castle (Figure 11.6).

A number of fords and bridges are also indicated on the 1st and 2nd edition OS maps on the route of the existing grid connection, for example at Borris, Kiltilly and Ballycarney/Corah. As mentioned above, the gird route extends along the public road through what was the demesne associated with Charlesfort House (Figure 11.7).

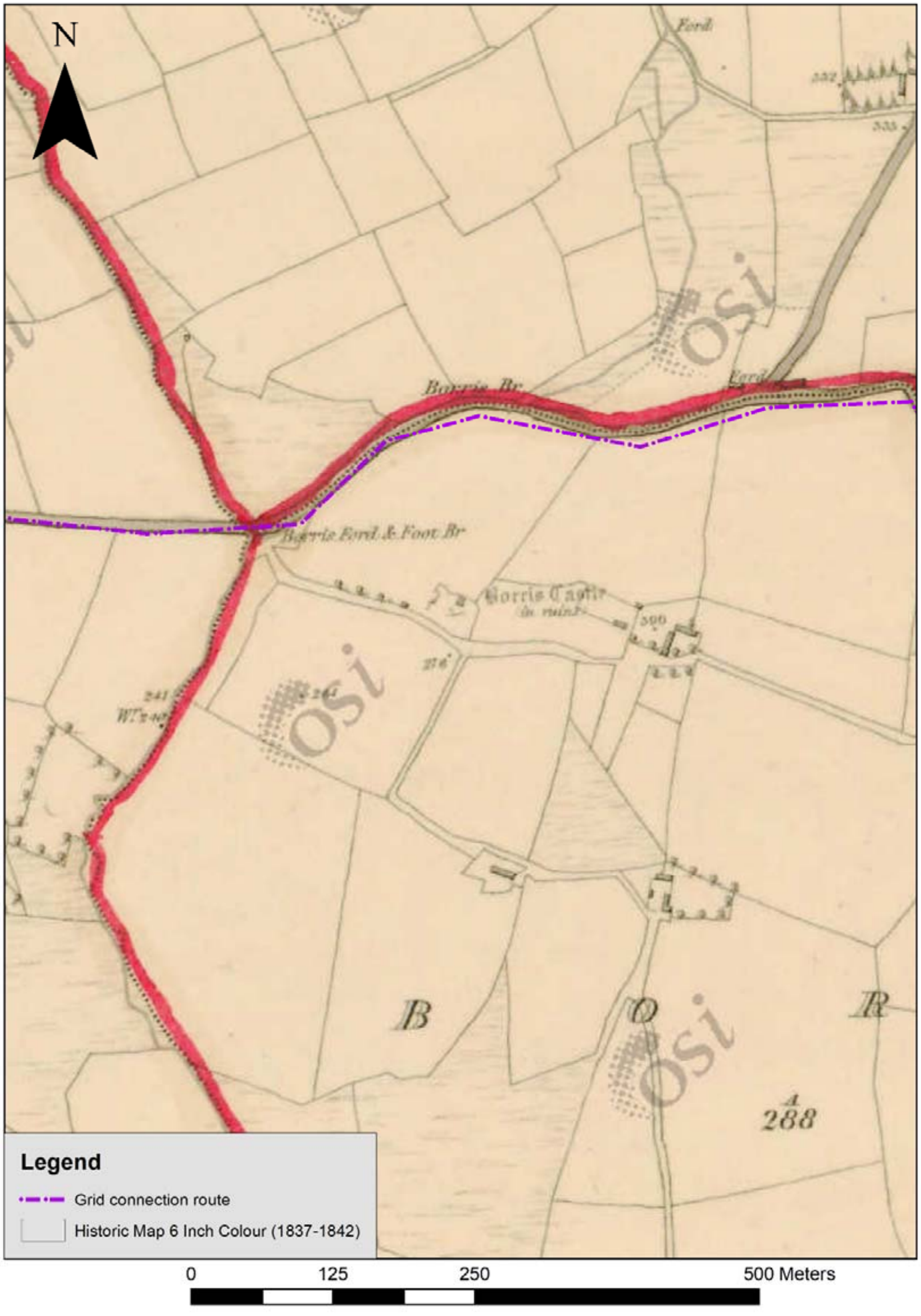


Figure 11.6: Grid connection route at Borris townland in relation to Borris Castle and Borris Ford.

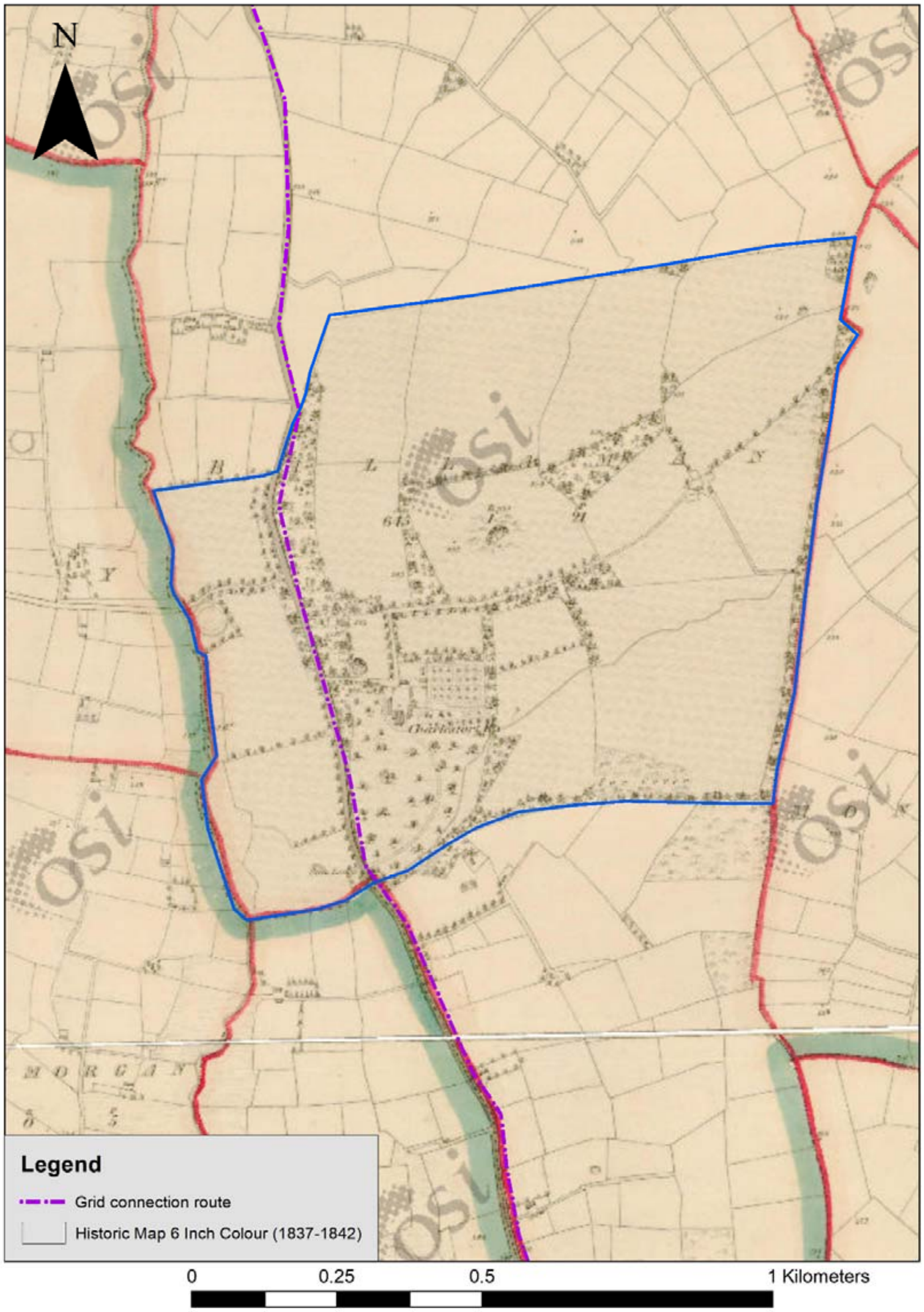


Figure 11.7: Grid connection route through demesne associated with Charlesfort House (outlined in blue).

11.4 Likely Significant Effects and Associated Mitigation Measures

11.4.1 Construction Phase Potential Impacts (Direct)

Direct Impact refers to a 'physical impact' on a monument or site. The construction phase of the development consisted of the excavation of a trench for the cable and/or pits for polesets.

11.4.1.1 Impact on National Monuments in State Care/Preservation Order

No national monuments in State Care or subject to a preservation order are located along the grid connection route. In this regard no direct impacts to this resource would have occurred as a result of ground works associated with the development.

11.4.1.2 Recorded Monuments

No recorded monuments are located within 100m of the existing grid connection route. No impacts to such monuments would therefore have occurred as a result of ground works associated with the development.

11.4.1.3 Protected Structures / NIAH

One NIAH/Protected structure (Reg. 15701005/ WCC1046) is located within 100m of the existing grid connection. It comprises a farmhouse set back slightly from the public road. No direct impacts to this structure would therefore have occurred as a result of the ground works associated with the grid connection.

11.4.1.4 Local Cultural Heritage

A review of the available historic cartographic sources for the area including the first edition and second edition OS maps was undertaken for any items of architectural or cultural heritage merit which may not appear in any records such as the NIAH or RPS. A number of bridges and fords are depicted on the historic mapping along the grid connection route where it extends along public roads. The cable would have been buried in the deck of such bridges or in the case of Corah Bridge directionally drilled beneath the river bed. These bridge structures are regarded as items of local cultural heritage merit but are not subject to any statutory protection.

11.4.2 Operational Phase Potential Impacts (Indirect)

Indirect impacts are where a feature or site of archaeological, architectural heritage merit or their setting is located in close proximity to a development. Indirect impacts here are mainly concerned with impacts on setting. Impacts on settings of sites may arise when a development is located immediately adjacent to a recorded monument or cluster of monuments or any cultural heritage asset. While the development may not physically impact on a site, it may alter the setting of a monument or group of monuments.

Potential impact to the visual amenity of a site or area and the significance of same is dependent on a number of factors regarding the sensitivity of the location or 'receptor' and the scale or magnitude of the proposed development. Similarly, the extent of the development and its duration and reversibility should all be considered (Guidelines for Landscape and Visual Impact Assessment 3rd edition – Consultation Draft).

The nature of the development (i.e. primarily underground cable) is such that no indirect effects on the setting of any cultural heritage constraints will have occurred. A short section of overhead line connects the underground cable to Crory 110 kV substation. No archaeological or cultural heritage constraints are located in the immediate vicinity of the OHL therefore impacts to the immediate setting of such constraints are not identified.

11.5 Cumulative Impacts

Cumulative impact is defined as 'The addition of many small impacts to create one larger, more significant, impact' (EPA 2002, 33). It is also defined as 'impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project' (EC 1999). Cumulative impacts encompass the combined effects of multiple developments or activities on a range of receptors. In this case the receptors are the archaeological monuments and architectural/cultural heritage sites in the immediate vicinity of the development. Cumulative Impacts at the Construction and Operational Stages are considered.

11.5.1 Cumulative Impacts (Direct Impacts)

The addition of other projects to the existing grid connection was considered in order to assess Cumulative Impacts. These include the existing Crory Group wind farms to which this grid connection relates. Archaeological monitoring of ground works associated with the construction phase of Gibbet Hill wind farm was carried out and did not result in the discovery of any archaeological remains or impacts to any known monuments. No information pertaining to archaeological monitoring of ground works associated with Ballycadden or Ballynancoran wind farms was available.

When the existing grid connection cable route is added to the aforementioned projects no increase in cumulative impacts on the cultural heritage resource is identified.

11.5.2 Cumulative Impacts (Indirect Impact on Setting)

Cumulative impacts on setting are more likely to occur at the operational stage of the development (i.e. post-construction). In this regard in order to assess overall cumulative effects on archaeology and cultural heritage the grid connection is considered in the context of other developments. The grid connection cable route is primarily underground with a short overhead section and has not resulted in any impacts on setting and therefore no cumulative impacts are identified.

11.6 Conclusion

This chapter comprises a remedial Environmental Impact Assessment Report (rEIAR) of the potential impact of the existing grid connection cable route for the existing Crory Wind Farm Group on the cultural heritage resource. Cultural heritage includes archaeology, architectural heritage and any other tangible assets. The assessment was based on GIS based mapping and a desktop analysis of all available baseline data.

All archaeological, architectural and cultural heritage constraints (items that are capable of being impacted) within 100m of either side of the grid connection route were assessed. No National Monuments or recorded monuments are located within 100m of the route therefore impacts to such assets are not identified. One NIAH/Protected Structure is located within 100m of the grid connection route, however, direct impacts to same as a result were not identified. Bridge crossings involved burying the cables within the deck of the bridge, except at Corah bridge where directional drilling beneath the streambed was utilised.

Given the primarily underground nature of the grid connection impacts to setting of any cultural heritage assets are not identified.

An assessment of cumulative impacts was also undertaken taking into consideration projects in the vicinity, particularly the Crory Wind Farm Group. No residual direct impacts or direct cumulative impacts as a result of the existing grid connection have been identified, although information pertaining to archaeological monitoring of ground works at Ballycadden or Ballynancoran wind farms was not available.

11.7 References

Architectural Heritage Guidelines for Planning Authorities (2011)

Department of Arts, Heritage, Gaeltacht and the Islands, 1999, Framework and Principles for the Protection of the Archaeological Heritage, 1999.

Guidelines on the information to be contained in Environmental Impact Statements, EPA 2017.

Wexford County Development Plan 2013-2019

Other Sources

Record of Monuments and Places (RMP) for County Wexford.

1st Edition 6 inch OS maps

2nd Edition 25 inch OS maps

www.webgis.archaeology.ie/historicenvironment

www.excavations.ie

www.buildingsofireland.ie

12. MATERIAL ASSETS

12.1 Traffic and Transport

The purpose of this section is to assess the retrospective traffic impact of the grid connection on the surrounding road network.

12.1.1 Receiving Environment

The majority of grid connection route is located within the existing road network. Within the public road network the cable route is located entirely within local routes (predominantly local secondary roads) with the exception of a single crossing of a regional road (R745).

The grid connections total approximately 28 kilometres in length and take the following route from the wind farms to the Crory substation: From the Knocknalour Wind Farm the grid connection cable route emerges from the site onto the public road at Grid Reference Coordinate E298,402 N159,504 (Irish National Grid). From this point the underground cable route runs south along the L-5114, the L-5143, the L-5141, the L-5133, the L-5132, and the L-6072 crossing the R-745 at Grid Reference Coordinate E298,499 N149,371. The cable route leaves the public road at approximately Grid Reference Coordinate E298,662 N148,494 and runs west across farm fields to terminate at the Crory 110kV Substation. The western spur that serves the Gibbet Hill Wind Farm enters the public road at approximately Grid Reference Coordinate E294,526 N157,843 and runs east along the L-1017 before joining the cable from Knocknalour at the junction with the L-5143 at Ballyroebuck. The eastern spur that serves the Ballycadden Wind Farm joins the L-1017 at approximately Grid Reference Coordinate E299,626 N155,319 and runs east along this road before turning south and following the L-5138 southwest to the junction with the L-5141 at Tombrack. All the lines continue from this point south to the substation in the same trench.

12.1.2 Likely, Significant Impacts, Associated Mitigation Measures, and Residual Effects

12.1.2.1 Construction Phase

There was the potential for short term nuisance to local road users and residents along the grid connection cable route during the construction phase. Mitigation measures were put in place to minimise the nuisance to road users and residents.

Mitigation Measures Implemented

A road opening licence was issued by Wexford County Council for the works within the public road network. All works were conducted in compliance with the traffic management measures required as a condition of the license. This ensured that access to homes and properties was maintained throughout the duration of the construction phase.

Residual Impacts

Temporary, slight, negative impacts on traffic and transportation during the construction phase of the project.

Significance of the Effects

Based on the assessment above there was **No Significant Effect** on traffic and transport as a result of the construction phase of the project.

12.1.2.2 Operational Phase

The grid connection will not generate any additional traffic during the operational phase. Therefore, **No Significant Effects** on traffic or transport are anticipated in association with the operation of the grid connection. In the unlikely event that maintenance or repair work on the cable are required, this could result in an **unlikely, imperceptible, neutral, brief effect** on local traffic.

12.1.2.3 Cumulative Impacts

The potential cumulative impacts and associated effects between the grid connection and the projects described in Section 2.9 of this rEIAR, hereafter referred to as the other projects, have been considered in terms of traffic and transport.

The relatively short duration of the construction phase of grid connection, and the short duration of the construction phases of the wind farms resulted in, at worst, a **temporary, slight, negative local effect** in relation to traffic and transport.

There are **No Significant Cumulative Effects** in relation to traffic and transport associated with the operational phase of the grid connection and wind farms.

12.2 Telecoms and Other Services

12.2.1 Cable Installation Methodology

The construction methodology detailed in Section 3.3 of this rEIAR describes the manner in which the cable was installed in the curtilage of the public road. Prior to works, the area where excavations were planned was surveyed and all existing services were identified. All relevant bodies i.e. ESB, Bord Gáis, Eir, Wexford County Council etc. were contacted and all drawings for all existing services sought.

Any underground services encountered along the cable routes were surveyed for level and the ducting was designed to pass over the service provided adequate cover is available. A minimum clearance of 300 mm was required between the bottom of the ducts and the service in question. Where the clearance could be achieved the ducting was designed to pass under the service and again 300 mm clearance between the top of the ducts and bottom of the service was achieved. All works were in compliance with the Eirgrid/ESB Networks specifications current at the time of construction.

12.2.2 Likely, Significant Impacts, Associated Mitigation Measures, and Residual Effects

12.2.2.1 Construction Phase

There was the potential for short-term nuisance to users of local networks and services that may be accommodated underground within the existing road corridor during the construction of the underground cabling duct work. The construction of the underground cable did not adversely affect any above ground telecommunications networks.

Mitigation Measures Implemented

The mitigation measures taken to ensure that the construction of the grid connection did not have any adverse effect on any service networks in the vicinity include the following:

- The grid connection corridor was surveyed and all existing services were identified prior to commencement of any works.
- Liaison occurred with the Local Authority including all the relevant area engineers to ensure all services are identified.
- Existing services were left in-situ and the cable crossed underneath the existing services, thus avoiding disruptions in service.

Residual Impacts

The construction methodology for the cable installation, and the mitigation measures described above ensured that the residual impact of the grid connection construction on telecoms and other services were at worst **brief, imperceptible, and of neutral effect.**

Significance of the Effects

Based on the assessment above there was **No Significant Effect** on telecoms and other services.

12.2.2.2 Operational Phase

There are no operational phase impacts or associated effects on telecoms or other services associated with cable route.

12.2.2.3 Cumulative Effects

The potential cumulative impacts and associated effects between the grid connection and the projects described in Section 2.9 of this rEIAR, hereafter referred to as the other projects, have been considered in terms of telecoms and other services.

The measures outlined in Section 12.2.2.1 above eliminated any potential for cumulative effects in relation to telecommunications and other services during the construction phases of the grid connection and the other projects.

There are no cumulative operational phase effects in relation to telecommunications and other services.

13. INTERACTION OF EFFECTS

13.1 Introduction

The preceding Chapters 4 to 12 of this rEIAR identify the potential significant environmental effects that may have occured in terms of Population and Human Health, Biodiversity (Flora and Fauna, Birds), Land, Geology and Soils, Water, Air and Climate, Noise and Vibration, Landscape and Visual, Cultural Heritage and Material Assets, as a result of the development. All of the potential significant effects of the proposed development and the measures implemented to mitigate them have been outlined in the preceding sections of this EIAR. However, for any development with the potential for significant environmental effects there is also the potential for interaction between these potential significant effects. The result of interactive effects may exacerbate the magnitude of the effects or ameliorate them, or have a neutral effect.

A matrix is presented in Table 13.1 below to identify potential interactions between the various aspects of the environment already assessed in this EIAR. The matrix highlights the occurrence of potential positive or negative effects during both the construction (C) and operational (O) phases. The matrix is symmetric, with each environmental component addressed in the previous sections of this EIAR being placed on both axes of a matrix, and therefore, each potential interaction is identified twice.

Table 13.1 Interaction Matrix: Potential for Interacting Impacts

	Phase	Population & Human Health	Biodiversity, Flora & Fauna	Land, Soils & Geology	Water	Air & Climate	Noise & Vibration	Landscape & Visual	Cultural Heritage	Material Assets
Population, Human Health	C									
	O									
Biodiversity, Flora & Fauna	C									
	O									
Land, Soils & Geology	C									
	O									
Water	C									
	O									
Air & Climate	C									
	O									
Noise & Vibration	C									
	O									
Landscape & Visual	C									
	O									
Cultural Heritage	C									
	O									
Material Assets	C									
	O									

Legend: **No Interacting Effect:** **Positive Effect:** **Neutral Effect:** **Negative Effect:**

The potential for interaction of effects has been assessed as part of the Impact Assessment process. While the work on all parts of the Remedial Environmental Impact Assessment Report (rEIAR) were not carried out by MKO, the entire project and all the work of all sub-consultants was managed and coordinated by the company. This rEIAR was edited and collated by MKO as an integrated report of findings from the impact assessment process, by all relevant experts, and effects that potentially interact have been assessed in the individual chapters of the EIAR above.

13.2 Impact Interactions

13.2.1 Population and Human Health

Population and Human Health and Air & Climate / Noise

The construction phase had the potential to create noise and dust, which could create a temporary nuisance for occupants of nearby dwellings. The presence of these works in any one area was short-term and transient in nature.

Population and Human Health and Water

The construction phase of the proposed development had the potential to give rise to some water pollution as a result of site activities, and any water pollution could affect other users of that water within the catchment. Mitigation measures ensured that no significant impacts occurred. Field reviews of the site and adjacent water courses revealed no evidence of any water pollution as a result of the construction and operation of the subject development.

Population and Human Health and Traffic

The construction phase of the proposed development will have given rise to some temporary disruption of traffic movements, and created some short-term inconvenience for other road users. The presence of these works in any one area was short-term and transient in nature. There was therefore, no significant effects on population and human health as a result of traffic generated, or disrupted by the construction of the subject development.

Population and Human Health and Landscape

The construction phase of the proposed development resulted in the introduction of construction machinery into a highly modified landscape. The presence of these works in any one area was very short-term and transient in nature. All surfaces were reinstated to their original condition after installation of the ducts, there was no changes to land-cover or visual appearance of the site. Therefore, the proposed development will have no effect on landscape during its operational phase.

13.2.2 Biodiversity, Flora and Fauna

Biodiversity, Flora & Fauna and Water

Site activities during the construction phase had the potential to give rise to some water pollution, and consequential impacts on flora and fauna that use that water within the same catchment. Mitigation measures were put in place to ensure that no significant impacts occurred. Field reviews of the site and adjacent water courses revealed no evidence of any water pollution as a result of the construction and operation of the subject development.

Biodiversity, Flora & Fauna and Noise and Vibration

Site activity during the construction phase gave rise to some noise that could be a nuisance for fauna. The presence of these works in any one area was very short term and transient in nature. Given the limited construction activities undertaken, and the short time frame involved, there were no significant impacts on biodiversity as a result of noise generated by the construction phase of the subject development.

13.2.3 Hydrology and Hydrogeology

Water and Land, Soils & Geology

The movement and removal of soils, overburden and rock during the construction phase had the potential to give rise to negative impacts on water quality through the potential discharge of sediment to surface waters. Mitigation measures were put in place to ensure that there were no impacts to surface waters as a result of the construction phase of the project. There are no effects or interactions associated with the operational phase.

13.2.4 Air and Climate / Noise

Air & Climate/Noise and Material Assets

The movement of construction vehicles both within and to and from the site had the potential to give rise to noise and dust nuisance during the construction phase. The presence of these works in any one area will be very short term and transient in nature and will therefore not result in a significant negative impact on Air and Climate or the Noise environment.

Air & Climate/Noise and Land, Soils & Geology

The movement and removal of soils, overburden and rock during the construction phase had the potential to give rise to noise and dust impacts. The presence of these works in any one area was very short term and transient in nature. Therefore, there was no significant negative effects on Air and Climate or the Noise environment.

13.3 Mitigation and Residual Impacts

Where any potential interactive negative impacts have been identified in the above, a description of the mitigation measures that were implemented has been included in the relevant sections (Chapters 4-13) of the rEIAR. The implementation of these mitigation measures reduced or removed the potential for these effects. Information on measured residual effects, and their significance, is also presented in each relevant chapter.

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APPENDIX 2-1

SCOPING RESPONSES

MKO
Tuam Road
H91 VW84
County Galway

27 November 2019

Re: Crory Wind Farm Group (CWFG) Grid Connection, Co. Wexford

Your Ref: 190806
Our Ref: 19/260

Thomas, a chara,

With reference to your email received on 14 November 2019, concerning the Crory Wind Farm Group (CWFG) Grid Connection, Co. Wexford, Geological Survey Ireland (a division of Department of Communications, Climate Action and Environment) would like to make the following comments:

Geological Survey Ireland is the national earth science agency and has datasets on Bedrock Geology, Quaternary Geology, Geological Heritage Sites, Mineral deposits, Groundwater Resources and the Irish Seabed. These comprise maps, reports and extensive databases that include mineral occurrences, bedrock/mineral exploration groundwater/site investigation boreholes, karst features, wells and springs. Please see our website for data availability and we recommend using these various data sets, when undergoing the planning and scoping processes. Geological Survey Ireland should be referenced to as such and should any data or geological maps be used, they should be attributed correctly to Geological Survey Ireland.

Geological Survey Ireland thanks you for your correspondence and there are no comments to be made at this stage.

However, if the proposed development plan is altered, please contact myself or my colleague, Clare Glanville (Clare.Glanville@dccae.ie) for further information and possible mitigation measures if applicable.

If we can be of any further help, please do not hesitate to contact me, or my colleague Clare Glanville.

Le meas,

Amrine Dubois Gafar

Amrine Dubois Gafar
Geoheritage Programme

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Received
05 DEC 2019
190806
Thomas Blackwell

Mr. Thomas Blackwell
McCarthy Keville O'Sullivan Ltd.
Tuam road
Co. Galway
H91 VW84

Dáta | Date	Ár dTag | Our Ref.	Bhur dTag | Your Ref.
4 December 2019	**TII19-107979**	**190806**

RE: EIAR Scoping Request: Crory Wind Farm Group Grid Connection near Ferns, Co. Wexford

Dear Mr. Blackwell,

Thank you for your letter of 1 November 2019 regarding an EIAR scoping request in relation to the above proposed project. Transport Infrastructure Ireland's (TII) observations are outlined below.

National Strategic Outcome 2 of the National Planning Framework includes the objective to maintain the strategic capacity and safety of the national road network. It is also an investment priority of the National Development Plan, 2018 – 2027, to ensure that the extensive transport networks which have been greatly enhanced over the last two decades, are maintained to a high level to ensure quality levels of service, accessibility and connectivity to transport users.

The issuing of this correspondence is provided as best practice guidance only and does not prejudice TII's statutory right to make any observations, requests for further information, objections or appeals following the examination of any valid application referred.

The approach to be adopted by TII in making such submissions or comments will seek to uphold official policy and guidance as outlined in the Spatial Planning and National Roads Guidelines for Planning Authorities (2012). Regard should also be had to other relevant guidance available at www.TII.ie.

With respect to EIAR Scoping issues, the recommendations indicated below provide only general guidance for the preparation of remedial EIAR, which may affect the national road network. The developer should have regard, *inter alia*, to the following:

1. As outlined in the Spatial Planning and National Roads Guidelines, it is in the public interest that, in so far as reasonably practicable, the national road network continues to serve its intended strategic purpose. The EIAR should should identify the methods/techniques proposed for any works traversing/in proximity to the national road network in order to demonstrate that the development can proceed complementary to safeguarding the capacity, safety and operational efficiency of that network.
2. Consultations should be had with the relevant local authority/national road design office with regard to locations of existing and future national road schemes.
3. In relation to cabling and potential connection routing, the scheme promoter should note locations of existing and future national road schemes and develop proposals to safeguard proposed road schemes. In the context of existing national roads, alternatives to the provision of cabling along the national road network, such as alternative routing or the laying of cabling in private lands adjoining the national road, should be considered in

Próiseálann BIÉ sonraí pearsanta a sholáthraítear dó i gcomhréir lena Fhógra ar Chosaint Sonraí atá ar fáil ag www.tii.ie.
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the interests of safeguarding the investment in and the potential for future upgrade works to the national road network. The cable routing should avoid all impacts to existing TII infrastructure such as traffic counters, weather stations, etc. and works required to such infrastructure shall only be undertaken in consultation with and subject to the agreement of TII, with any costs attributable borne by the applicant/developer. The developer should also be aware that separate approvals may be required for works traversing the national road network.

4. Clearly identify haul routes proposed and fully assess the network to be traversed. Separate structure approvals/permits and other licences may be required in connection with the proposed haul route and all structures on the haul route should be checked by the applicant/developer to confirm their capacity to accommodate any abnormal load proposed.

5. Where appropriate, subject to meeting the appropriate thresholds and criteria and having regard to best practice, a Traffic and Transport Assessment be carried out in accordance with relevant guidelines, noting traffic volumes attending the site and traffic routes to/from the site with reference to impacts on the national road network and junctions of lower category roads with national roads. The Authority's Traffic and Transport Assessment Guidelines (2014) should be referred to in relation to proposed development with potential impacts on the national road network. The scheme promoter is also advised to have regard to Section 2.2 of the TII TTA Guidelines which addresses requirements for sub-threshold TTA.

6. TII Standards should be consulted to determine the requirement for Road Safety Audit (RSA) and Road Safety Impact Assessment (RSIA).

7. Assessments and design and construction and maintenance standards and guidance are available at TII Publications that replaced the NRA Design Manual for Roads and Bridges (DMRB) and the NRA Manual of Contract Documents for Road Works (MCDRW).

8. The developer, in conducting Environmental Impact Assessment, should have regard to TII Environment Guidelines that deal with assessment and mitigation measures for varied environmental factors and occurrences. In particular;

    a. TII's Environmental Assessment and Construction Guidelines, including the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (National Roads Authority, 2006),

    b. The EIAR should consider the Environmental Noise Regulations 2006 (SI 140 of 2006) and, in particular, how the development will affect future action plans by the relevant competent authority. The developer may need to consider the incorporation of noise barriers to reduce noise impacts (see *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (1st Rev., National Roads Authority, 2004)).

Notwithstanding any of the above, the developer should be aware that this list is non-exhaustive, thus site and development specific issues should be addressed in accordance with best practice.

I hope that the above comments are of use in your EIAR preparation.

Yours sincerely,

PP Mark Byrne

Michael McCormack
Senior Land Use Planner

IASCACH INTÍRE ÉIREANN
INLAND FISHERIES IRELAND

Thomas Blackwell
MKO consultants
Tuam Road
Galway
H91 VW84

Received
22 JAN 2020
190806
Thomas Blackwell.

21 January 2020

Environmental scoping request re Crory Wind Farm Group Grid Connection

Dear Mr. Blackwell,

My apologies for the delay in getting back to you.

With regard to your letter dated 1st November 2019 the grid connection route runs through the catchment area of 5 separate Slaney River tributaries, the Mine River, Ballycarney River, Ballingale River, Ballynabarney Stream and Clohamon Stream.
Salmon spawning is known to occur in the Mine, Ballingale and Ballycarney Rivers and while I don't have any specific fish survey data on the Ballynabarney and Clohamon streams, they both represent excellent salmonid nursery habitat and hold populations of brown trout.

All catchments are likely to hold populations of Brook Lamprey, while there is potential River lamprey spawning habitat in the Mine, Ballingale and Ballycarney Rivers.

All catchment would be expected to hold populations of European Eel.

Yours sincerely,

Donnachadh Byrne
Senior Fisheries Environmental Officer

Please note that any further correspondence regarding this matter should be addressed to Mr. Donnachadh Byrne, Senior Fisheries Environmental Officer, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24

An Roinn Cultúir,
Oidhreachta agus Gaeltachta
Department of Culture,
Heritage and the Gaeltacht

Your Ref: 190806 Crory Wind Farm Group Grid Connection Substitute Consent
Our Ref: **G Pre00290/2019**
(Please quote in all related correspondence)

12 December 2019

Thomas Blackwell,
Senior Environmentalist
MKO
Tuam Road,
Galway

Via email: tblackwell@mkoireland.ie

Re: Intention to apply for substitute consent under Section 177E of the Planning and Development Act, 2000, as amended for the Crory Wind Farm Group (CWFG) grid connection which is located west of Ferns in County Wexford and runs from four separate wind farms to the Crory 110 kV substation

A chara

On behalf of the Department of Culture, Heritage and the Gaeltacht, I refer to correspondence received in connection with the above.

Outlined below are heritage-related observations/recommendations of the Department under the stated heading.

Underwater Archaeology

As part of the appropriate cultural heritage assessment, all watercourses (rivers, river banks, streams, lakes or associated bridges, etc.) should also be archaeologically assessed by way of an Underwater Archaeological Impact Assessment (UAIA):

- The applicants shall engage the services of a suitably qualified and suitably experienced underwater archaeologist to carry out the UAIA.
- The UAIA shall include detailed bank and in-water archaeological assessment.
- The UAIA shall be licensed by the Department of Culture, Heritage and the Gaeltacht and a detailed method statement shall accompany the application.
- The UAIA shall comprise detailed desktop study, walkover survey and hand-held metal detection surveys.
- The UAIA is to be licensed and a detailed method statement shall accompany the licence application to the National Monuments Service section of this Department.
- Recommendations in the resultant UAIA section of the Cultural Heritage Assessment report shall include for further archaeological mitigation by way of

avoidance of any identified known or potential underwater cultural heritage (UCH) or further archaeological mitigation such as archaeological testing, should avoidance not be possible.

- The UAIA Report should be forwarded to the Department of Culture, Heritage and the Gaeltacht for consideration and further comment before any permission is granted for the proposed application.

The above observations/recommendations are based on the papers submitted to this Department on a pre-planning basis and are made without prejudice to any observations that the Minister may make in the context of any consultation arising on foot of any development application referred to the Minister, by the planning authority, in her role as statutory consultee under the Planning and Development Act, 2000, as amended.

You are requested to send further communications to this Department's Development Applications Unit (DAU) at **manager.dau@chg.gov.ie** (team monitored); if this is not possible, correspondence may alternatively be sent to:

The Manager
Development Applications Unit (DAU)
Department of Culture, Heritage and the Gaeltacht
Newtown Road
Wexford
Y35 AP90

Is mise, le meas

Sinéad O' Brien

Sinéad O' Brien
Development Applications Unit

APPENDIX 3-1

DETAILED SITE DRAWINGS

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Drawing Legend

Planning Application Boundary

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DRAWING TITLE:

Location Context Map

PROJECT TITLE: Crory Wind Farm Group Grid Connection

DRAWING BY: **Joseph O Brien**	CHECKED BY: **Jimmy Green**
PROJECT No.: **190806**	DRAWING No.: **190806 - 01**
SCALE: **1:50,000 @ A3**	DATE: **06.03.2020**
OS SHEET No.: **OS2814, OS2816, OS3014, OS3016**	

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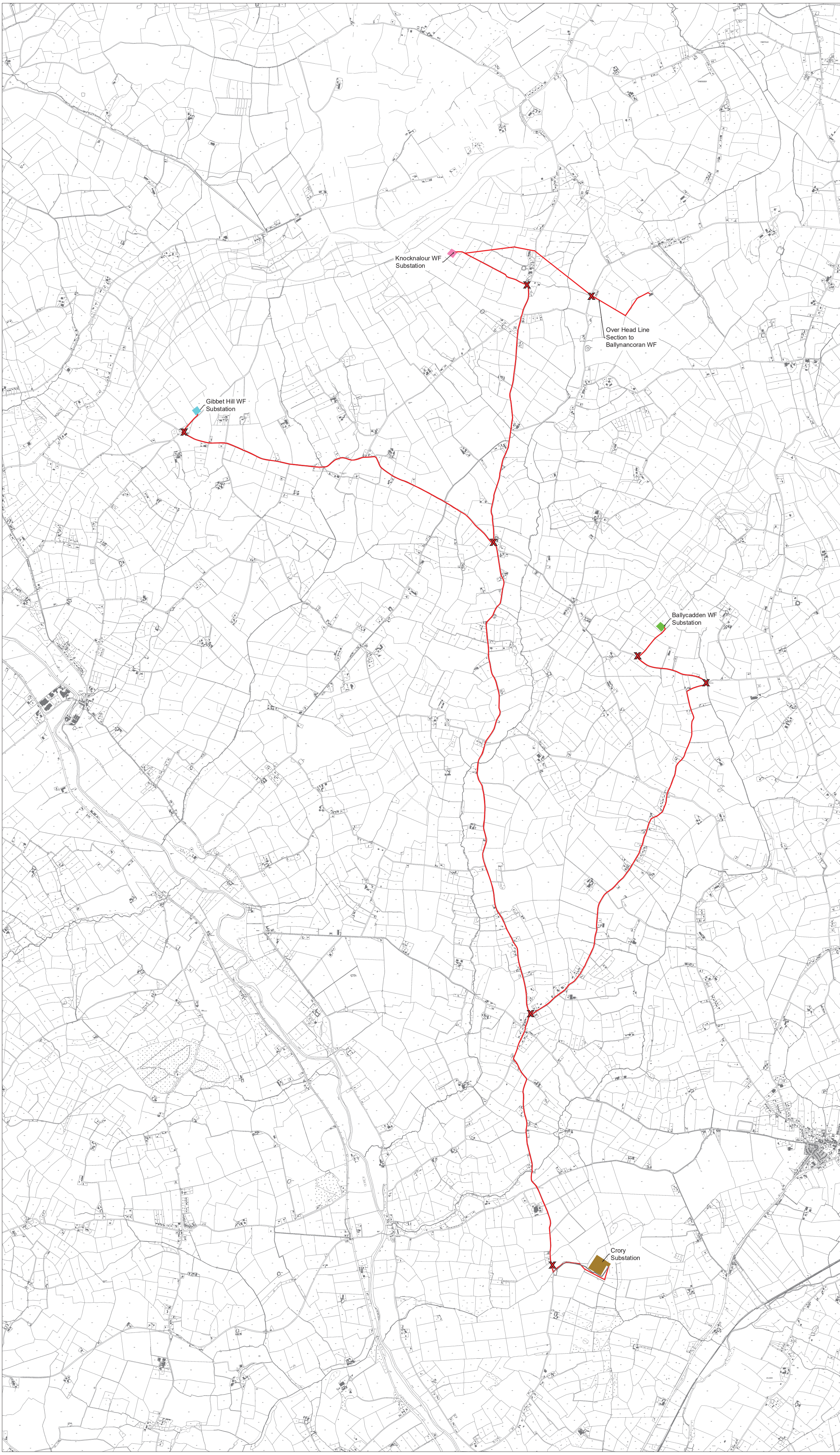

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Drawing Legend

- Planning Application Boundary
- Site Notice

DRAWING TITLE:

Site Notice Location Map

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 190806 - 02
SCALE: 1:20,000 @ A1	DATE: 06.03.2020

OS SHEET No.:
Works Areas in: 4716, 4717, 4778, 4779, 4838, 4839, 4901

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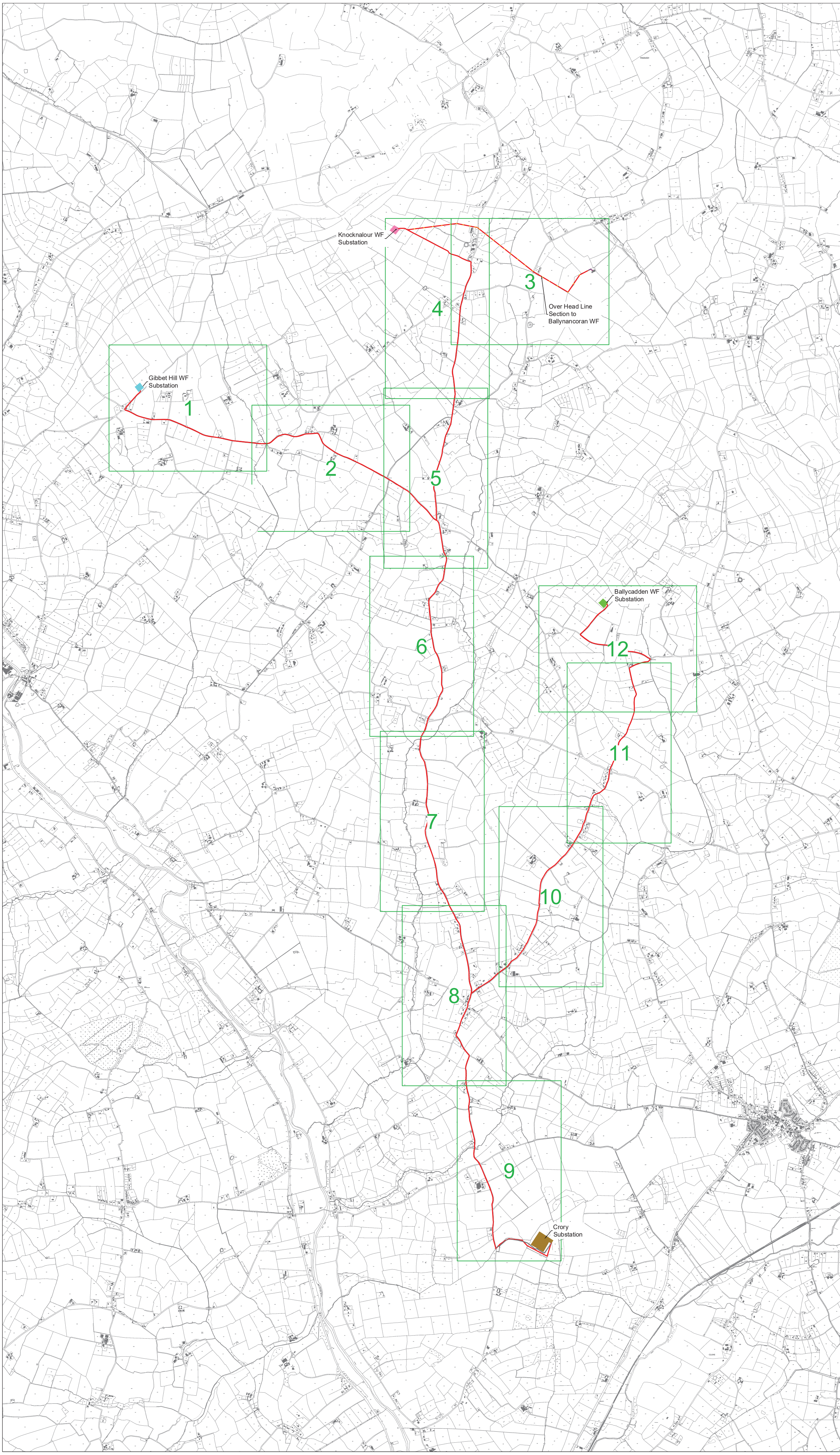

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Drawing Legend

- Planning Application Boundary
- Underground Grid Connection
- JB Joint Bay

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DRAWING TITLE:
Site Layout Key Plan

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: **Joseph O Brien**	CHECKED BY: **Jimmy Green**
PROJECT No.: **190806**	DRAWING No.: **190806 - 03**
SCALE: **1:20,000 @ A1**	DATE: **06.03.2020**

OS SHEET No.:
Works Areas in: 4716, 4717, 4778, 4779, 4838, 4839, 4901

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Drawing Legend

- Planning Application Boundary
- Underground Grid Connection
- JB Joint Bay
- Culvert/Water Crossing Point

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DRAWING TITLE:
Site Layout Plan - Sheet 1 of 12

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 190806 - 04
SCALE: 1:2,500 @ A1	DATE: 06.03.2020

OS SHEET No.:
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Drawing Legend

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- Underground Grid Connection
- JB Joint Bay
- Culvert/Water Crossing Point

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DRAWING TITLE:

Site Layout Plan - Sheet 2 of 12

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 190806 - 05
SCALE: 1:2,500 @ A1	DATE: 06.03.2020

OS SHEET No.:
Works Areas in: 4716, 4717, 4778, 4779, 4838, 4839, 4901

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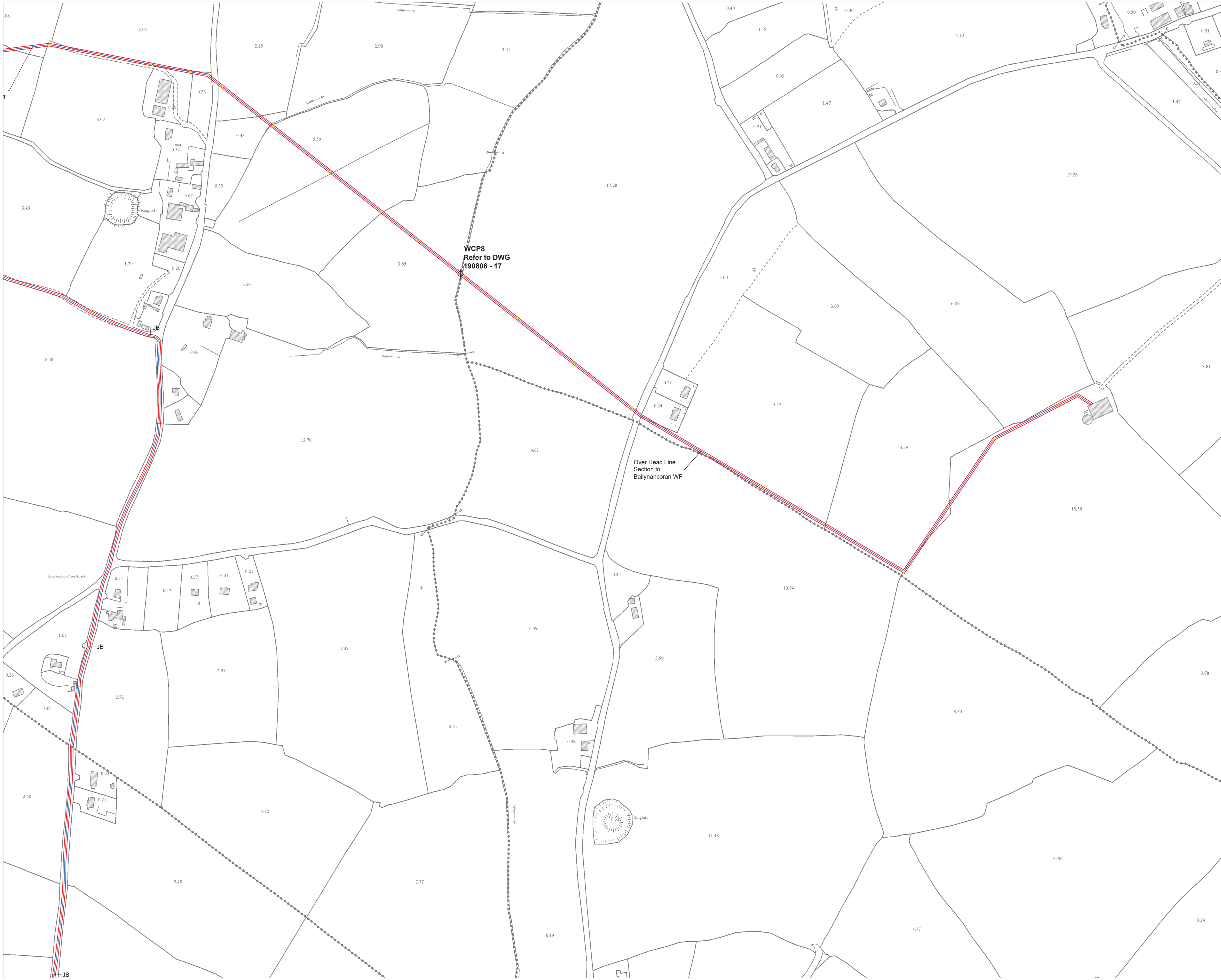

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Drawing Legend

- Planning Application Boundary
- Underground Grid Connection
- Overhead Line
- JB Joint Bay
- Polesets (Refer to DWG 4636-P-GC-200-02)

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DRAWING TITLE:

Site Layout Plan - Sheet 3 of 12

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 190806 - 06
SCALE: 1:2,500 @ A1	DATE: 06.03.2020

OS SHEET No.: Works Areas in: 4716, 4717, 4778, 4779, 4838, 4839, 4901

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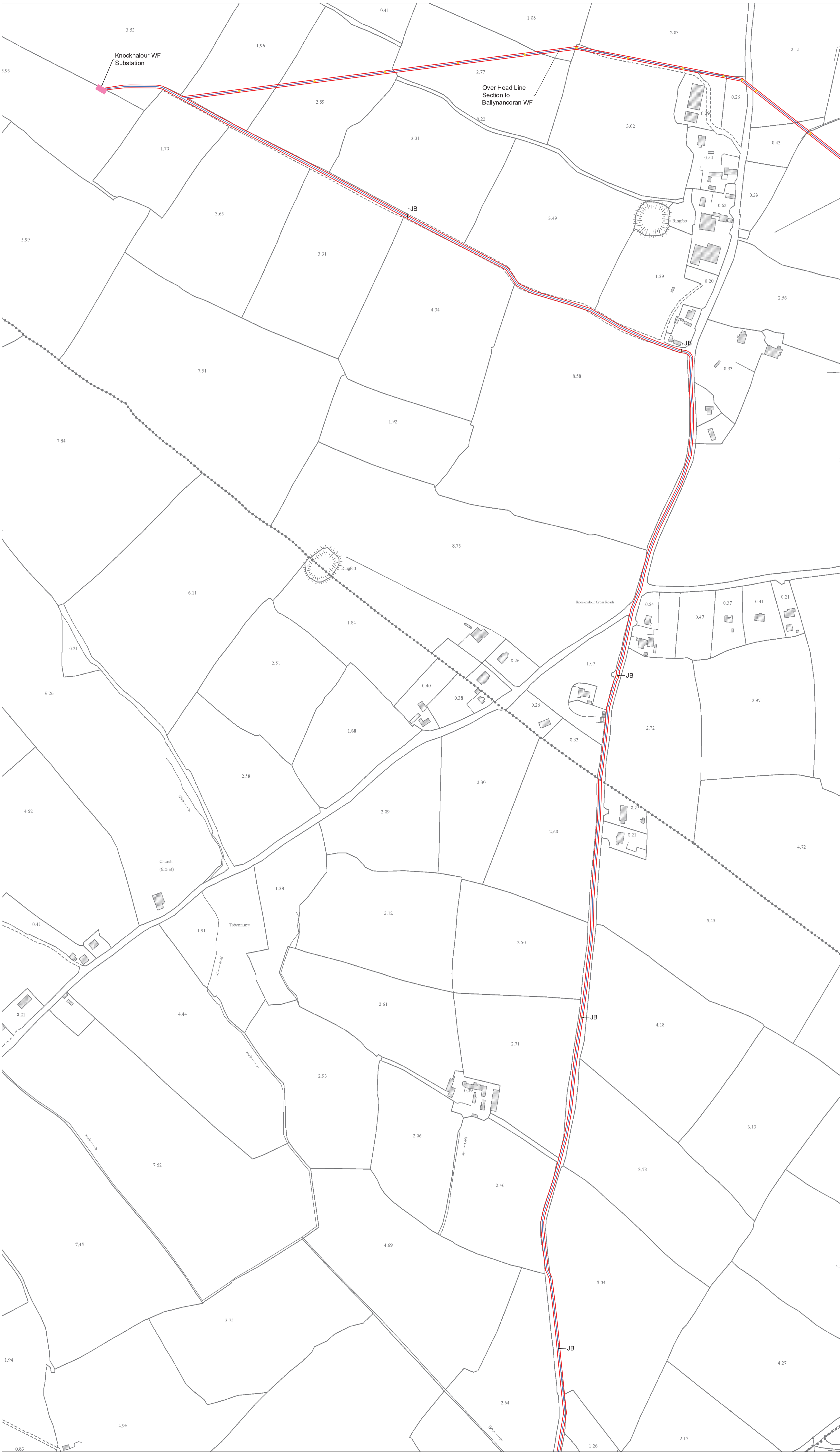

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Drawing Legend

- Planning Application Boundary
- Underground Grid Connection
- Overhead Line
- JB Joint Bay
- Polesets (Refer to DWG 4636-P-GC-200-02)

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DRAWING TITLE:
Site Layout Plan - Sheet 4 of 12

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: **Joseph O Brien**	CHECKED BY: **Jimmy Green**
PROJECT No.: **190806**	DRAWING No.: **190806 - 07**
SCALE: **1:2,500 @ A1**	DATE: **06.03.2020**

OS SHEET No.:
Works Areas in: 4716, 4717, 4778, 4779, 4838, 4839, 4901

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Drawing Legend

- Planning Application Boundary
- Underground Grid Connection
- JB Joint Bay
- Culvert/Water Crossing Point

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DRAWING TITLE:
Site Layout Plan - Sheet 5 of 12

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 190806 - 08
SCALE: 1:2,500 @ A1	DATE: 06.03.2020

OS SHEET No.:
Works Areas in: 4716, 4717, 4778, 4779, 4838, 4839, 4901

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Drawing Legend

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- JB Joint Bay
- Culvert/Water Crossing Point

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DRAWING TITLE:
Site Layout Plan - Sheet 6 of 12

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 190806 - 09
SCALE: 1:2,500 @ A1	DATE: 06.03.2020

OS SHEET No.:
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Drawing Legend

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- Underground Grid Connection
- JB Joint Bay
- Culvert/Water Crossing Point

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DRAWING TITLE:

Site Layout Plan - Sheet 7 of 12

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 190806 - 10
SCALE: 1:2,500 @ A1	DATE: 06.03.2020

OS SHEET No.:
Works Areas in: 4716, 4717, 4778, 4779, 4838, 4839, 4901

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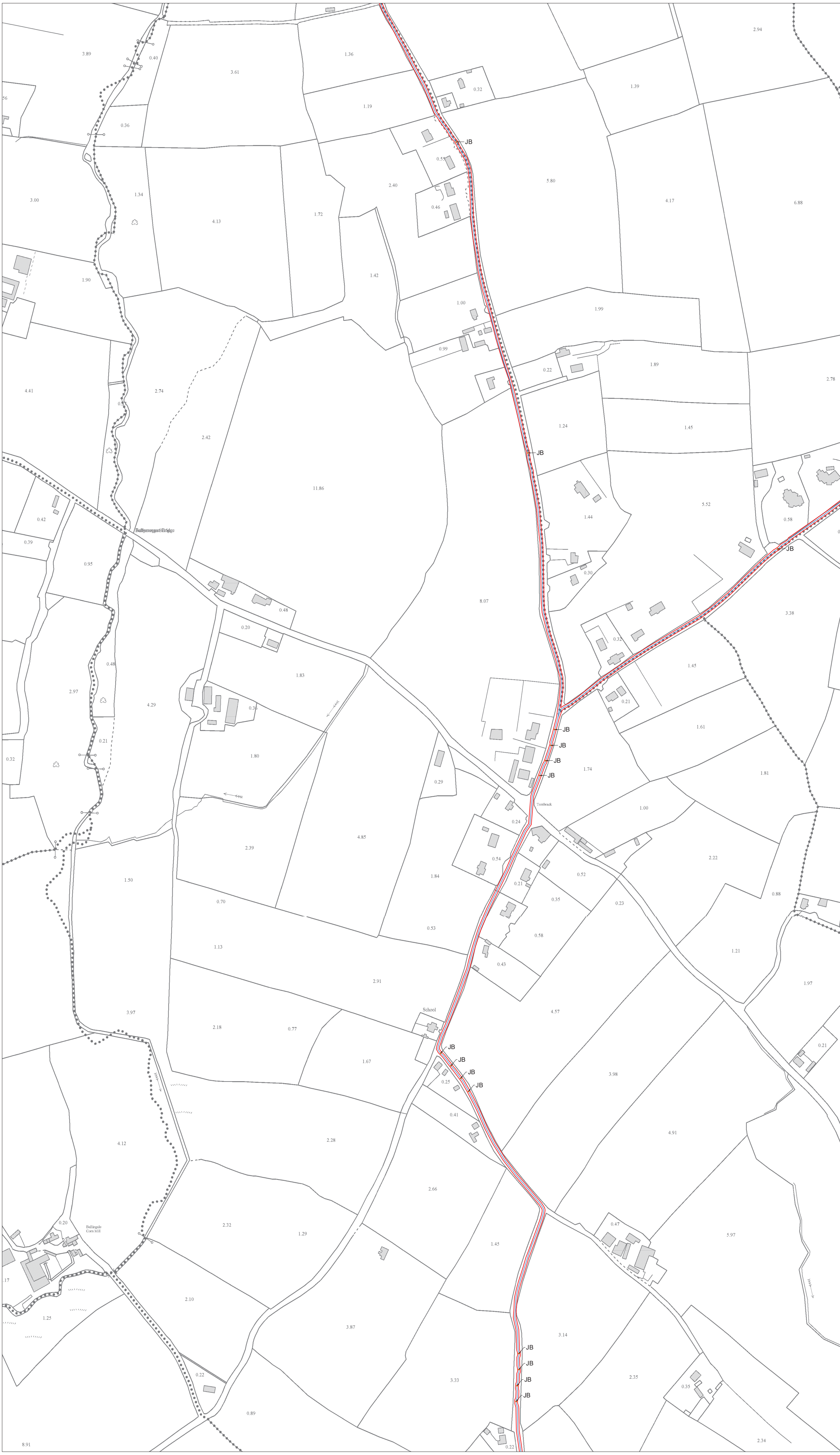

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Drawing Legend

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- Underground Grid Connection
- JB Joint Bay

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DRAWING TITLE:
Site Layout Plan - Sheet 8 of 12

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 190806 - 11
SCALE: 1:2,500 @ A1	DATE: 06.03.2020

OS SHEET No.:
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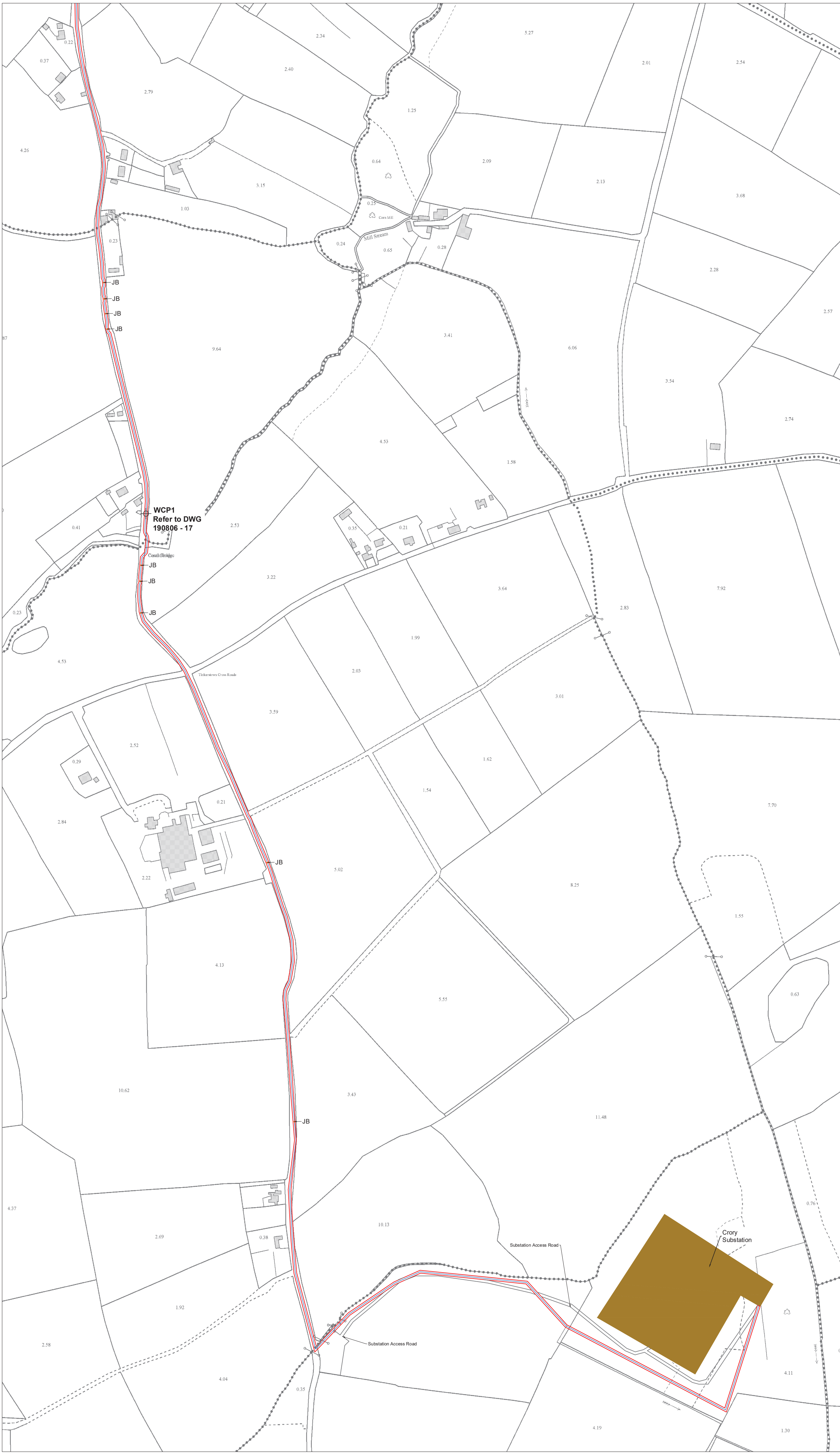

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Drawing Legend

- Planning Application Boundary
- Underground Grid Connection
- JB: Joint Bay
- Culvert/Water Crossing Point

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DRAWING TITLE:
Site Layout Plan - Sheet 9 of 12

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 190806 - 12
SCALE: 1:2,500 @ A1	DATE: 06.03.2020

OS SHEET No.:
Works Areas in: 4716, 4717, 4778, 4779, 4838, 4839, 4901

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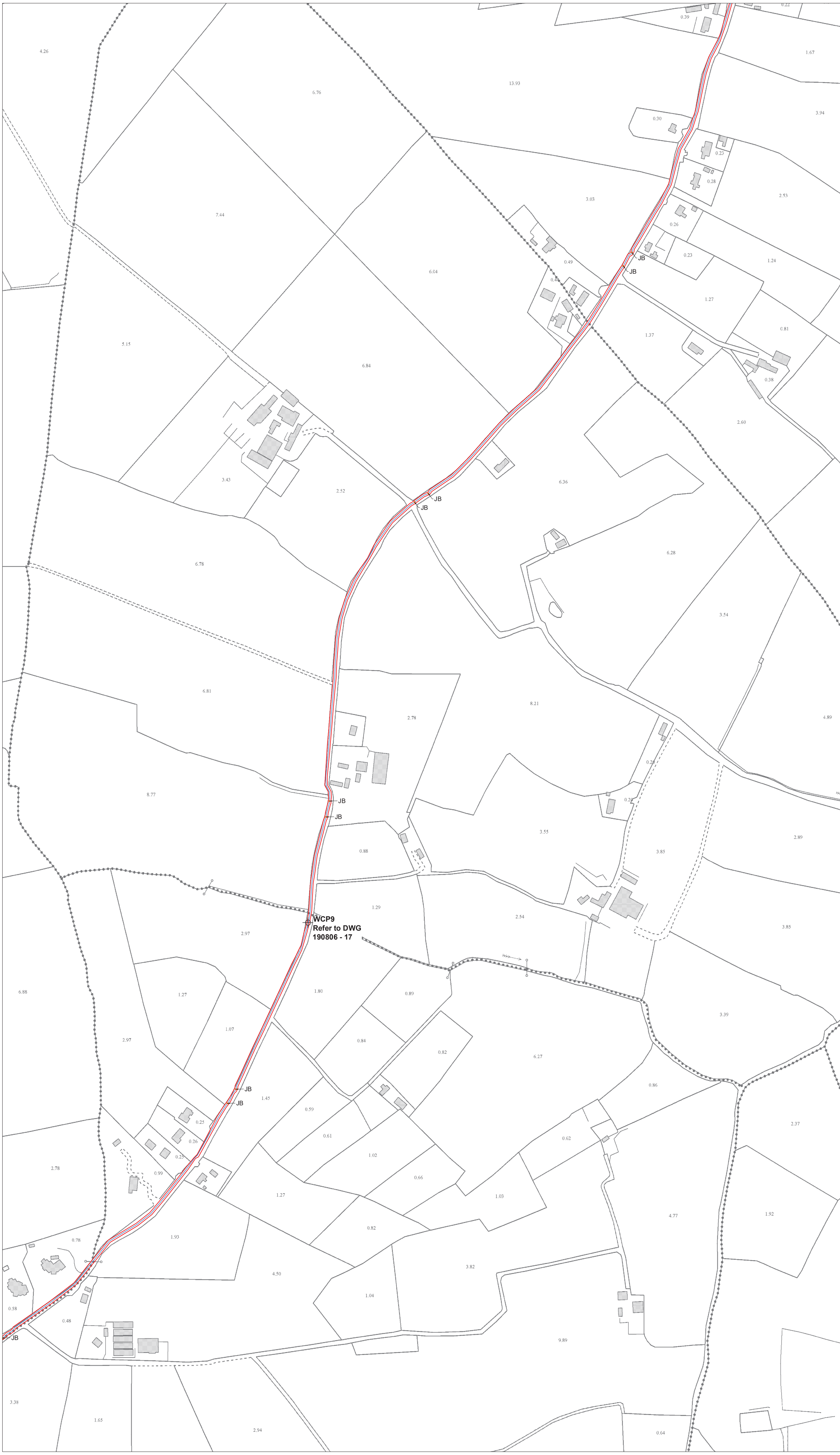

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Drawing Legend

- Planning Application Boundary
- Underground Grid Connection
- JB Joint Bay
- Culvert/Water Crossing Point

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DRAWING TITLE:
Site Layout Plan - Sheet 10 of 12

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 190806 - 13
SCALE: 1:2,500 @ A1	DATE: 06.03.2020

OS SHEET No.:
Works Areas in: 4716, 4717, 4778, 4779, 4838, 4839, 4901

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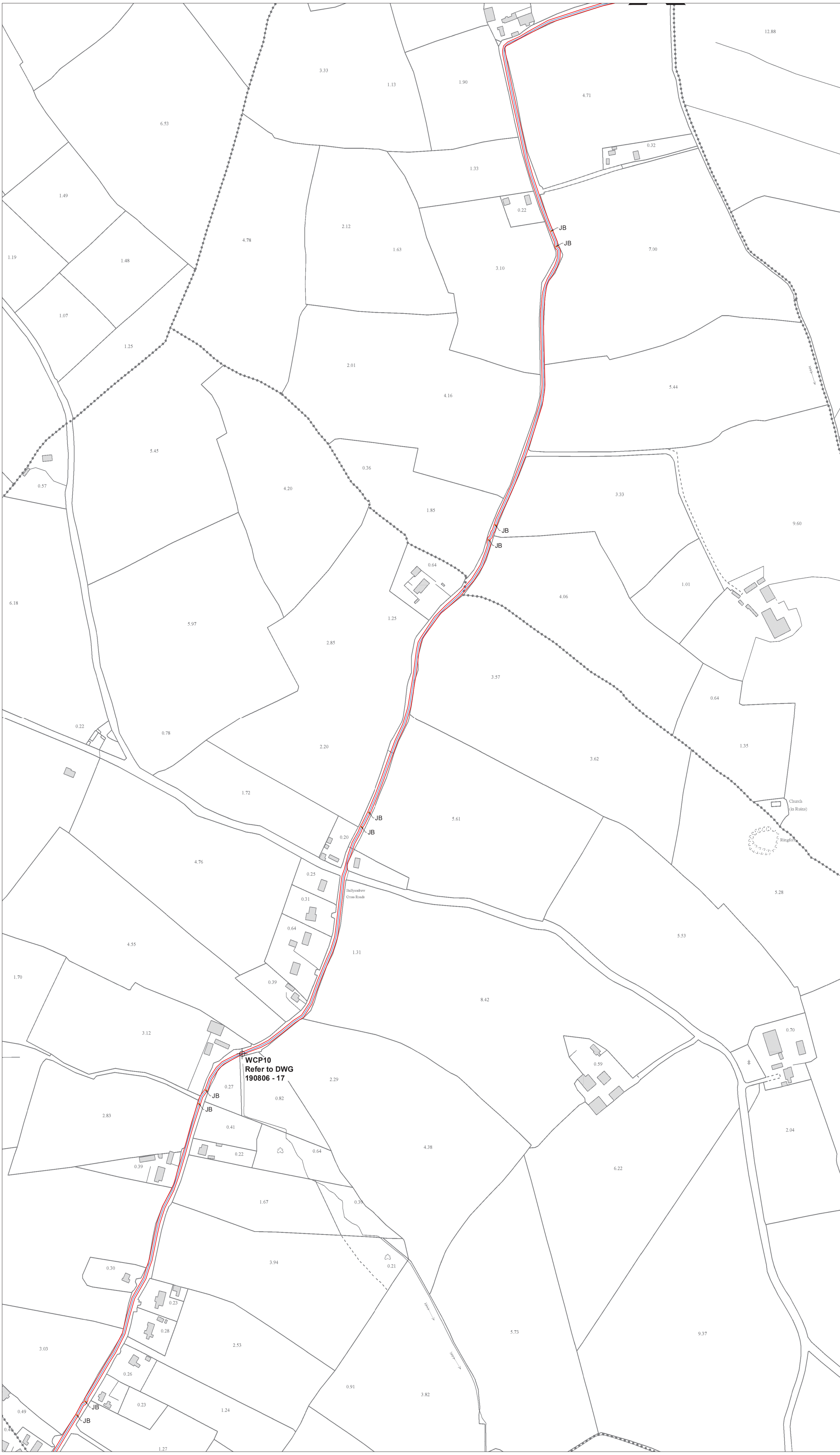

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Drawing Legend

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- Underground Grid Connection
- JB Joint Bay
- Culvert/Water Crossing Point

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N

DRAWING TITLE:

Site Layout Plan - Sheet 11 of 12

PROJECT TITLE:

Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 190806 - 14
SCALE: 1:2,500 @ A1	DATE: 06.03.2020

OS SHEET No.: Works Areas in: 4716, 4717, 4778, 4779, 4838, 4839, 4901

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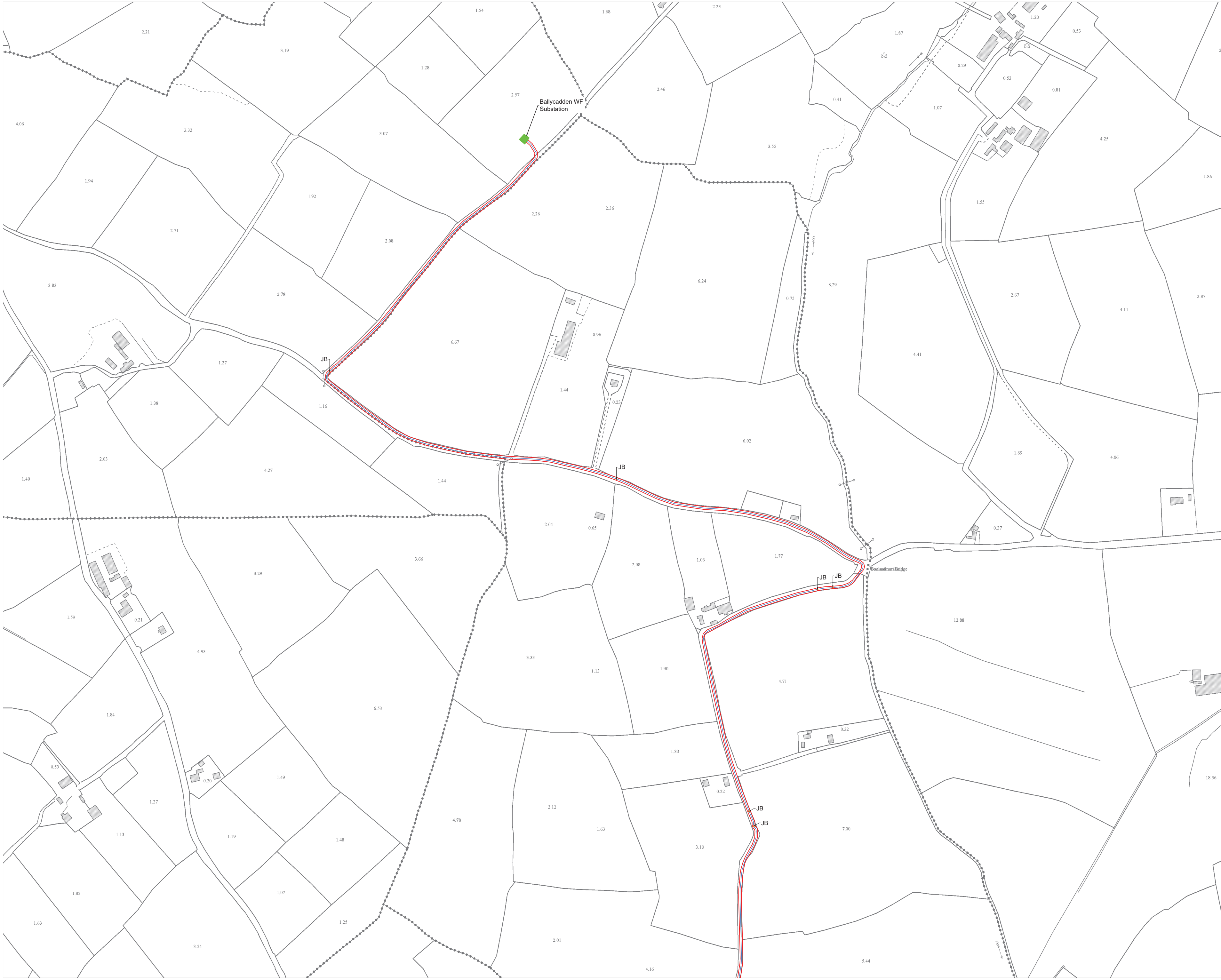

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Drawing Legend

- Planning Application Boundary
- Underground Grid Connection
- JB Joint Bay

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DRAWING TITLE:
Site Layout Plan - Sheet 12 of 12

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: **Joseph O Brien**	CHECKED BY: **Jimmy Green**
PROJECT No.: **190806**	DRAWING No.: **190806 - 15**
SCALE: **1:2,500 @ A1**	DATE: **06.03.2020**

OS SHEET No.: **Works Areas in: 4716, 4717, 4778, 4779, 4838, 4839, 4901**

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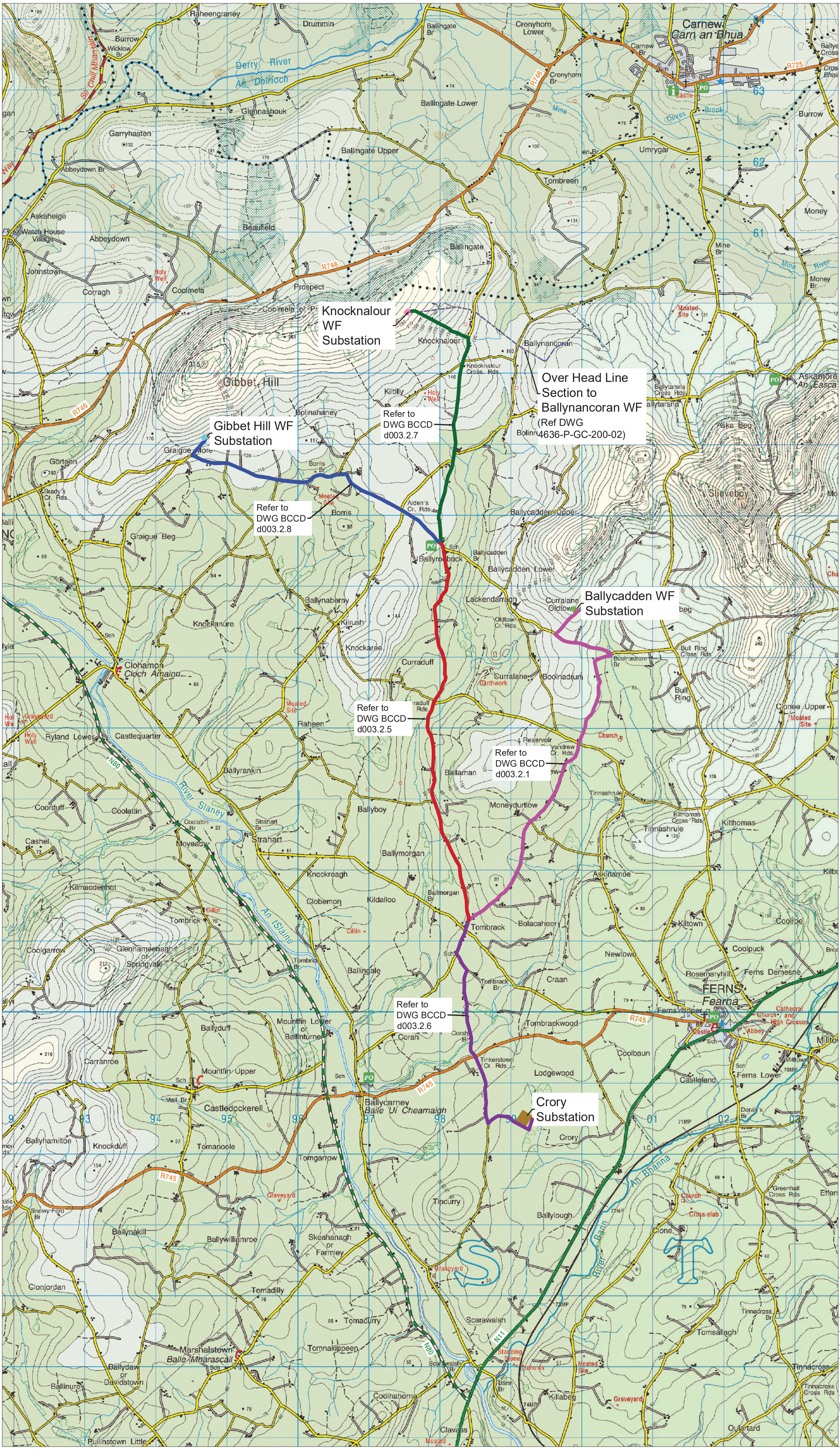

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Drawing Legend

- Overhead Line (Refer to DWG 4636-P-GC-200-02 for Polesets)
- Refer to DWG BCCD d003.2.1
- Refer to DWG BCCD d003.2.5
- Refer to DWG BCCD d003.2.6
- Refer to DWG BCCD d003.2.7
- Refer to DWG BCCD d003.2.8

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DRAWING TITLE:
Typical OHL Pole Set & Cable Ducting Reference Map

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 190806 - 16
SCALE: 1:50,000 @ A3	DATE: 06.03.2020
OS SHEET No.: OS2814, OS2816, OS3014, OS3016	

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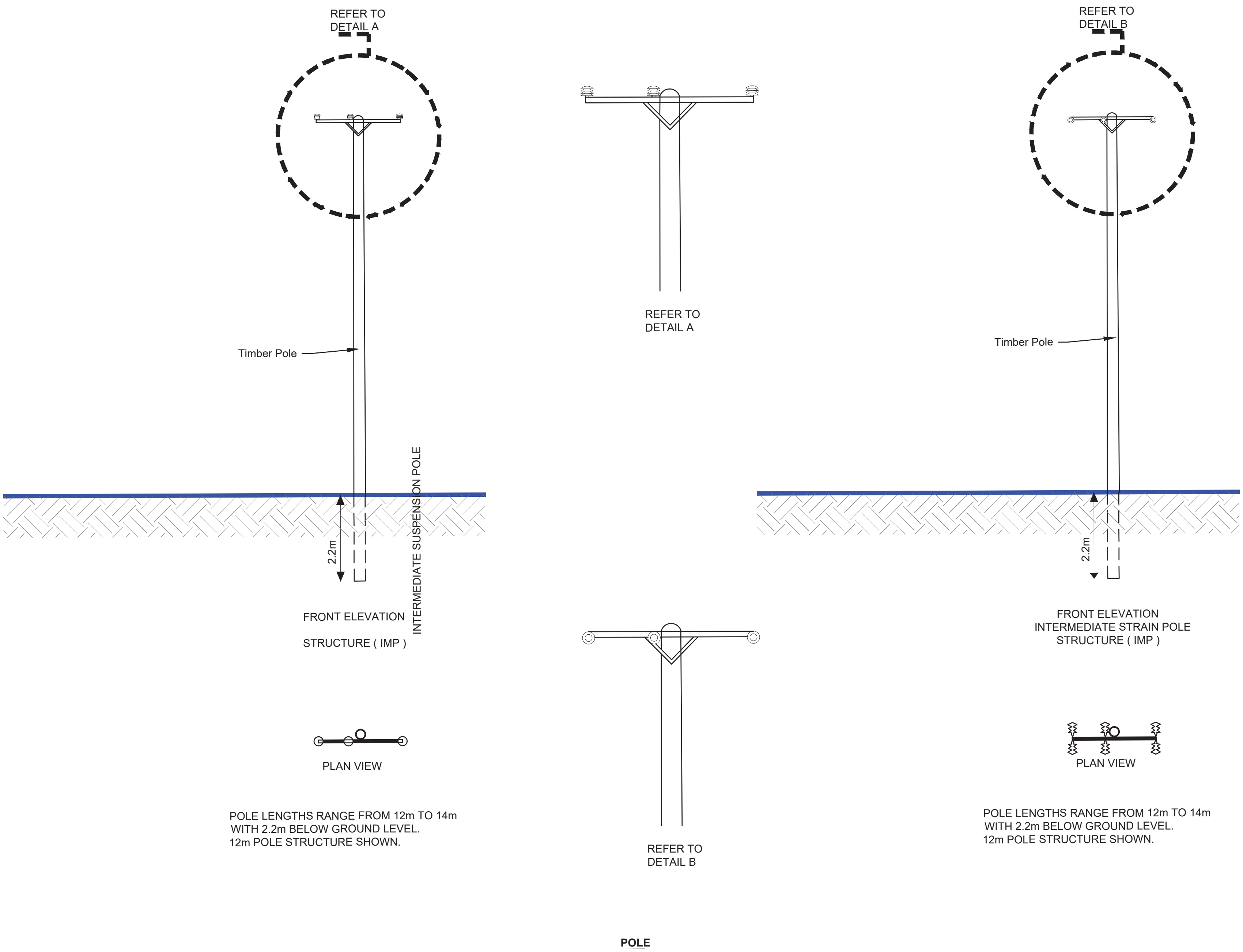

DRAWING TITLE:

Typical Polesets

Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 4636-P-GC-200-02
SCALE: 1:100 @A3	DATE: 06.03.2020

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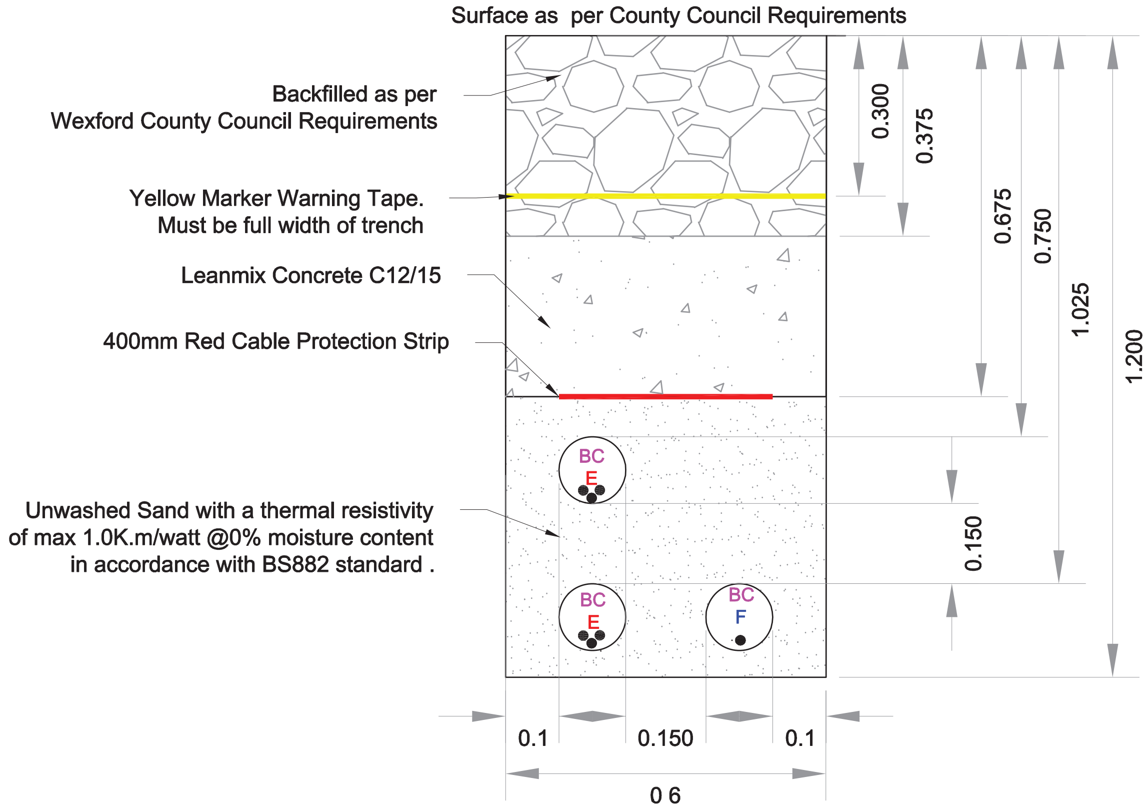

Ballycadden Trench Cross Section

XX — WIND FARM NAME
Y — CABLE TYPE

WIND FARM NAME
- GH = GIBBET HILL
- KB = KNOCKNALOUR/BALLYNANCORAN
- BB = BALLAMAN/BALLYDUFF
- BC = BALLYCADDEN

CABLE TYPE
- E = ELECTRICAL
- F = FIBRE OPTIC

DUCT TYPE ESB CODE 9317553
- 125mm OUTER DIAMETER uPVC DUCT WITH 12mm DRAW ROPES.
- MINIMUM SEPARATION TO ADJACENT DUCTS ON THE SAME CIRCUIT 150mm
- MINIMUM SEPARATION TO ADJACENT DUCTS ON THE SEPARATE CIRCUIT 300mm
- COMM. DUCTS 125mm OUTER DIAMETER uPVC DUCT WITH 12mm DRAW ROPES

NOTES:
- JOINT BAYS TO BE TEMPORARILY BACKFILLED WITH Cl804. PERMANENT BACKFILLED FOLLOWING PULLING AND JOINTING OF CABLES

REV	DATE	DRAWN BY	CHECKED BY	DETAILS
D	29.07.11	M.K	J.OC	FINAL TRENCH DETAIL
C	04.07.11	M.K	J.OC	TRENCH REDESIGN
B	13.06.11	M.K	J.OC	DUCT SPACING AMENDMENT
A	20.04.11	M.K	J.OC	FIRST ISSUE

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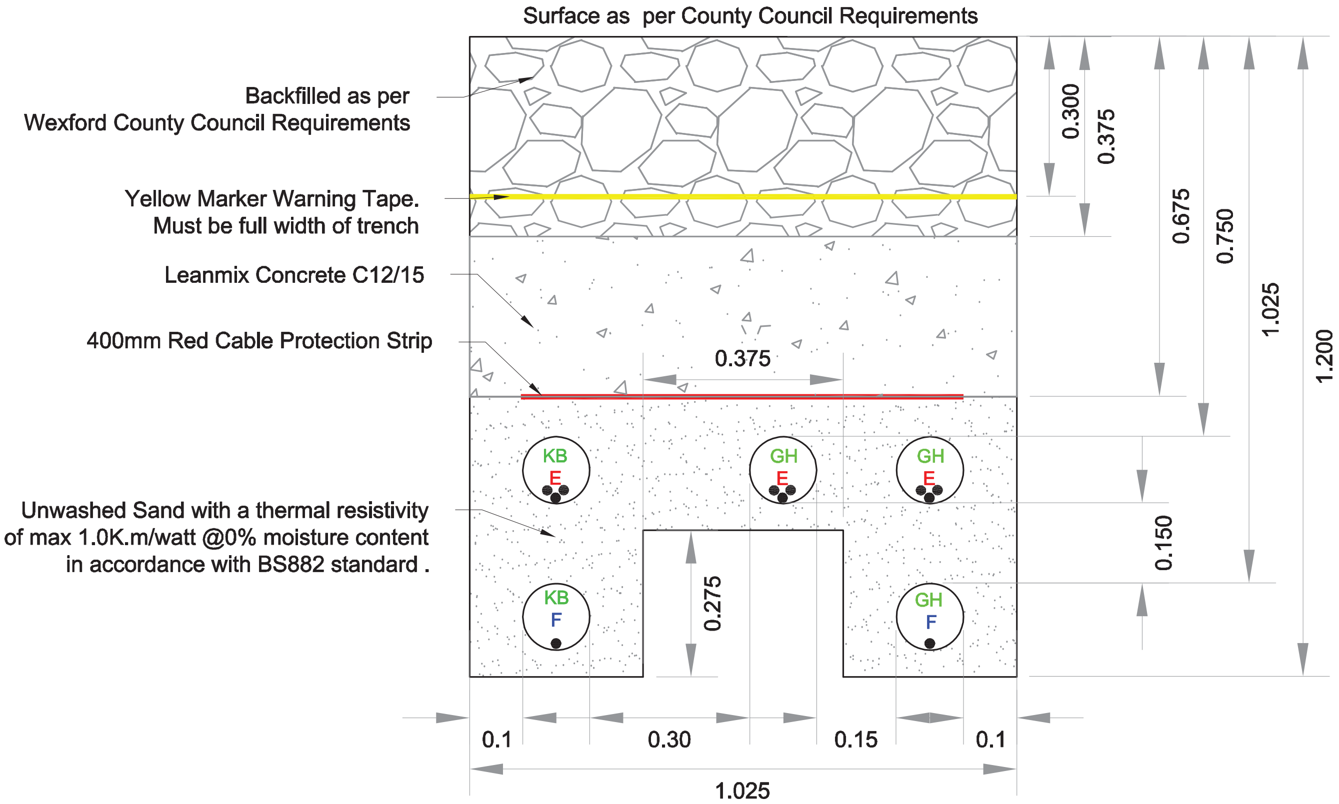
CLIENT

PROJECT
CRORY SUB GROUP

TITLE
TYPICAL BALLYCADDEN TRENCH CROSS SECTION

SCALE	STATUS	
1:10	APPROVED	
PAPER SIZE: A3	DRAWN BY: M.KRAS	CHECKED AND APPROVED: J.O'CONNOR
PROJECT PHASE: CONSTRUCTION	DATE: 29/07/2011	DATE: 29/07/2011
DRAWING NUMBER: BCCD d003.2.1		REVISION: D

FILE NAME



Knocknalour/Gibbet Hill
Trench C
Cross Section

AS BUILT

XX — WIND FARM NAME
Y — CABLE TYPE

WIND FARM NAME
- GH = GIBBET HILL
- KB = KNOCKNALOUR/BALLYNANCORAN
- BB = BALLAMAN/BALLYDUFF
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CABLE TYPE
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- F = FIBRE OPTIC

DUCT TYPE ESB CODE 9317553
- 125mm OUTER DIAMETER uPVC DUCT WITH 12mm DRAW ROPES.
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A	20.04.11	M.K	J.OC	FIRST ISSUE

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PROJECT
CRORY SUB GROUP

TITLE
COMBINED KB/GH TRENCH CROSS SECTION

SCALE	STATUS	
1:10	APPROVED	
PAPER SIZE	DRAWN BY	CHECKED AND APPROVED
A3	M.KRAS	J.O'CONNOR
PROJECT PHASE	DATE	DATE
CONSTRUCTION	29/07/2011	29/07/2011
DRAWING NUMBER		REVISION
BCCD d003.2.5 KB/GH		D

FILE NAME
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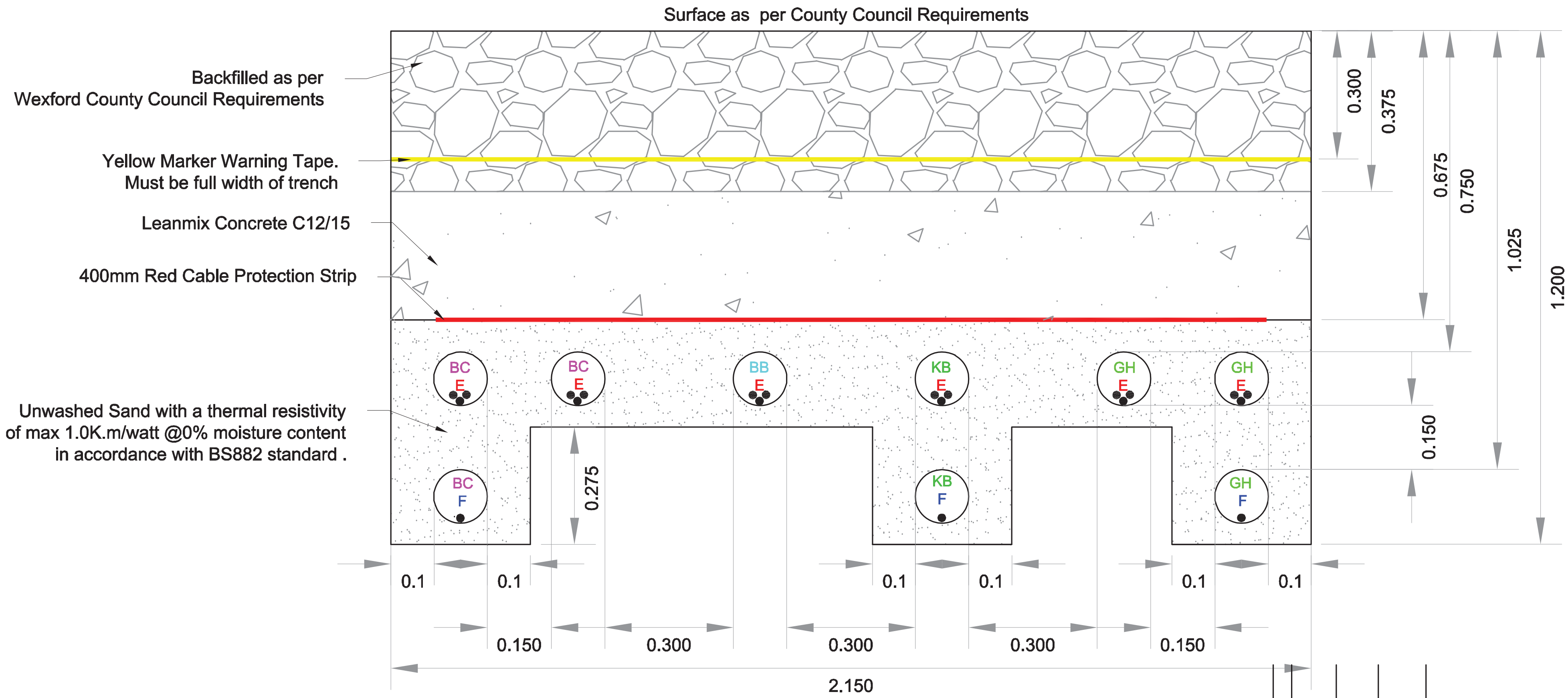

Combined Crory Sub-Group
Trench A
Cross Section

XX — WIND FARM NAME
Y — CABLE TYPE

WIND FARM NAME
- GH = GIBBET HILL
- KB = KNOCKNALOUR/BALLYNANCORAN
- BB = BALLAMAN/BALLYDUFF
- BC = BALLYCADDEN

CABLE TYPE
- E = ELECTRICAL
- F = FIBRE OPTIC

DUCT TYPE ESB CODE 9317553
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NOTES:
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AS BUILT

REV	DATE	DRAWN BY	CHECKED BY	DETAILS
D	29.07.11	M.K	J.OC	FINAL TRENCH DETAIL
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B	13.06.11	M.K	J.OC	DUCT SPACING AMENDMENT
A	20.04.11	M.K	J.OC	FIRST ISSUE

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PROJECT
CRORY SUB GROUP

TITLE
COMBINED TRENCH CROSS SECTION

SCALE	STATUS	
1:10	APPROVED	
PAPER SIZE	DRAWN BY	CHECKED AND APPROVED
A3	M.KRAS	J.O'CONNOR
PROJECT PHASE	DATE	DATE
CONSTRUCTION	29/07/2011	29/07/2011

DRAWING NUMBER	REVISION
BCCD d003.2.6 Combined	D

FILE NAME
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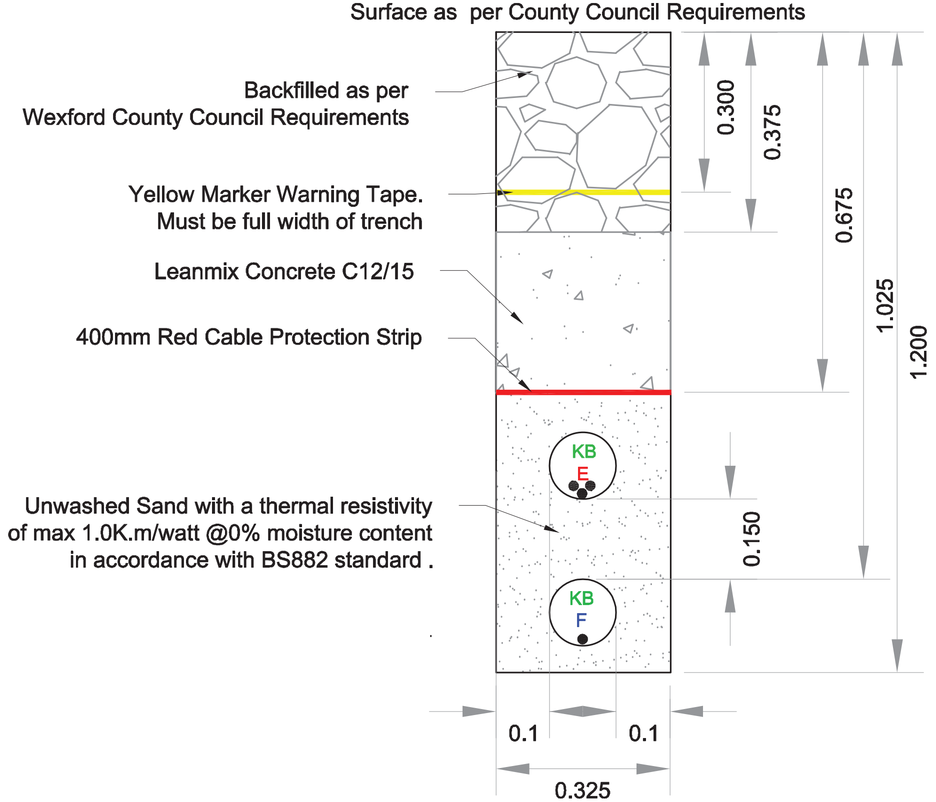
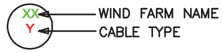


Knocknalour/Ballynancoran
Trench G
Cross Section

AS BUILT



WIND FARM NAME
- GH = GIBBET HILL
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- BB = BALLAMAN/BALLYDUFF
- BC = BALLYCADDEN

CABLE TYPE
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- F = FIBRE OPTIC

DUCT TYPE ESB CODE 9317553
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REV	DATE	DRAWN BY	CHECKED BY	DETAILS
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C	04.07.11	M.K	J.OC	TRENCH REDESIGN
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PROJECT
CRORY SUB GROUP

TITLE
KNOCKNALOUR/BALLYNANCORAN
TRENCH CROSS SECTION

SCALE	STATUS	
1:10	APPROVED	
PAPER SIZE	DRAWN BY	CHECKED AND APPROVED
A3	M.KRAS	J.O'CONNOR
PROJECT PHASE	DATE	DATE
CONSTRUCTION	29/07/2011	29/07/2011

DRAWING NUMBER: BCCD d003.2.7 KB
REVISION: D

FILE NAME
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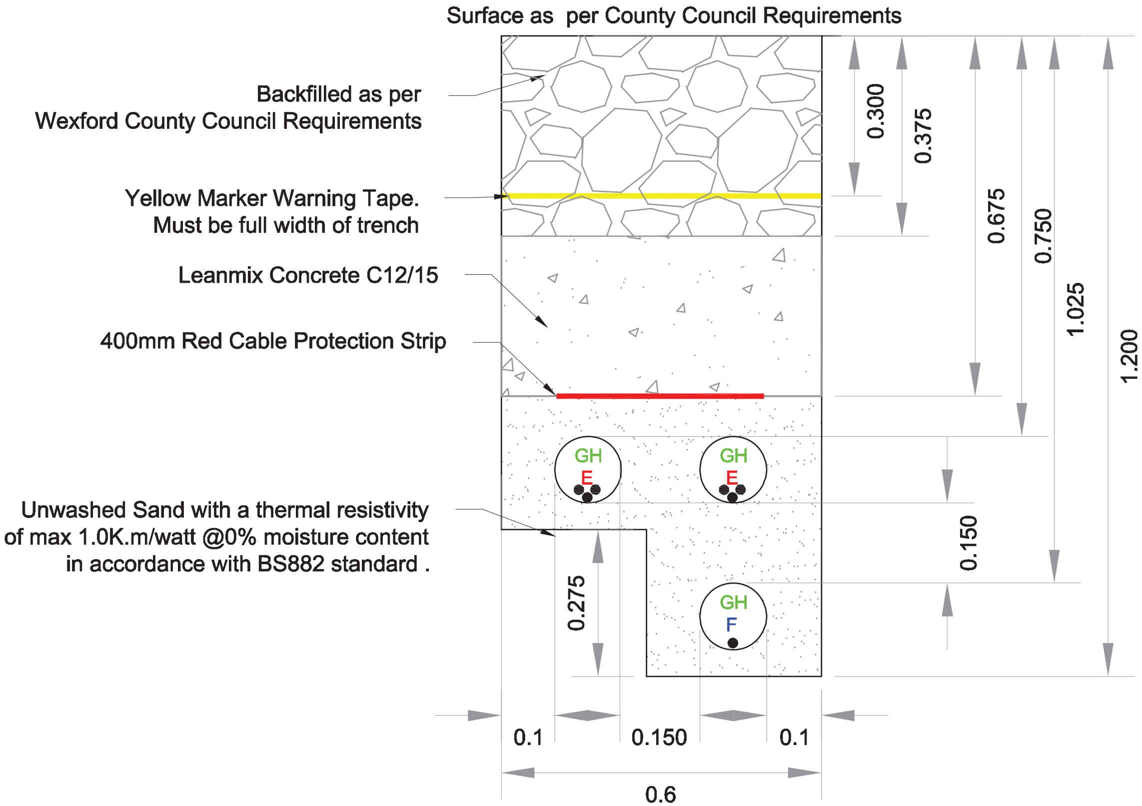

Gibbet Hill
Trench F
Cross Section

XX — WIND FARM NAME
Y — CABLE TYPE

WIND FARM NAME
- GH = GIBBET HILL
- KB = KNOCKNALOUR/BALLYNANCORAN
- BB = BALLAMAN/BALLYDUFF
- BC = BALLYCADDEN

CABLE TYPE
- E = ELECTRICAL
- F = FIBRE OPTIC

DUCT TYPE ESB CODE 9317553
- 125mm OUTER DIAMETER uPVC DUCT WITH 12mm DRAW ROPES.
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- MINIMUM SEPARATION TO ADJACENT DUCTS ON THE SEPARATE CIRCUIT 300mm
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REV	DATE	DRAWN BY	CHECKED BY	DETAILS
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B	13.06.11	M.K	J.OC	DUCT SPACING AMENDMENT
A	20.04.11	M.K	J.OC	FIRST ISSUE

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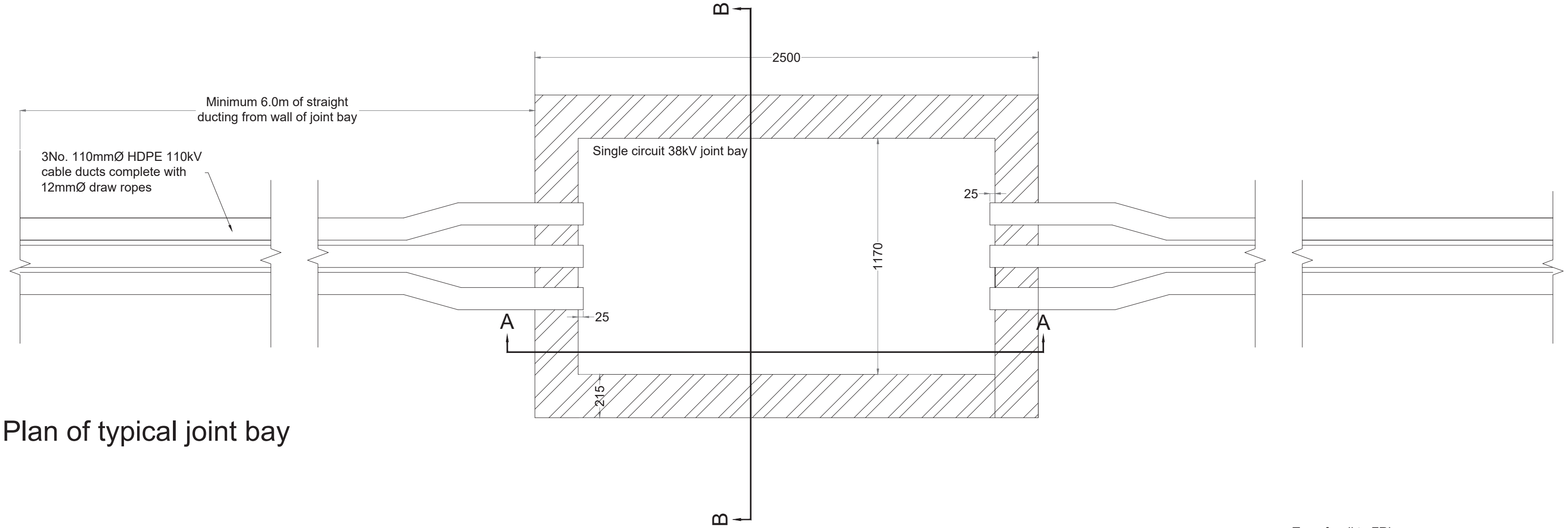
PROJECT
CRORY SUB GROUP

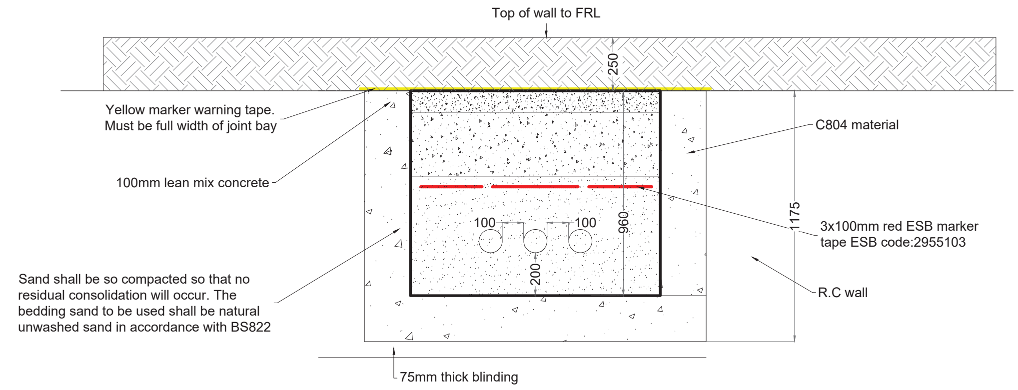
TITLE
GIBBET HILL
TRENCH CROSS SECTION

SCALE	STATUS	
1:10	PRE CONSTRUCTION	
PAPER SIZE	DRAWN BY	CHECKED AND APPROVED
A3	M.KRAS	J.O'CONNOR
PROJECT PHASE	DATE	DATE
CONSTRUCTION	29/07/2011	29/07/2011
DRAWING NUMBER		REVISION
BCCD d003.2.8 GH		D

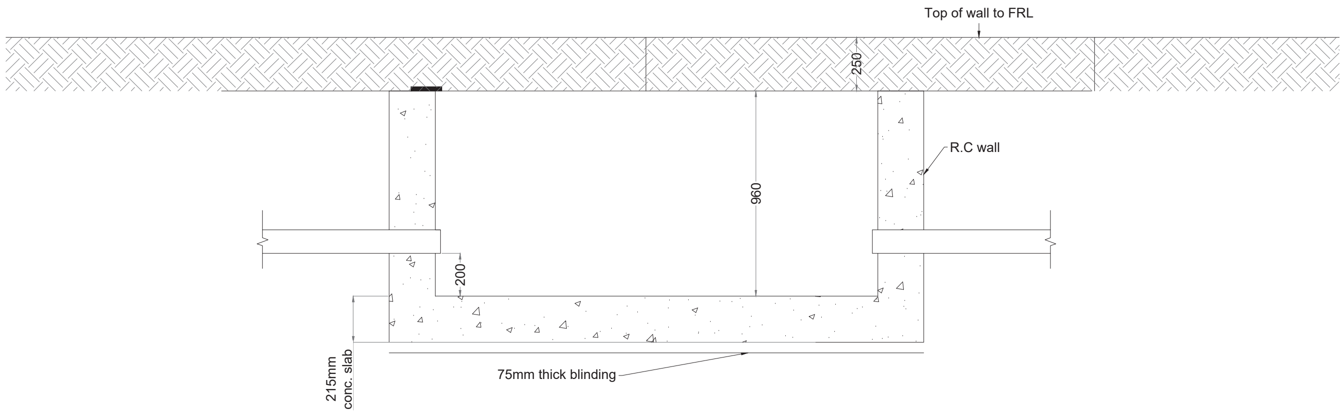
FILE NAME



Plan of typical joint bay



Section B-B



Section A-A

DRAWING TITLE:
Typical Joint Bay Detail

PROJECT TITLE:
Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 190806 - 18
SCALE: 1:25 @ A3	DATE: 06.03.2020

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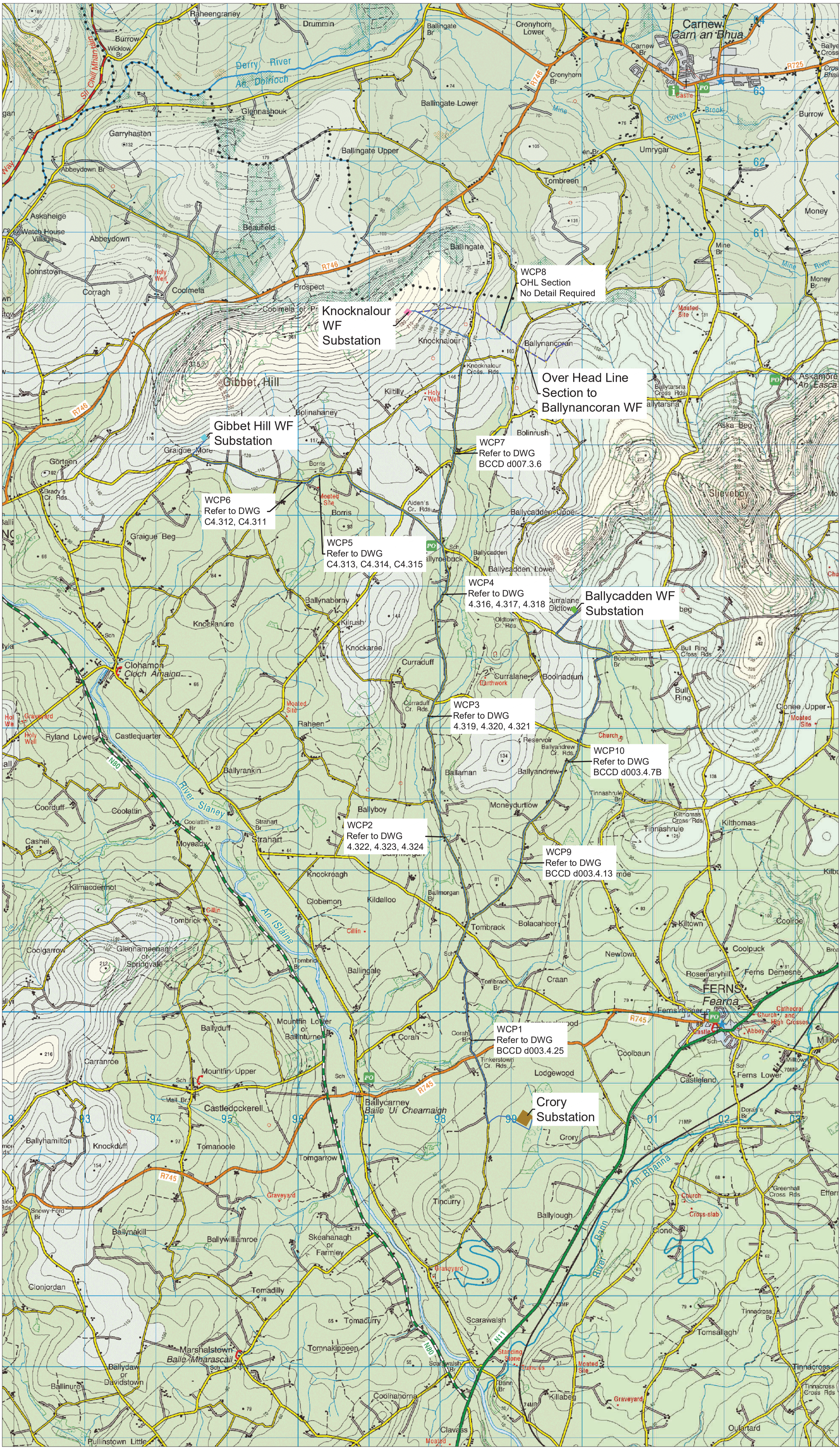
Website: www.mkoireland.ie



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Drawing Legend

- Underground Grid Connection
- Overhead Line
- Culvert/Water Crossing Point

DRAWING TITLE:

Water Course Crossings Reference Map

PROJECT TITLE: Crory Wind Farm Group Grid Connection

DRAWING BY: Joseph O Brien	CHECKED BY: Jimmy Green
PROJECT No.: 190806	DRAWING No.: 190806 - 17
SCALE: 1:50,000 @ A3	DATE: 06.03.2020
OS SHEET No.: OS2814, OS2816, OS3014, OS3016	

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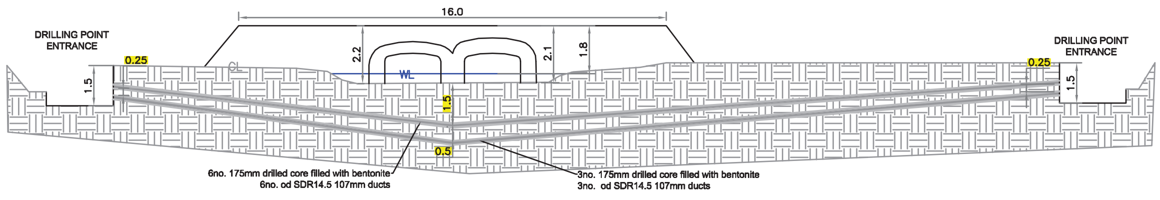
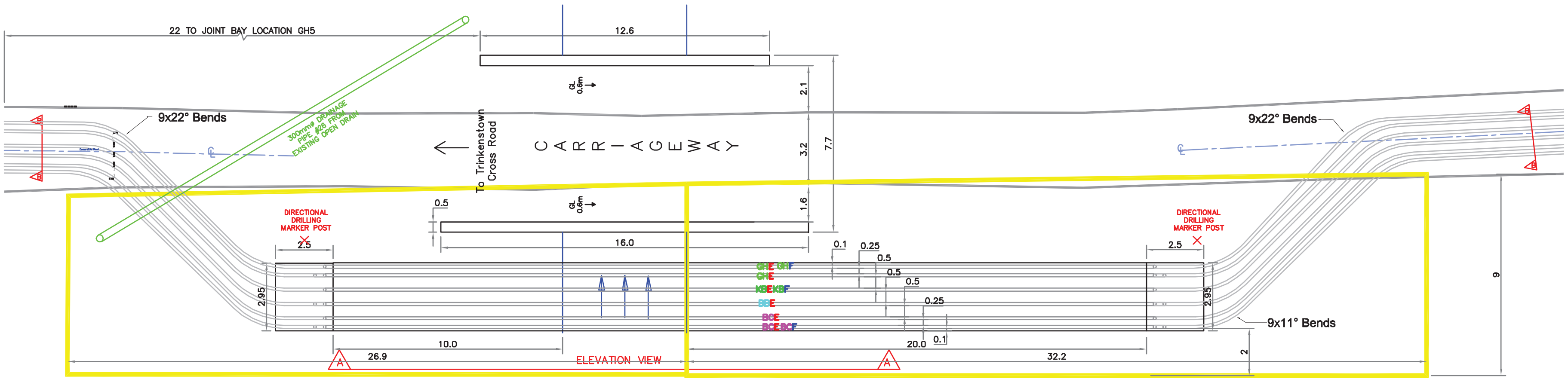
WCP1



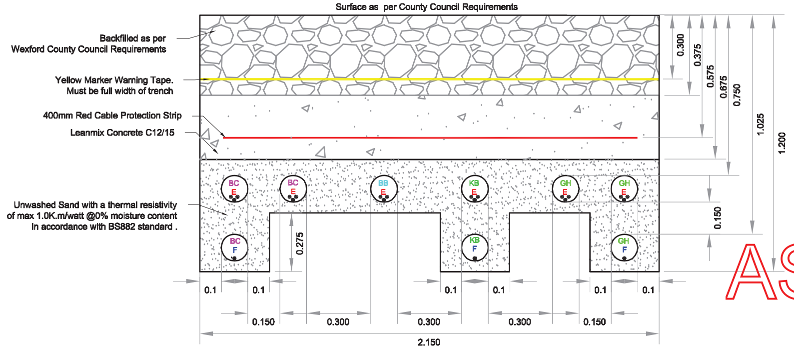
DIRECTIONAL DRILLING LONG SECTION A-A

SCALE 1:200



DIRECTIONAL DRILLING LONG SECTION A-A

SCALE 1:200



SECTION B-B

SCALE 1:25

XX ← WIND FARM NAME
Y ← CABLE TYPE

WIND FARM NAME
- GH = GIBBET HILL
- KB = KNOCKNALOUR/BALLYNANCORAN
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AS BUILT

NOTES:
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REV	DATE	DRAWN BY	CHECKED BY	DETAILS
F	10.11.11	M.B.	J.O'C.	NOTES ADDED TO BENDS
E	07.11.11	M.B.	J.O'C.	22° BENDS SHOWN
D	02.08.11	M.K	J.OC	TRANCH UPDATED, ADDITIONAL DETAILS ADDDED
C	–	–	–	–
B	–	–	–	–
A	20.04.11	M.K	J.OC	FIRST ISSUE

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Fax +353 (0) 1 845 5612
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CLIENT

PROJECT
CRORY SUB GROUP

TITLE
CORAH BRIDGE

SCALE	STATUS	
1: 200,1: 25	PRE CONSTRUCTION	
PAPER SIZE	DRAWN BY	CHECKED AND APPROVED
A3	M.KRAS	J.O'CONNOR
PROJECT PHASE	DATE	DATE
PRE CONSTRUCTION	02/08/2011	02/08/2011

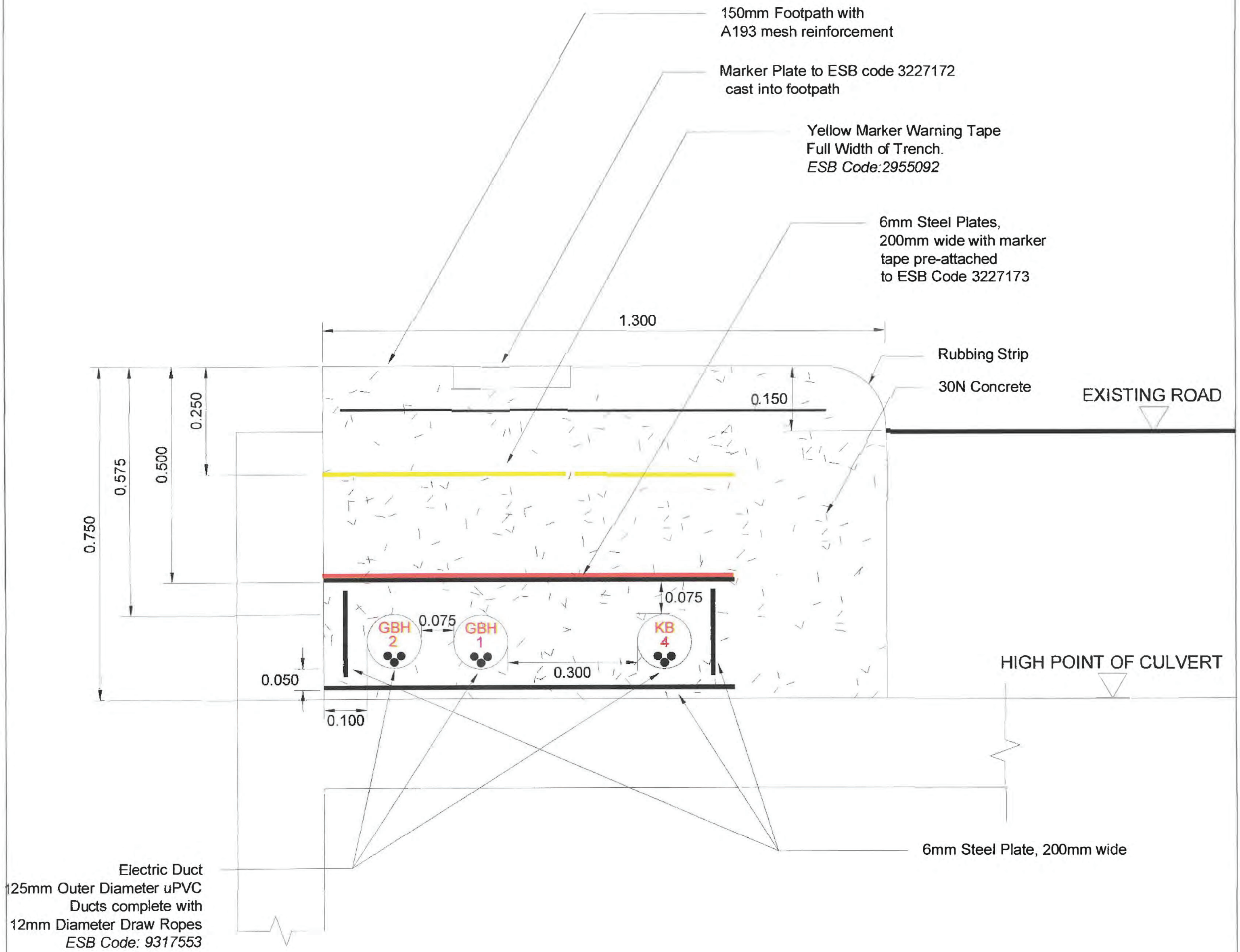
DRAWING NUMBER: BCCD d003.4.25

REVISION: F

FILE NAME

WCP 2

Trench Cross Section at Culvert



Amendment	amended	Date:	ID:
Stage: As Built	Proj.-no.:	IR003	
	Page no.:	4.322	
	Date:	09.10.12	
Project: Gibbet Hill Windfarm Co. Wexford	Drawn by:	LR	
	Scale:	1:10@A3	
Plan Content: External Cable Route Culvert - Cross Section			

ABO WIND Ireland Ltd.

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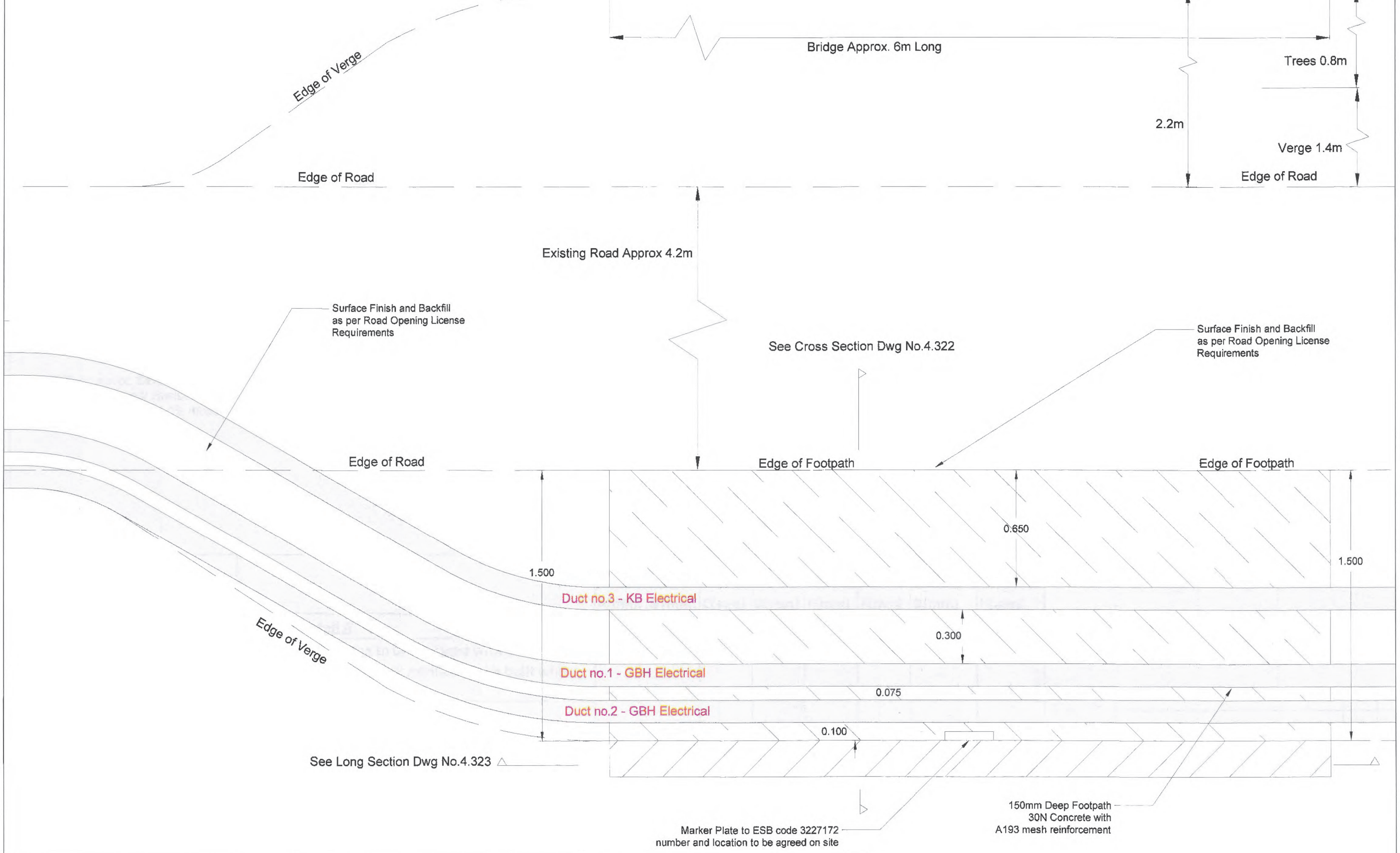
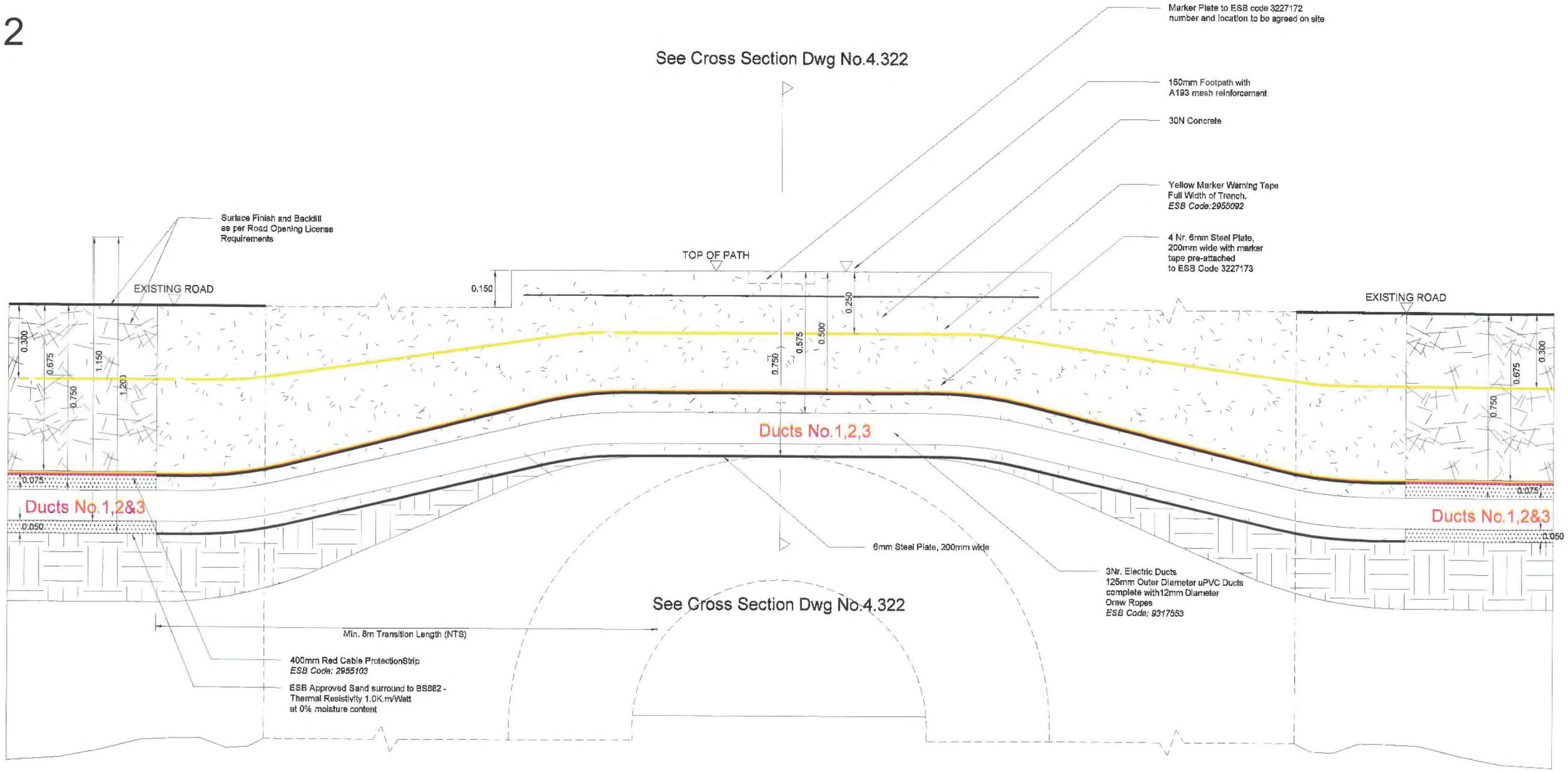
Sandycove, Dublin
Tel. +353 (01) 6636133
Fax +353 (01) 2304058

WCP2



Project Gibbet Hill Windfarm Co. Wexford	Stage As Built	Proj.-no.: IR003				
		Page no.: 4.324				
ABO WIND Ireland Ltd. Dublin Office 53 Glasthule Road Sandycove, Dublin Tel. +353 (01) 6636133 Fax +353 (01) 2304058	Plan Content External Cable Route Culvert - Plan	Date: 09.10.12				
		Drawn by: LR				
		Scale: 1:20@A3	Amendment	amended	Date:	ID:

WCP 2



Amendment	amended	Date:	ID:
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	Page no.:		4.323
	Date:		09.10.12
Project Gibbet Hill Windfarm Co. Wexford	Drawn by:		LR
	Scale:		1:20@A3
Plan Content External Cable Route Culvert - Long Section			

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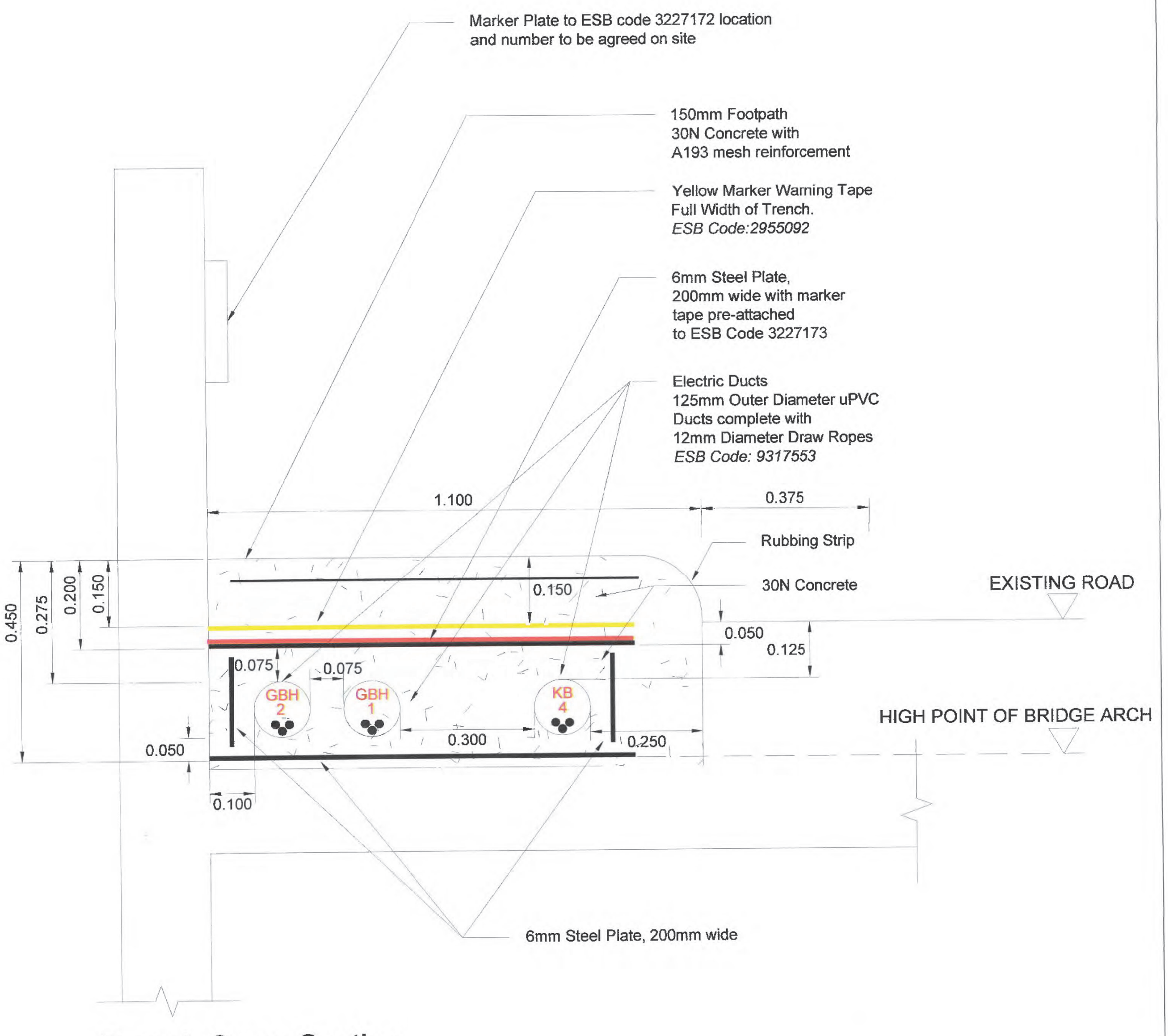
WCP3



Trench Cross Section

Amendment	amended	Date:	ID:
Stage: As Built	Proj.-no.:		IR003
	Page no.:		4.319
	Date:		09.10.12
Project: Gibbet Hill Windfarm Co. Wexford	Drawn by:		LR
	Scale:		1:10@A3
Plan Content: External Cable Route Bridge - Cross Section			

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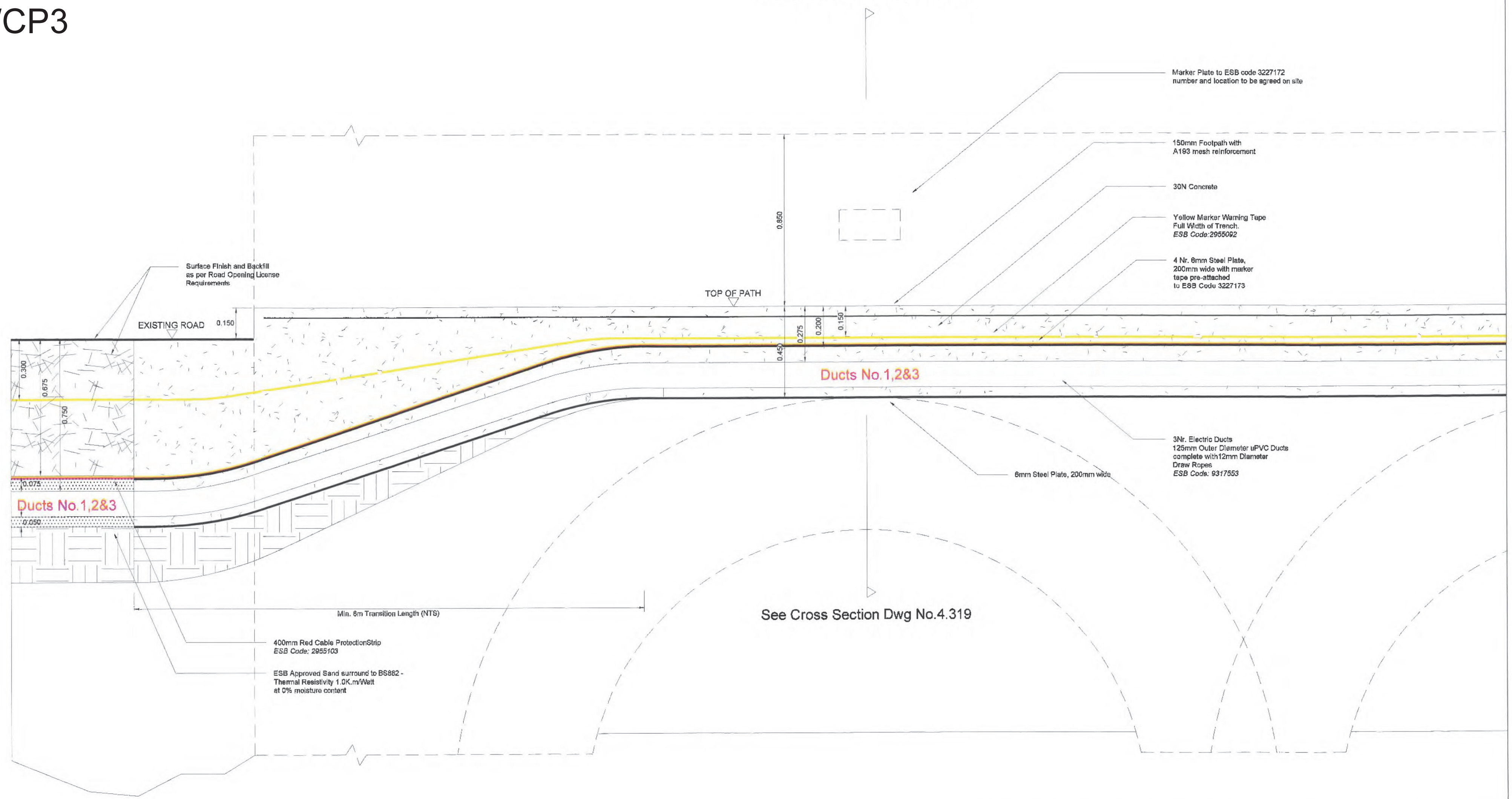

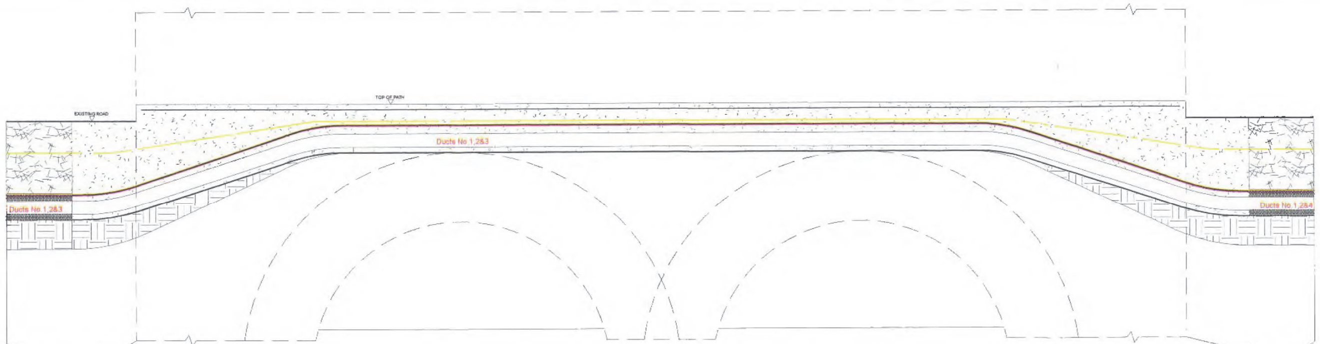

1:50@A3

Amendment	amended	Date:	ID:
Stage As Built	Proj.-no.:	IR003	
	Page no.:	4.320	
	Date:	09.10.12	
Project Gibbet Hill Windfarm Co. Wexford	Drawn by:	LR	
	Scale:	1:20@A3	
Plan Content External Cable Route Bridge - Long Section			

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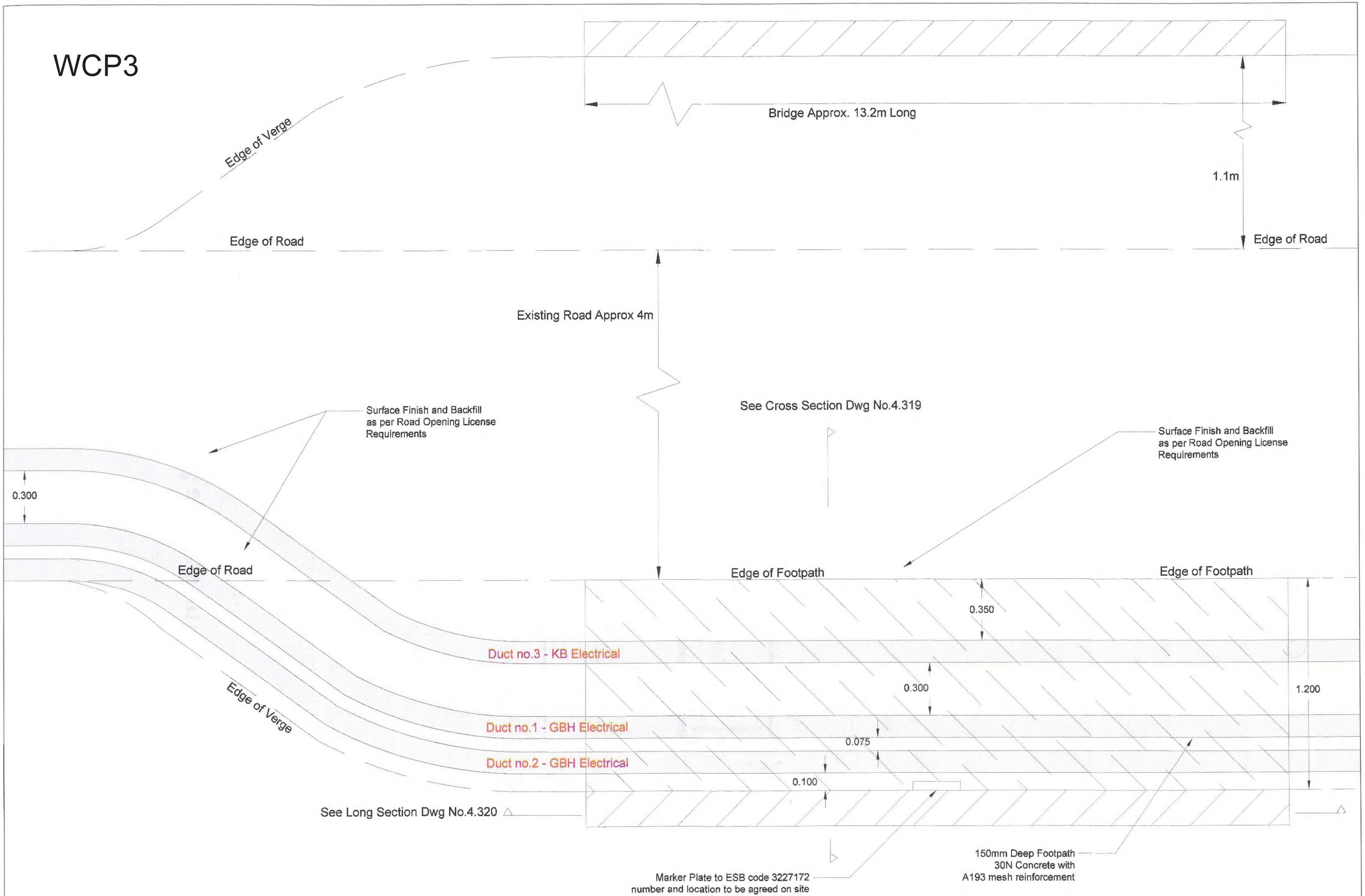

Project Gibbet Hill Windfarm Co. Wexford	Stage As Built	Proj.-no.:	IR003				
		Page no.:	4.321				
ABO WIND Ireland Ltd. Dublin Office 53 Glasthule Road Sandycove, Dublin Tel. +353 (01) 6636133 Fax +353 (01) 2304058	Plan Content External Cable Route Bridge - Plan	Date:	09.10.12				
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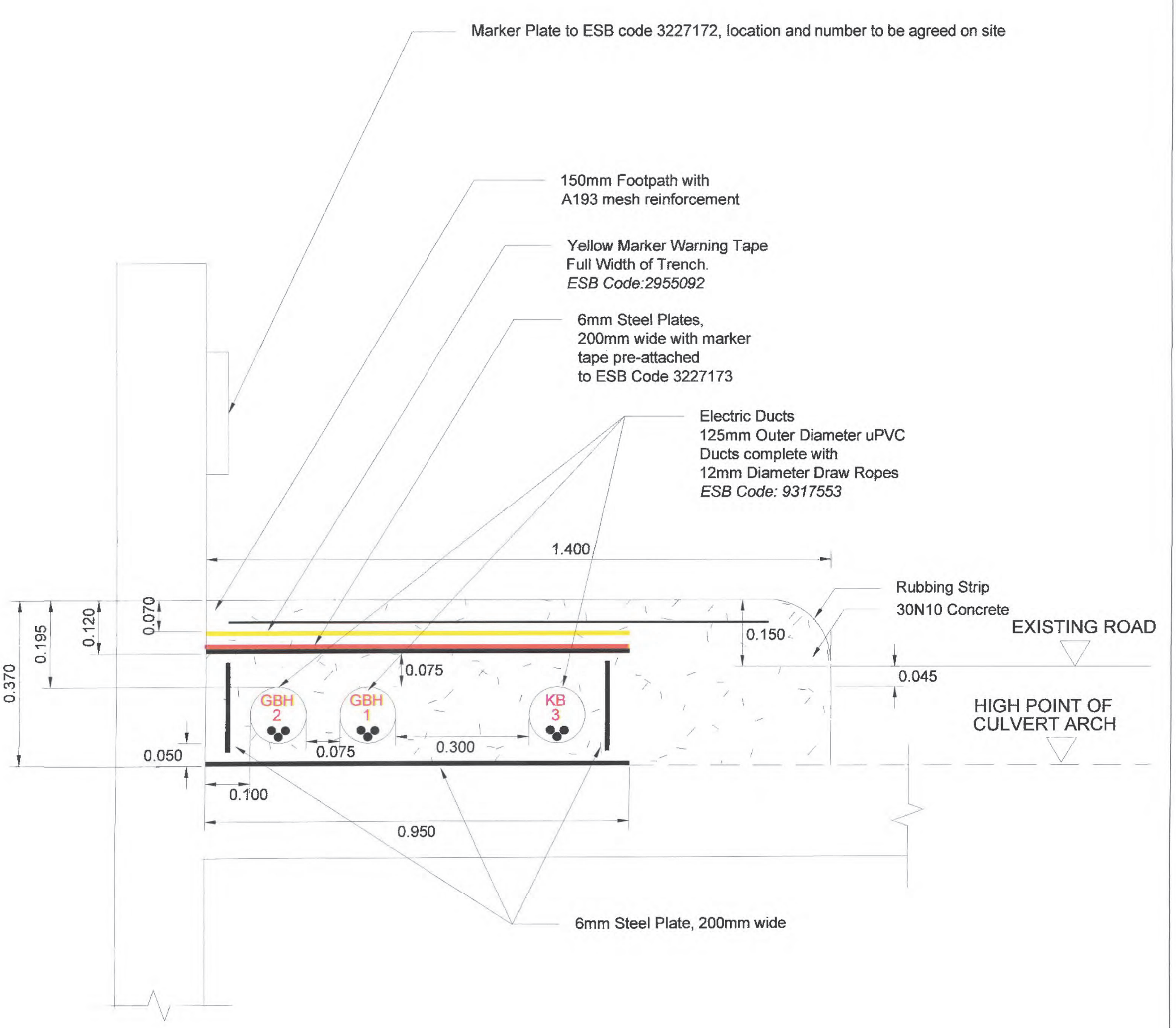

Trench Cross Section at Culvert

cover revised, concrete changed to 30N10	LR	06.06.12	C
Amendment	amended	Date:	ID:
Stage: As Built	Proj.-no.: 1R003		
	Page no.: 4.316		
	Date: 09.10.12		
Project: Gibbet Hill Windfarm, Co. Wexford	Drawn by: LR		
	Scale: 1:10@A3		
Plan Content: External Cable Route, Culvert - Cross Section			

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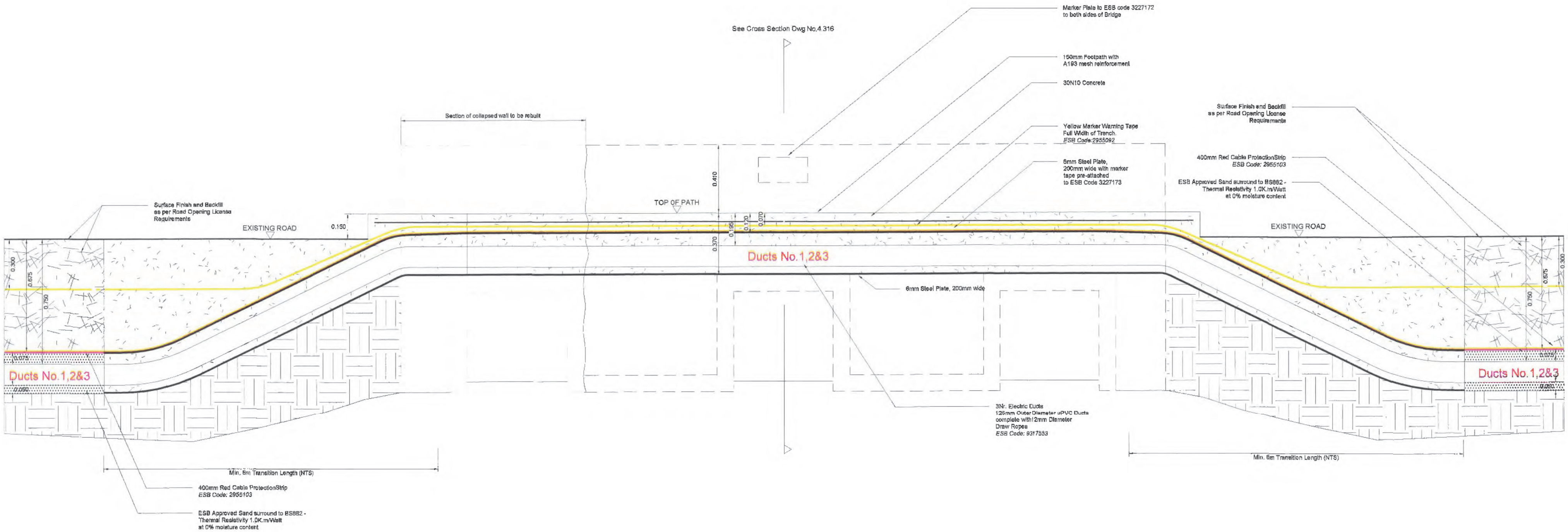
WCP4



Amendment	amended	Date:	ID:

Stage
As Built

Proj.-no.: IR003
Page no.: 4.317
Date: 09.10.12
Drawn by: LR

Project
Gibbet Hill Windfarm
Co. Wexford

Scale: 1:25@A3

Plan Content
External Cable Route
Culvert - Long Section

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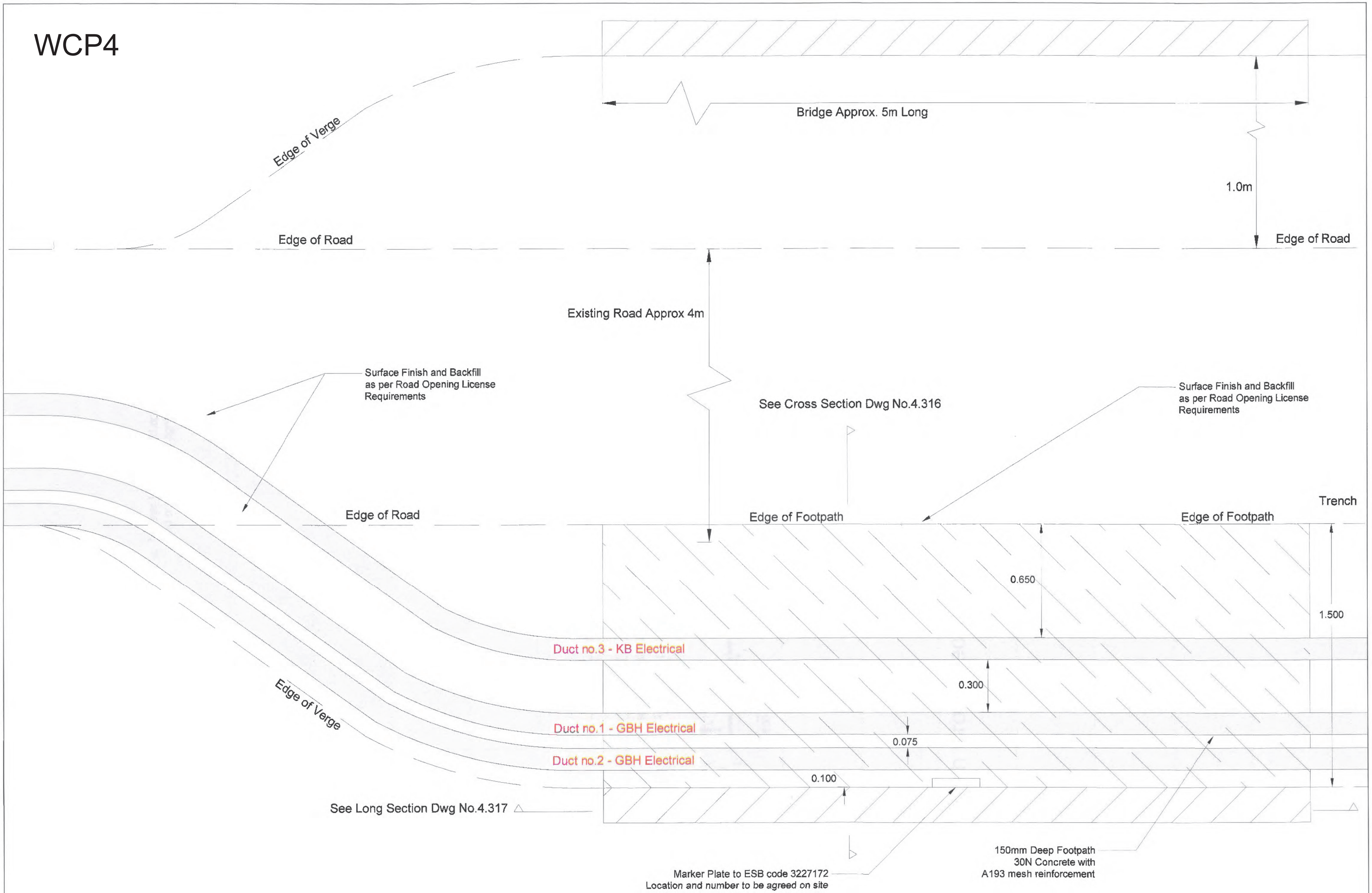
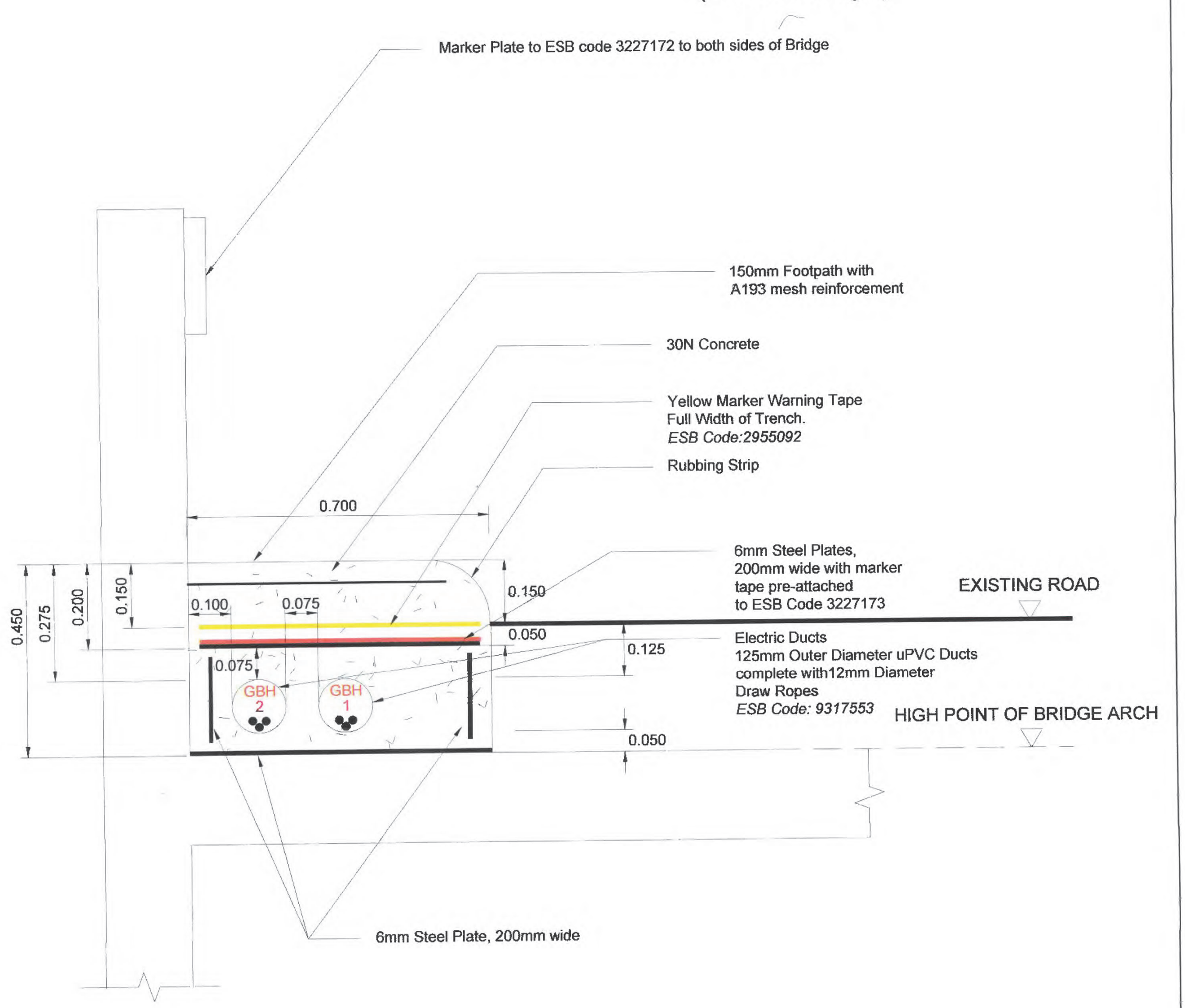


Project: Gibbet Hill Windfarm Co. Wexford	Stage: As Built	Proj.-no.:	IR003
		Page no.:	4.318
ABO WIND Ireland Ltd. Dublin Office 53 Glasthule Road Sandycove, Dublin Tel. +353 (01) 6636133 Fax +353 (01) 2304058	Plan Content: External Cable Route Culvert - Plan	Date:	09.10.12
		Drawn by:	LR
		Scale:	1:20@A3

Amendment	amended	Date:	ID:

WCP5

Trench Cross Section at (Borris Bridge)



Amendment	amended	Date:	ID:
Depth of cover revised	LR	31.05.12	C
Red tape on bottom steel plate removed from drawing Steel plate added to inner and outer side of bridge crossing	LR	19.01.12	B
Communications duct removed	PJB	23.11.11	A

Stage: Contract	Proj.-no.:	IR003
	Page no.:	C4.313
	Date:	23.09.11
Project: Gibbet Hill Windfarm Co. Wexford	Drawn by:	LR
	Scale:	1:10@A3
Plan Content: External Cable Route Bridge - Cross Section		

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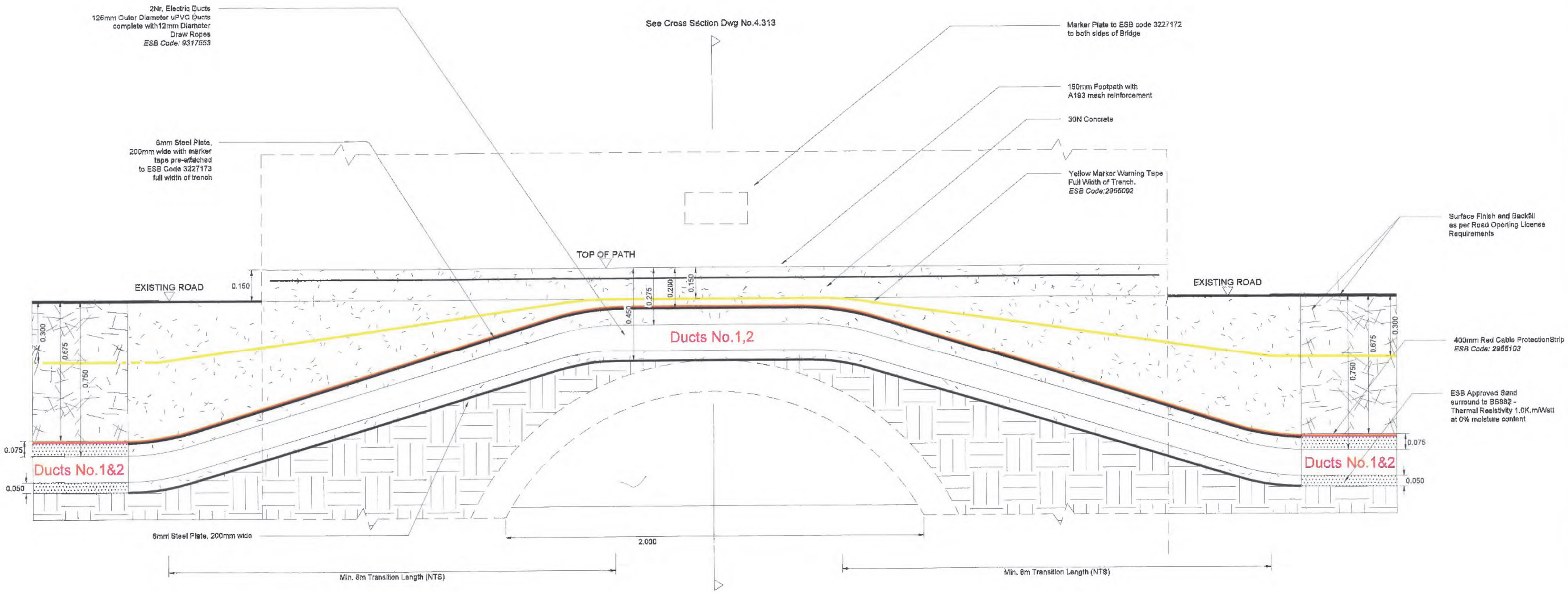

Depth of cover revised	LR	31.05.12	C
Red tape removed from bottom steel plate	LR	19.01.12	B
Communications duct removed	PJB	23.11.11	A
Amendment	amended	Date:	ID:

Stage Contract	Proj.-no.: IR003 Page no.: C4.314 Date: 23.09.11
Project Gibbet Hill Windfarm Co. Wexford	Drawn by: LR Scale: 1:20@A3
Plan Content External Cable Route Bridge - Long Section	

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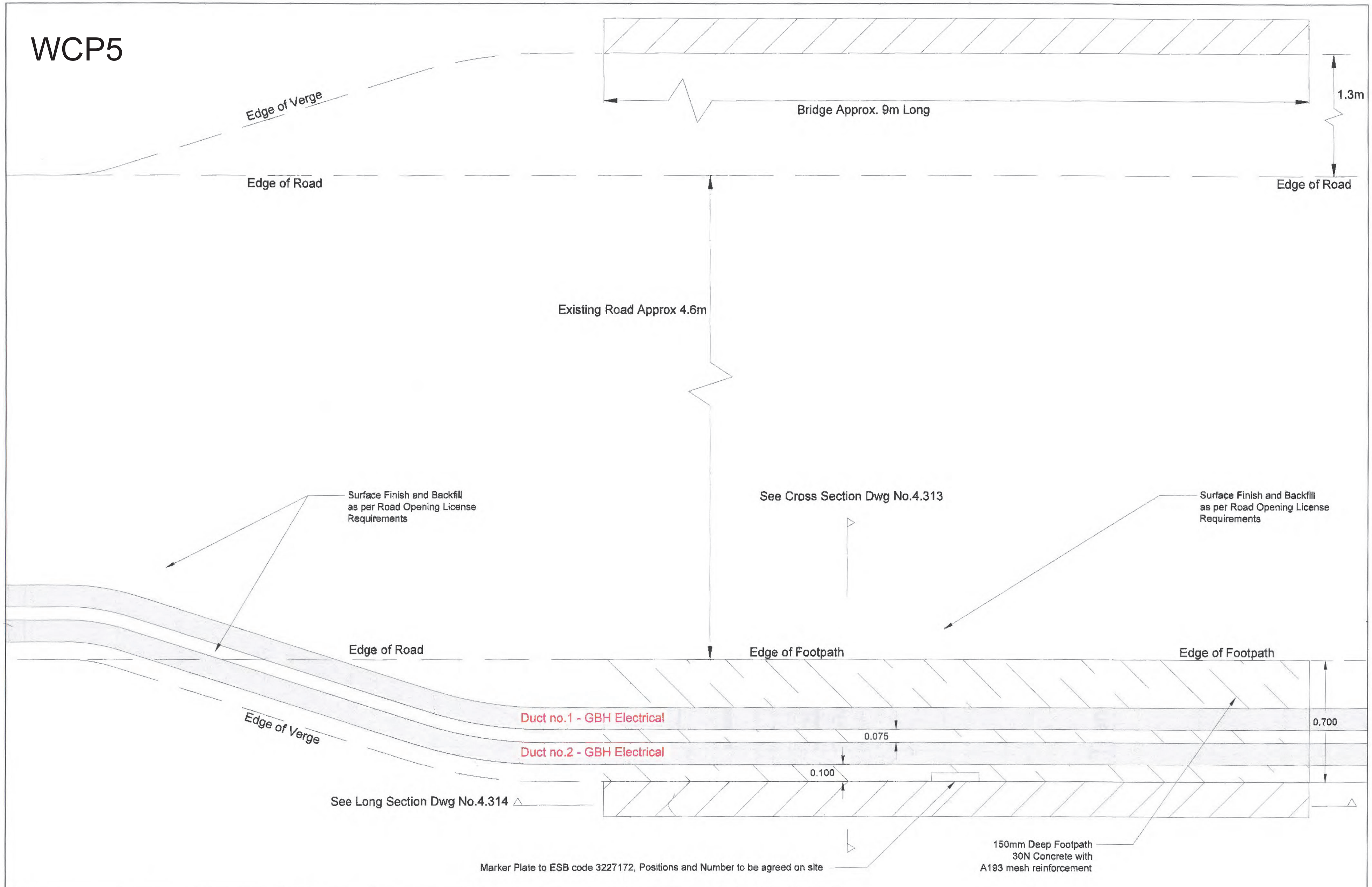

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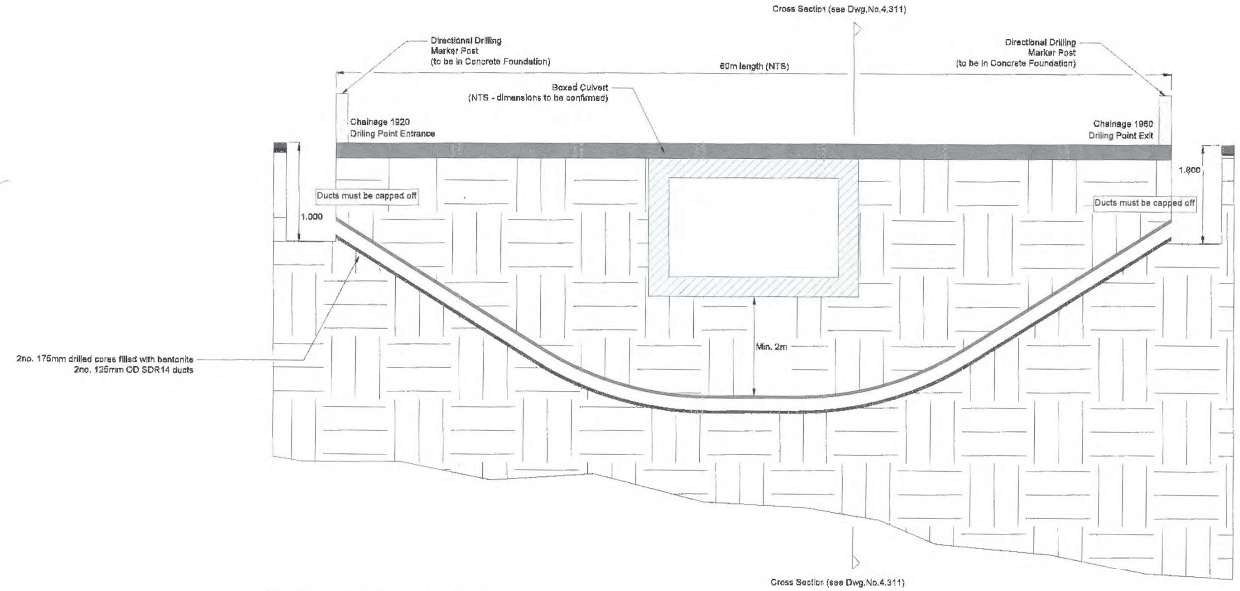
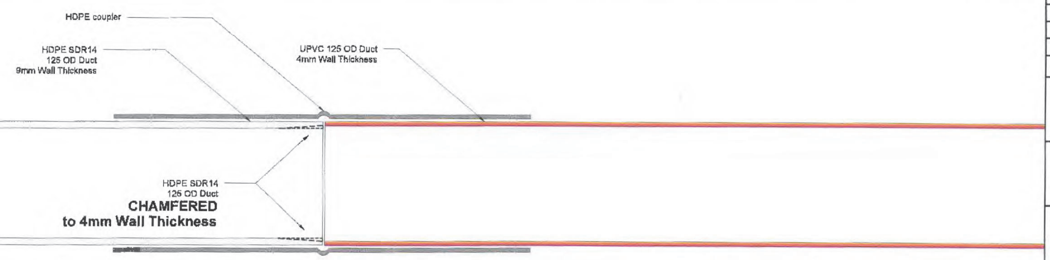
Gibbet Hill Windfarm Co. Wexford	Contract	Proj.-no.:	IR003				
		Page no.:	C4.315				
ABO WIND Ireland Ltd. Dublin Office 53 Glasthule Road Sandycove, Dublin Tel. +353 (01) 6636133 Fax +353 (01) 2304058	Plan Content External Cable Route Bridge - Plan	Date:	23.09.11				
		Drawn by:	LR	Marker plates note added	LR	19.01.12	B
		Scale:	1:20@A3	Communications duct removed	PJB	24.11.11	A
				Amendment	amended	Date:	ID:

WCP6



Directional Drilling Long Section

1:50@A3



Long Section Detail of Link from UPVC duct to SDR duct

1:5@A3

Note:
E,N location of Launch & Exit pit and gradient of pipe at Launch & Exit Pit to be included in As-Built drawings.

Amendment	amended	Date:	ID:
Note Added. Min Depth changed to 2m	LR	19.01.12	B
Communications duct removed	PJB	23.11.11	A

Stage: Contract	Proj.-no.: IR003
	Page no.: C4.312
	Date: 23.09.11
Project: Gibbet Hill Windfarm Co. Wexford	Drawn by: LR
	Scale: As Shown@A3

Plan Content
External Cable Route
Culvert - Directional Drill Long Section & Detail

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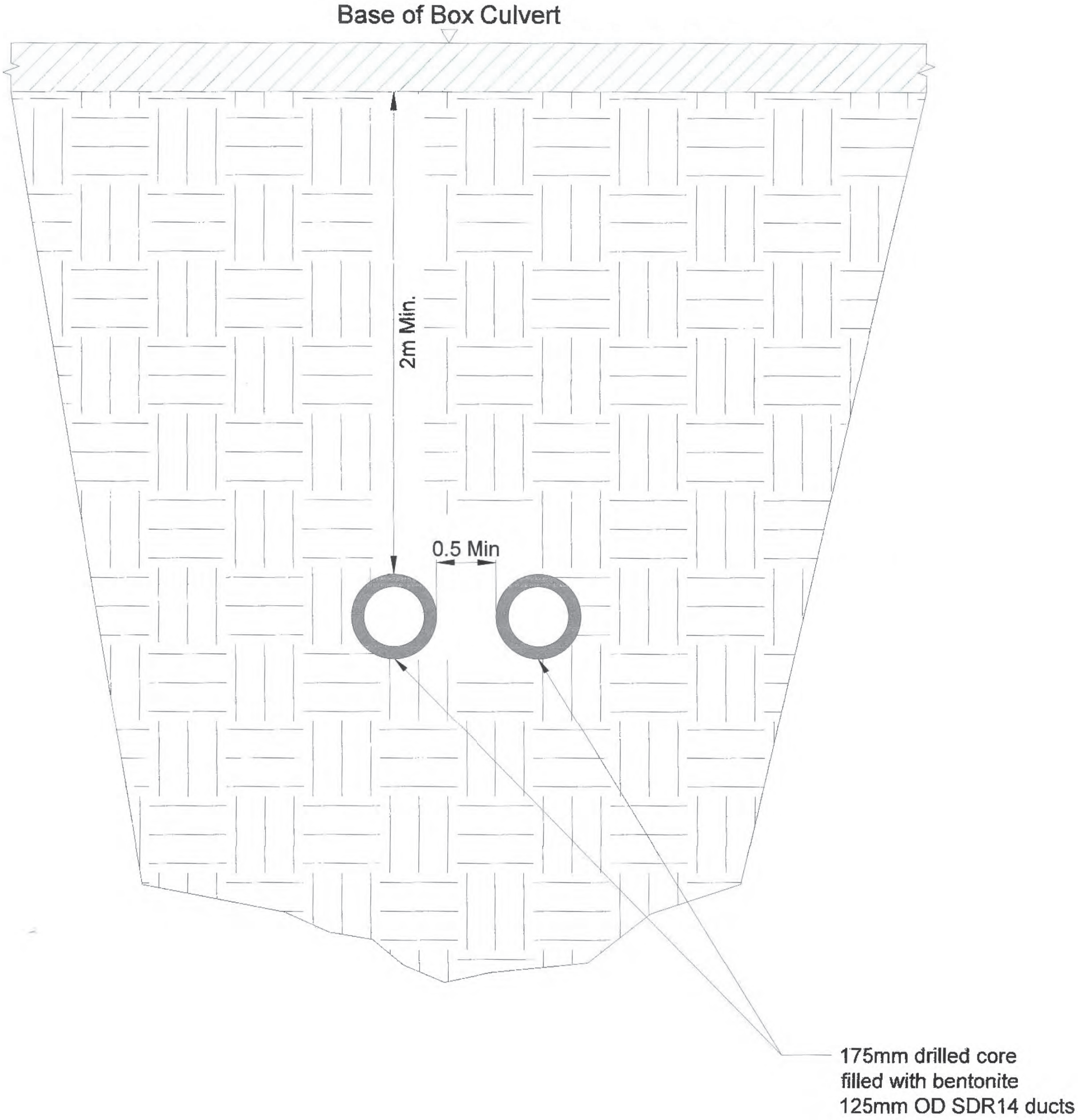
WCP6



Minimum depth changed to 2m	LR	19.01.12	B
Communications duct removed	PJB	23.11.11	A
Amendment	amended	Date:	ID:
Stage Contract	Proj.-no.: IR003 Page no.: C4.311 Date: 23.09.11		
Project Gibbet Hill Windfarm Co. Wexford	Drawn by: LR Scale: 1:20@A3		
Plan Content External Cable Route Culvert - Directional Drill Cross Section			

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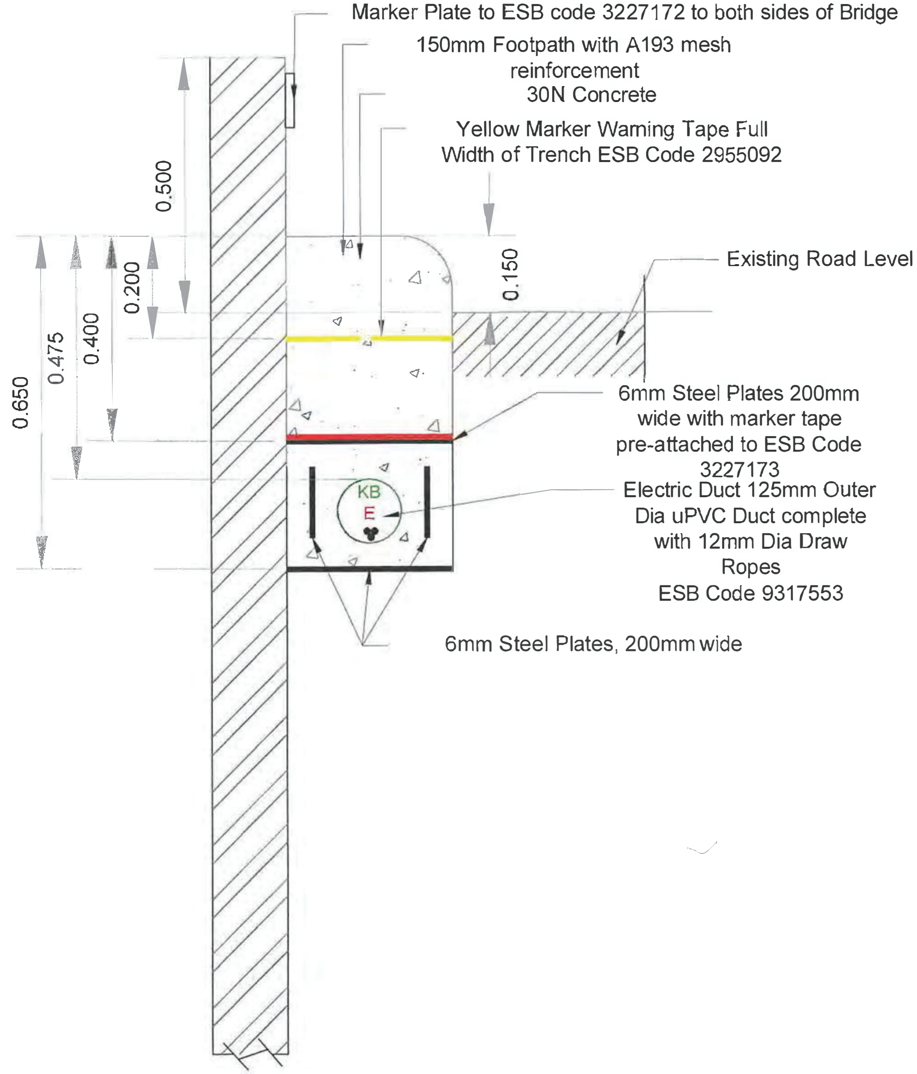
WCP7



Bridge Crossing; Cross Section A-A

AS BUILT

REV	DATE	DRAWN BY	CHECKED BY	DETAILS
A	21.03.12	MK	JB	FIRST ISSUE

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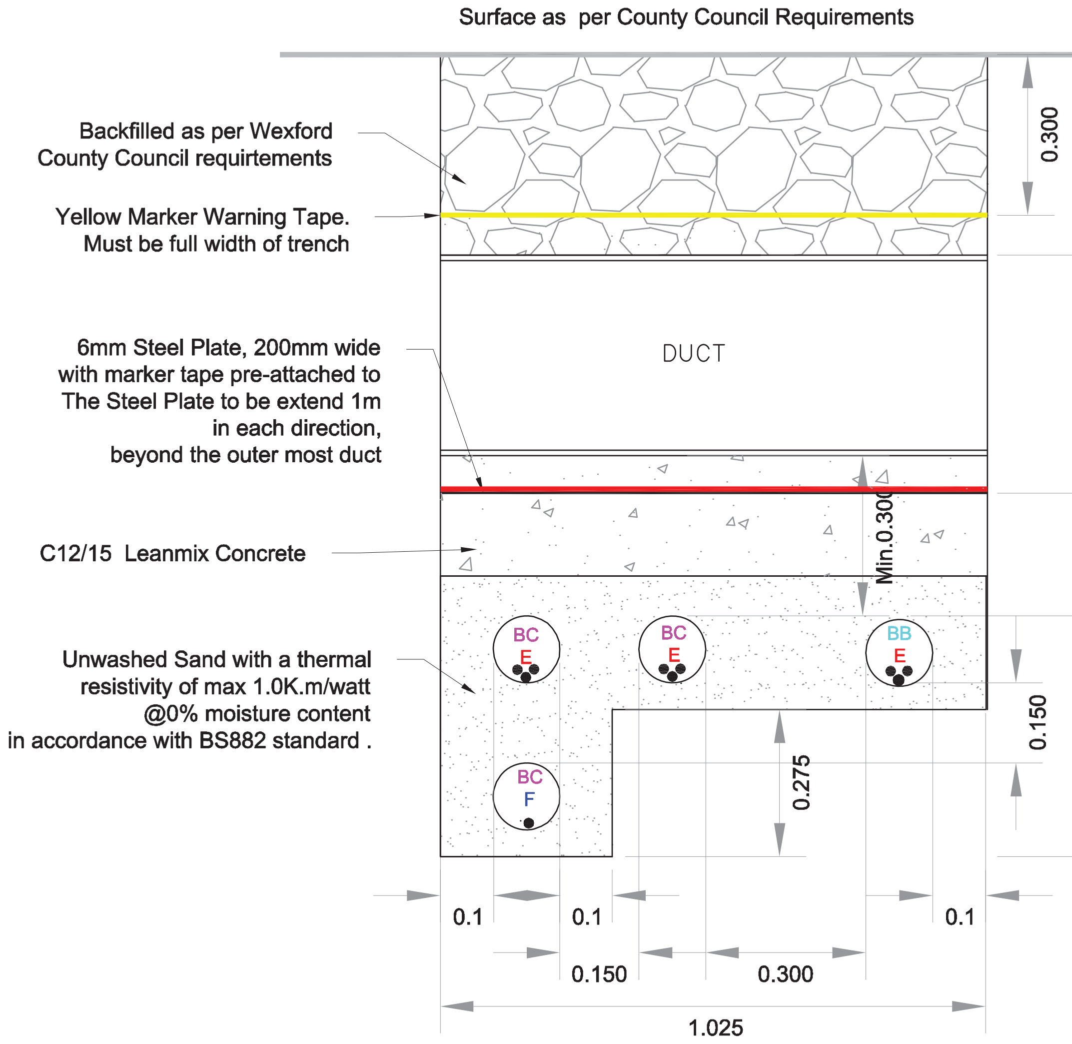
CLIENT

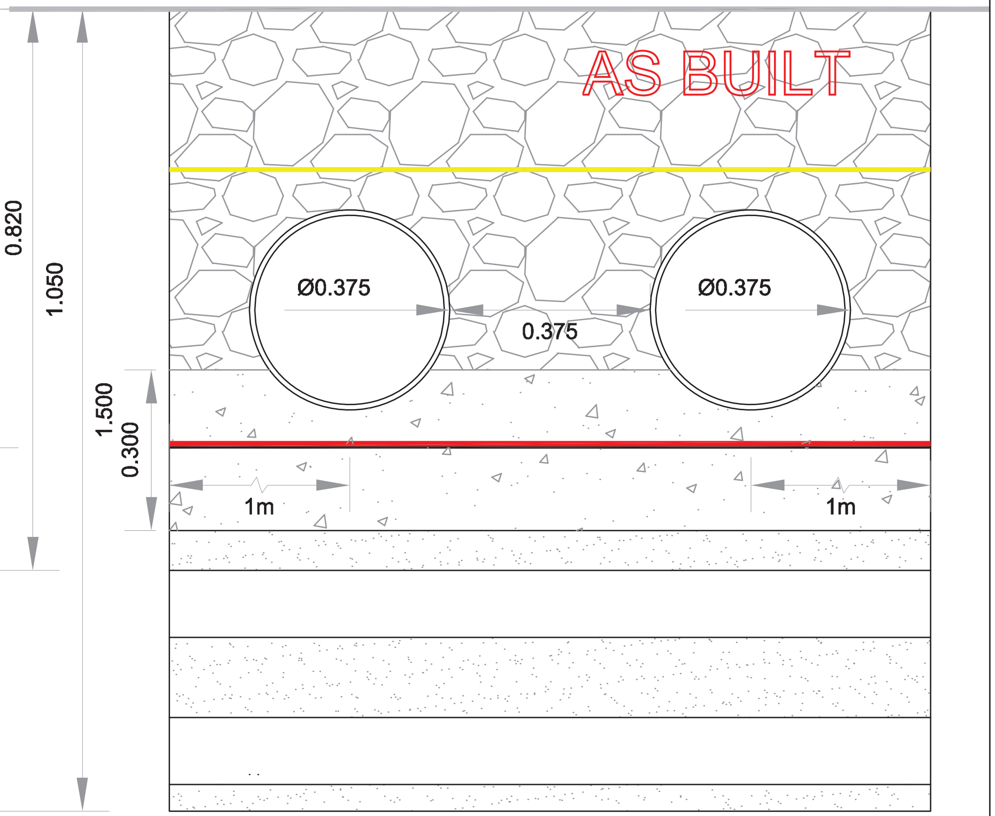
PROJECT
CRORY SUB-GROUP
KNOCKNALOUR/BALLYNANCORAN

TITLE
CONCRETE SUPPORT AT BRIDGE CROSSING

SCALE: 1:10	STATUS	
PAPER SIZE: A3	DRAWN BY: M.KRAS	CHECKED AND APPROVED: J.O'CONNOR
PROJECT PHASE	DATE: 21/03/2012	DATE: CONSTRUCTION
DRAWING NUMBER: BCCD d007.3.6		REVISION: A



Crossing Pipes Cross Section



Crossing Pipes Long Section

XX — WIND FARM NAME
Y — CABLE TYPE

WIND FARM NAME
- GH = GIBBET HILL
- KB = KNOCKNALOUR/BALLYNANCORAN
- BB = BALLAMAN/BALLYDUFF
- BC = BALLYCADDEN

CABLE TYPE
- E = ELECTRICAL
- F = FIBRE OPTIC

DUCT TYPE ESB CODE 9317553
- 125mm OUTER DIAMETER uPVC DUCT WITH 12mm DRAW ROPES.
- MINIMUM SEPARATION TO ADJACENT DUCTS ON THE SAME CIRCUIT 150mm
- MINIMUM SEPARATION TO ADJACENT DUCTS ON THE SEPARATE CIRCUIT 300mm
- COMM. DUCTS 125mm OUTER DIAMETER uPVC DUCT WITH 12mm DRAW ROPES

NOTES:
- JOINT BAYS TO BE TEMPORARILY BACKFILLED WITH Cl804. PERMANENT BACKFILLED FOLLOWING PULLING AND JOINTING OF CABLES

WCP9

REV	DATE	DRAWN BY	CHECKED BY	DETAILS
D	02.08.11	MK	JOC	Trench Update
C	06/07/2011	MK	JOC	Trench Redesign
B	21.04.11	M.K	J.OC	UPDATED TO NEW DESIGN
A	20.04.11	M.K	J.OC	FIRST ISSUE

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CLIENT

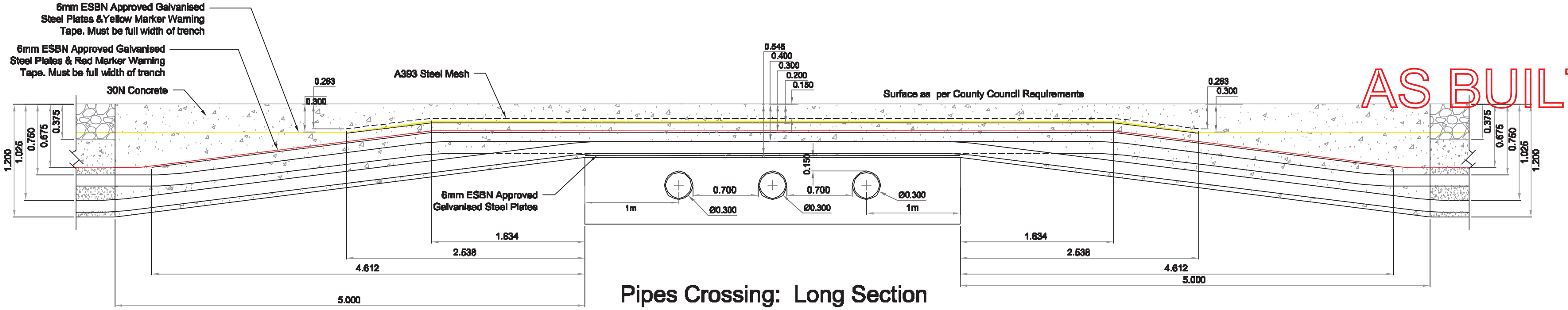
PROJECT
CRORY SUB GROUP

TITLE
2x375mm CROSSING PIPE

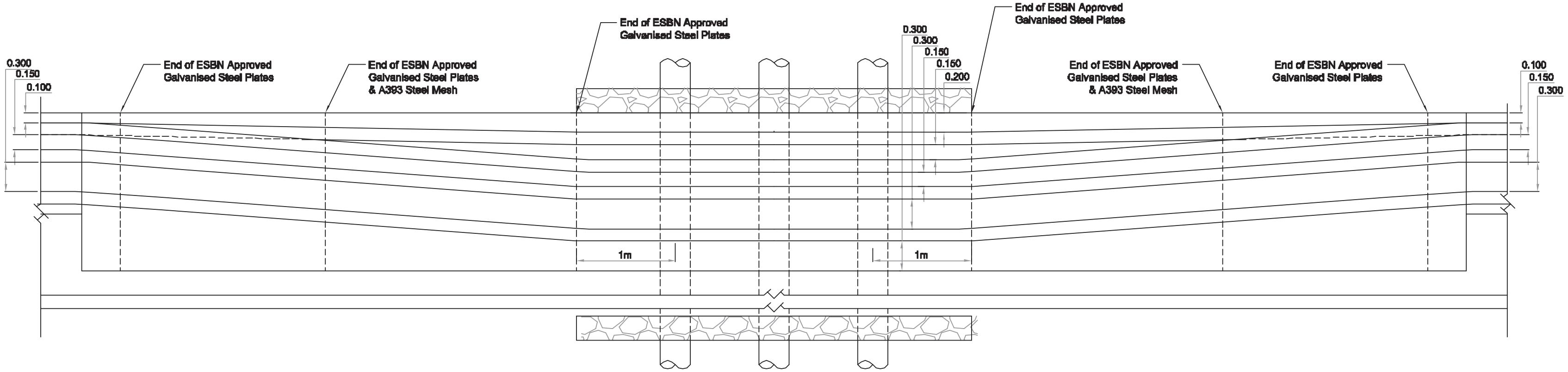
SCALE	STATUS	
1:10		
PAPER SIZE: A3	DRAWN BY: M.KRAS	CHECKED AND APPROVED: J.O'CONNOR
PROJECT PHASE: PRE CONSTRUCTION	DATE: 21/06/2011	DATE: 21/06/2011
DRAWING NUMBER: BCCD d003.4.13		REVISION: D

FILE NAME

AS BUILT

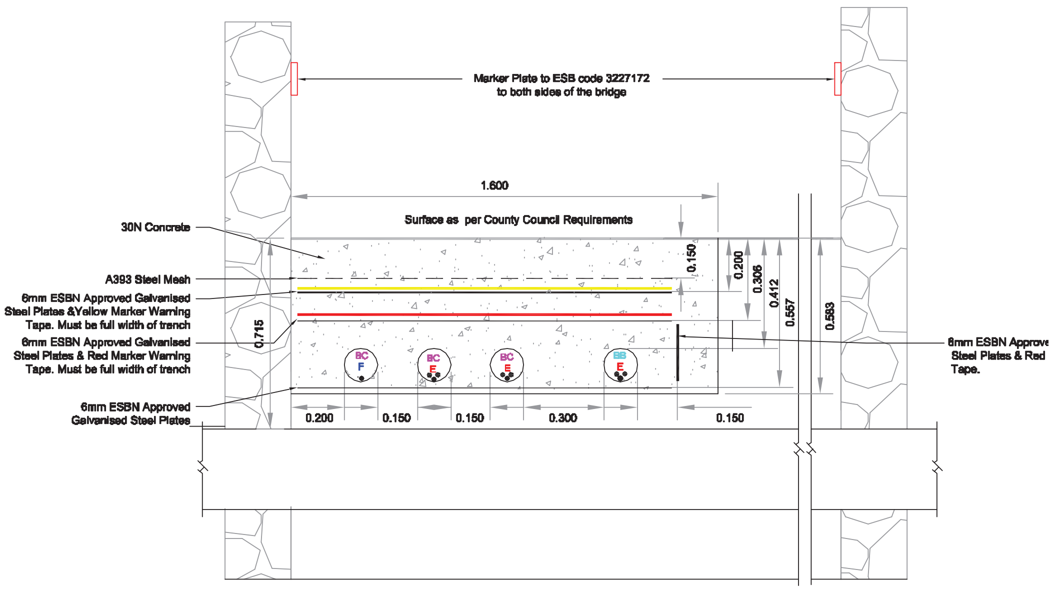


Pipes Crossing: Long Section



Pipes Crossing: Plan

WCP10



Pipes Crossing: Cross Section

XX — WIND FARM NAME
Y — CABLE TYPE

WIND FARM NAME
- GH = GIBBET HILL
- KB = KNOCKNALOUR/BALLYNANCORAN
- BB = BALLAMAN/BALLYDUFF
- BC = BALLYCADDEN

CABLE TYPE
- E = ELECTRICAL
- F = FIBRE OPTIC

DUCT TYPE ESB CODE 9317553
- 125mm OUTER DIAMETER uPVC DUCT WITH 12mm DRAW ROPES.
- MINIMUM SEPARATION TO ADJACENT DUCTS ON THE SAME CIRCUIT 150mm
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- COMM. DUCTS 125mm OUTER DIAMETER uPVC DUCT WITH 12mm DRAW ROPES

NOTES:
- JOINT BAYS TO BE TEMPORARILY BACKFILLED WITH CI804. PERMANENT BACKFILLED FOLLOWING PULLING AND JOINTING OF CABLES

REV	DATE	DRAWN BY	CHECKED BY	DETAILS
F	30.09.11	M.B.	J.O'C.	DIMENSIONS REVISED
E	16.09.11	M.B.	J.O'C	New Crossing Added
D	02.08.11	MK	JOC	Trench Update
C	06/07/2011	MK	JOC	Trench Redesign
B	21.06.11	M.K	J.OC	UPDATED TO NEW DESIGN
A	20.04.11	M.K	J.OC	FIRST ISSUE

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CLIENT

PROJECT
CRORY SUB GROUP

TITLE
3x300mm CROSSING PIPES

SCALE	STATUS	
1:20		
PAPER SIZE: A3	DRAWN BY: M.KRAS	CHECKED AND APPROVED: J.O'CONNOR
PROJECT PHASE: PRE CONSTRUCTION	DATE: 21/06/2011	DATE: 21/06/2011
DRAWING NUMBER: BCCD d003.4.7B		REVISION: G

FILE NAME

APPENDIX 4-1

EMF & YOU: INFORMATION ABOUT ELECTRIC & MAGNETIC FIELDS AND THE ELECTRICITY TRANSMISSION SYSTEM IN IRELAND

Energy for generations

EMF & YOU

Information about Electric & Magnetic Fields and the electricity network in Ireland

April 2017

ABOUT ESB

ESB was established in 1927, as a corporate body in the Republic of Ireland under the Electricity (Supply) Act of 1927. Since then, ESB has been providing energy for those life moments, big and small, profound and everyday where electricity influences people's lives for the better. As a strong, diversified, vertically integrated utility, ESB operates right across the electricity market: from generation, through transmission and distribution to supply of customers.

ESB is fully committed to protecting the health and safety of employees, contractors, customers and the public. Safety is a core company value of ESB and this value guides the approach to safety across all business activities. Arising from concerns about possible adverse health effects resulting from exposure to electric and magnetic fields (EMF) from electrical equipment, such as power lines and appliances, ESB has set out its policy in relation to this topic in this booklet.

WELCOME

ESB understands that some people may have concerns about the potential side effects of frequent EMF exposure on health. Over the last 35 years, there has been considerable public debate surrounding EMF and this has generated many questions.

The main interest of people in this country has centred around the fields produced by ESB overhead power transmission lines, but questions have also been asked about the fields produced by other electrical sources such as household electrical appliances, distribution lines and substations. In accordance with our desire to deal in an open manner with this issue we are providing you with information on this subject, covering key questions such as:

- What are EMFs?
- What studies have been carried out so far?
- Are there risks to human health?
- What is the national and international guidance on EMF exposure?
- Do power lines affect animals?
- Should people take any special precautions against EMF?

The quality of your living and working environment, along with the welfare of livestock and farm crops is of the utmost importance to us at all times. All of ESB Networks plant and equipment complies with the European Recommendation (1999/519/EC) on the limitation of exposure of the general public to electromagnetic fields (0Hz to 300 GHz). Despite over 35 years of intensive research into power frequency EMFs, the international overriding scientific consensus is that EMFs, as generated from power lines, do not cause any adverse long term health effects.

We hope you find this booklet useful and informative and that it provides the answers to the questions currently being asked on this issue, which first became an area of Irish public concern in the 1980s. To explain any technical terms used in the following pages, a glossary has been included on page 32. Please contact ESB for more information or visit our website at www.esb.ie

Pat O'Doherty, Chief Executive

WHAT ARE ELECTROMAGNETIC FIELDS?

Electromagnetic Fields have been recognised since electricity was discovered and have been the subject of thousands of scientific studies across the globe.

Our knowledge and understanding of EMF has grown significantly in recent years.

Electric and Magnetic Fields occur both naturally and from man-made sources.

All electricity, both natural and man-made, produces two types of fields: electric fields and magnetic fields. EMF are produced by natural phenomena which have been a constant part of the environment throughout human evolution. For instance, the Earth has a natural electric field and a magnetic field.

The most common source of man-made EMF that we encounter is electricity.

The man-made sources include all electrical systems including house wiring, electrical appliances and overhead and underground power lines. In Ireland the voltage in homes is 230V. Electricity in Ireland is transmitted at voltages of up to 400,000V (400kV).

The Electric Field

The electric field depends on voltage. The higher the voltage, the stronger the electric field. You can imagine it as being like pressure in a water pipe. A 400kV power line produces a higher electric field than a 110kV power line. The magnitude of an electric field is expressed in volts or kilovolts (thousands of volts) per metre. This is written as V/m or kV/m.

Electric fields are strongest closest to a power line and their level reduces quickly with distance. Electric fields are blocked by buildings, trees etc.

Therefore, inside a typical house the dominant sources of electric fields are typical household appliances such as microwave ovens, hair-dryers and electric blankets.

There are no external electric fields associated with underground cables. This is because the electric field produced is contained within the cable.

The Magnetic Field

The magnetic field is produced by moving electric charges and so the strength of the magnetic field varies directly with the current flows in lines or cables. As a result, the magnetic field can vary at different times during the day. You can imagine this as being like the flow rate of water in a water pipe. Magnetic fields are measured in units of microtesla (μT).

Unlike electric fields, magnetic fields are not blocked by buildings, trees etc. Like electric fields, magnetic fields are highest closest to an electricity line or cable and their level reduces quickly with distance from the line or cable.

Appliances that use a lot of power, such as electric heaters or cookers, generate higher levels of magnetic fields than lower powered appliances.

Q Why does a fluorescent light glow under a high voltage powe line?

There is a well-known phenomenon whereby a fluorescent light will glow dimly if placed below a high-voltage power line. This effect is caused by the electric field. The electric field causes a tiny current (measured in millionths of an ampere) to flow through the mercury vapour inside the tube which casts a weak glow. The moment you move the fluorescent light away from the line, the electric field weakens and the light goes out. This phenomenon has no impact on people or other organisms.

WHAT IS THE ELECTROMAGNETIC SPECTRUM?

Electromagnetic energy travels in waves. These waves span a broad range of frequencies from static frequency (fields that do not change direction with time) at one end of the spectrum, to very high frequency (fields that change billions of times per second) at the other end of the spectrum.

The electromagnetic spectrum shown in Figure A identifies the various types of electromagnetic energy based on their frequency. The earth's magnetic field is largely constant and therefore is described as a static field. Its frequency is very low or zero. The earth's static magnetic field (which acts like a giant bar magnet) causes a compass to align north-south.

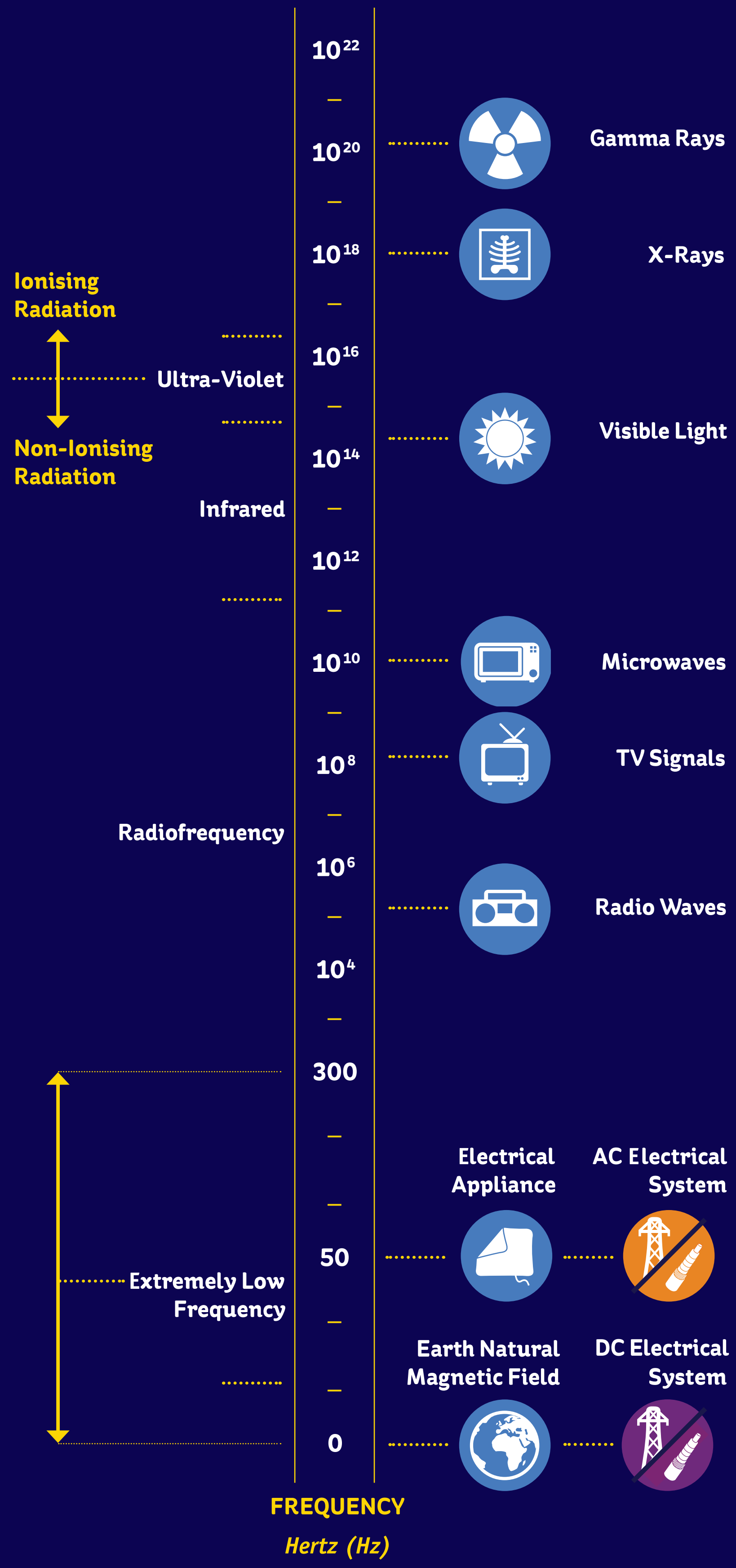
Most man-made sources of electric and magnetic fields fluctuate in direction and intensity. They are called time-varying or alternating current fields (AC). Time-varying or AC fields come from anything that runs on electricity, from electrical installations to household appliances.

Their frequency is expressed in Hertz (Hz). Hertz is the rate at which the field alternates back and forth per second. The electric power system operates at 50Hz in Ireland and Europe and 60Hz in some other places such as North America and thus is a source of EMF at these frequencies. Such frequencies are in the extremely low frequency (ELF) range, 0-300Hz. The ELF EMF from all electrical equipment are time-varying fields with a dominant frequency of 50Hz in Ireland/Europe.

The strength of the EMF or field depends on how close you are to the equipment. Hence the EMF a person can experience from a household appliance can be similar or higher than that from transmission lines because you can be much closer to the household appliance than an overhead transmission line, which is usually several metres or more away from you.

THE ELECTROMAGNETIC SPECTRUM

FIGURE A



ARE EMFs ASSOCIATED WITH ELECTRICITY THE SAME AS RADIATION?

No. The fields resulting from electricity are fundamentally different from x-ray and gamma ray radiation.

Whilst these are all forms of electromagnetic energy there are important fundamental differences.

The term radiation is usually used to refer to ionising energy. Ionising means that, if the radiation is sufficiently strong, it can break bonds in molecules and therefore damage biological molecules including the DNA of cells. Only the high-frequency portion of the electromagnetic spectrum is ionising. This includes, x-rays, gamma rays and ultraviolet light.

The energy in visible light, radio frequency and fields in the static and 50Hz ranges, including electricity, are all classified as non-ionising.

It is very important to realise that 50Hz fields, i.e. electricity, are non-ionising. They have insufficient energy to ionise molecules. Examples of non-ionising energy include EMF from the earth and electric power sources, radio waves and TV waves, microwaves, and most frequencies of visible light. *See figure A, page 9.*

WHAT SCIENTIFIC STUDIES ON THE HEALTH IMPACT OF EMF HAVE BEEN CARRIED OUT?

Since 1979 many scientific studies have been carried out on the possible effects of EMF on people.

To determine if something is harmful to health, scientists evaluate the results from three different types of studies.

1. Epidemiological Studies

Epidemiology is the study of patterns of disease in populations. It searches for statistical links or associations between exposures, such as EMF, and disease in human populations. Epidemiological studies are usually observational, meaning that researchers investigate, but do not try to change, what happens as people go about their daily lives. As a result, epidemiological studies are susceptible to certain kinds of errors that lead an exposure and a disease to be associated even when one does not cause the other. For example, the positive association between number of doctors per capita and mortality rates arises not because doctors increase mortality, but rather because of social and economic factors such as industrialisation and job opportunities. Likewise, just because persons with a certain health condition live near electric power sources does not mean that the fields from these power sources caused the condition. Other environmental and behavioural causes would have to be ruled out, as would the possibility that some people moved to the area after already developing the health condition.

2. Experimental Studies – People and Animals

These studies involve exposing people or animals to EMF in controlled laboratory conditions and looking for biological changes. For practical reasons, human experimental studies of EMF are usually short-term. Experimental studies generally study effects of short-term exposures.

3. Experimental Studies – Cells and Tissues

These studies involve exposing isolated tissues and cells to EMF in controlled laboratory conditions to investigate potential mechanisms of interaction.

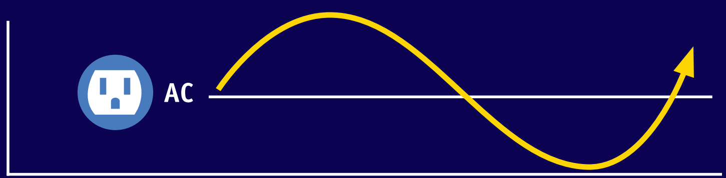
TWO TYPES OF TECHNOLOGY

Transmission systems worldwide are typically constructed as overhead lines and in some cases underground cables are used.

Two types of technology can be used to transmit electricity. Both AC and DC power lines produce electric and magnetic fields. AC lines produce AC electric and magnetic fields and DC lines produce static electric and magnetic fields. ESB Networks transmission and distribution networks are AC systems.

When electricity transmission cables are placed underground, the metallic shielding of the cables block the electric field from the cables above the ground, but this shielding does not block the magnetic field from the cables.

ALTERNATING MAGNETIC FIELDS



STATIC MAGNETIC FIELDS

Figure B. Schematic comparison of AC and DC current flow and the resulting magnetic fields.

THE EFFECT OF DISTANCE ON MAGNETIC FIELDS

Both AC and DC technologies produce magnetic fields and both decrease with distance as you move away from the line or cable. See graph below:

AC LINES AND CABLES

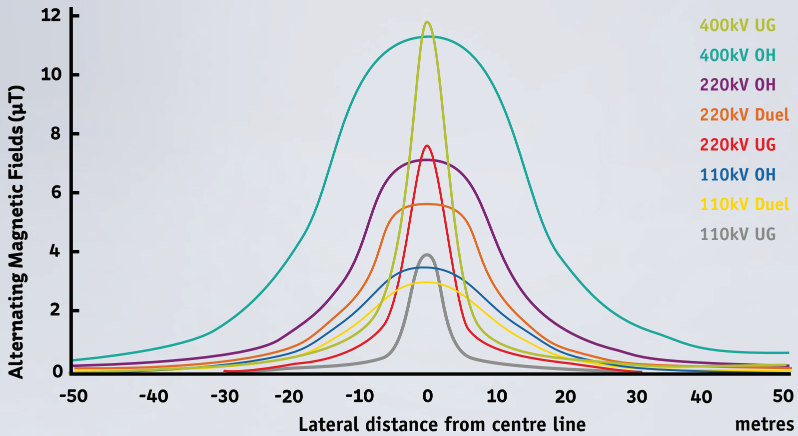


Figure C llustrates the magnetic field from overhead AC lines operating in Ireland. The field strength decreases with distance. The fields from these AC lines are far below the 1998 ICNIRP Guidelines for exposure to AC magnetic fields (100µT). In 2010 ICNIRP updated its ELF-EMF guidelines, which included the recommendation for a 200µT reference level for exposure for the general public, but these have not yet been adopted by the European Union.

WHAT DO HEALTH AND SCIENTIFIC AGENCIES SAY ABOUT RESEARCH ON AC MAGNETIC FIELDS AND HEALTH?

National and international health and scientific agencies have reviewed more than 35 years of research including thousands of studies.

None of these agencies has concluded that exposure to ELF-EMF from power lines or other electrical sources is a cause of any long-term adverse effects on human, plant, or animal health.
Agencies have recognised a statistical association between estimated higher long-term exposures to magnetic fields and childhood leukaemia in some epidemiological studies. However they have not been able to rule out the contribution of chance, selection bias and other factors to explain this association with reasonable confidence. Neither long-term studies of animals, nor studies of cellular mechanisms, have confirmed a biological basis for such an association. This explains why no health agency has concluded that there is a causal relationship between magnetic fields and health effects.

SCENIHR is the European Union's Scientific Committee on Emerging and Newly Identified Health Risks. The committee provides opinions on emerging or newly-identified health and environmental risks.

On 4 February 2014, SCENIHR published its "Preliminary opinion on Potential health effects of exposure to electromagnetic fields (EMF)". This is an update to its 2009 opinion.

The committee reported that new epidemiology studies do not shed light on a previously reported association with childhood leukaemia. Shortcomings in these studies, and a lack of experimental support from animal studies or cellular evidence prevent a causal interpretation of this statistical association.

Several recent epidemiology studies examined residential proximity to power lines and childhood leukaemia risk, but overall provided no new evidence for an association. In the largest study to date, Bunch et al. (2014) provided an extension and update to the 2005 study in the United Kingdom by Draper et al.

The authors extended the study period by 13 years (1962-2008), included lower voltage lines (132kV) in addition to 275/400kV lines, and included Scotland in addition to England and Wales in their analyses. Bunch et al. (2014) included over 53,000 childhood cancer cases and over 66,000 healthy control children and reported no overall association with residential proximity to 132kV, 275kV, and 400kV power lines for leukaemia or any other cancer among children.

The statistical association with distance that was reported in the earlier Draper et al. (2005) study was not apparent in this extended analysis.

No health agency has concluded that exposure to EMF from power lines and other electrical sources is a cause of any long-term adverse effects on human, plant, or animal health.

In 2007, the World Health Organisation updated the International Agency for Research on Cancer (IARC) report with the publication of its comprehensive review of ELF-EMF health research.[1]

The conclusions of the World Health Organisation report can be summarised as follows:

- The research does not establish that exposure to EMF of the nature associated with power lines causes or contributes to any disease or illness.
- There are no substantive health issues related to electric fields at levels generally encountered by members of the public.
- While epidemiology studies have reported a weak statistical association between childhood leukaemia and long-term exposures to magnetic fields greater than 0.3-0.4µT, this association is not supported by the laboratory studies and has not been considered a causal relationship.
- The animal studies as a whole do not show adverse effects, including cancer, among animals exposed to high levels of magnetic fields.
- The laboratory studies on cells and tissues have not confirmed any explanation as to how weak magnetic fields could cause disease.
- Because the epidemiology studies have limitations and the experimental studies provide little or no support for an association with cancer or mechanisms to cause cancer, the World Health Organisation did not conclude that magnetic fields cause childhood leukaemia. Thus, considering all of the research together, the reviewers for the World Health Organisation did not conclude that magnetic fields cause any long-term, adverse health effects.
- The view of the World Health Organisation on ELF-EMF and health issues provided on its website is "based on a recent in-depth review of scientific literature, [we conclude] that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields".[2]

[1] http://www.who.int/peh-emf/publications/elf_ehc/en/index.html
[2] http://www.who.int/peh-emf/about/whatisemf/en/index.html

To date, the whole body of scientific research has not confirmed any adverse effect to human health from EMF.

Independent international health and scientific agencies are continuing to review and monitor the possibility of health effects from exposure to EMF. They are doing this not because they have identified a problem but to ensure that even the smallest possibility of a health risk has not been overlooked, given that everyone in the developed world is exposed to EMF.

The findings of these agencies carry considerable weight, as they reflect the judgements of groups of multiple scientists rather than the views of individuals.

The World Health Organisation stated that the scope of any actions we may take to reduce EMF exposure, either personally or as a society, should be proportional to the strength of the science. The actions to reduce exposure should be very low in cost and should not compromise the health, social and economic benefits of electricity to our society.

WHAT IS THE VIEW OF THE IRISH GOVERNMENT?

In March 2007, Ireland's Department of Communications, Marine and Natural Resources (DCMNR) assembled a panel of independent scientists to review EMF and radio frequency research. The conclusions are summarised in the document entitled "Health Effects of Electromagnetic Fields". The conclusions of this report were consistent with those of The International Agency for Research on Cancer (IARC), the World Health Organisation and other national and international agencies. In relation to EMF, the report states:

'No adverse health effects have been established below the limits suggested by international guidelines.'

In 1988 and 1992, The Department of Energy (Dr T. McManus) published comprehensive assessments of scientific research on electromagnetic fields. In summary of the views of the national and international organisations who have produced reports and addressed the issue, Dr. McManus concludes 'Without exception these reports and the position taken by the organisations concerned do not see enough evidence to be able to indict electromagnetic fields as a hazard to health'.

In 2011, Professor Denis O'Sullivan, Chief Scientific Advisor to the Irish Government published an updated review entitled 'A Review of Recent Investigations into the Possible Health Effects of Exposure to Electromagnetic Fields (EMF) from Power Lines'. In relation to possible long term health effects Professor O'Sullivan concludes that 'the lack of positive findings in controlled experiments or in studies on animals further weakens the belief that this association is in fact, a real one. Furthermore, there is no known biological explanation for the effect. It is simply not possible for the level of energies associated with power lines to cause cancer'.

WHAT IS THE VIEW OF THE EUROPEAN UNION?

In 1999, the Council of the European Union adopted a recommendation in relation to public and occupational exposure to EMF. This recommendation applies the exposure guidelines advocated in 1998 by the ICNIRP, to locations where people spend significant time.

The 1998 ICNIRP guidelines specify limits on exposure to EMF, which are called 'basic restrictions'. To make sure that these basic restriction limits are not exceeded, conservative measurable 'reference levels' for both electric and magnetic field exposure are provided. For the general public these reference levels at 50Hz are 5kV/M and 100µT.[3] If the EMF exposure level is less than the reference level, compliance with the basic restriction is assured. However, if exposure exceeds the reference level, the circumstances of the exposure need to be examined more closely to confirm compliance. However, even if the measured values exceed the relevant reference level, it does not necessarily follow that ICNIRP's basic restrictions for public EMF exposure will be exceeded. The circumstances of the exposure would need to be examined more closely by adopting the most up to date calculation methods available.

[3] In 2010 ICNIRP updated its ELF-EMF guidelines, which included the recommendation for a 200µT reference level for exposure for the general public, but these have not yet been adopted by the European Union.

ARE THERE ANY PRECAUTIONS THAT NEED TO BE TAKEN?

A 2007 Government report stated that, while there is limited scientific evidence of an association between ELF-EMF and childhood leukemia, considerable research carried out in laboratories does not support this possibility.

Nevertheless, the report recommended that the evidence should not be discounted and suggested no-cost, or lowcost, precautionary measures to lower people's exposure to ELF fields.

As a precautionary measure, it recommended that future power lines and power installations should be sited away from heavily populated areas. The report also noted that lowering international guideline limits as a precautionary measure is not recommended by the World Health Organisation.

These precautionary goals are achieved by routing transmission lines as far from existing residences as is reasonably possible, optimising the phasing of adjacent lines, and incorporating stakeholder input during the consultation process carried out in the development of new electricity infrastructure.

Source: Report from Expert Group on the Health Effects of Electromagnetic Fields for Department of Communications, Marine and Natural Resources, 2007.

DO POWER LINES AFFECT ANIMALS?

As with human health, some have expressed concern about the potential effects of EMF from high-voltage transmission lines on animal health, welfare, behaviour and productivity.
The potential effects from EMF on both economically important domesticated animal species and wildlife have been investigated since the 1970s. This has led to a good understanding of the potential means by which EMF could affect organisms in the vicinity of power lines.
Overall, the research does not show that EMF have adverse effects on the health, behaviour or productivity of animals, including livestock.

The substantial body of research on wild and domestic animals is informative for all large mammals and does not indicate any risk. Thus, there is no scientific basis in the research literature to conclude that the presence of a transmission line would create conditions that would impair the health of animals or would precipitate abnormal behaviour.
Studies on dairy cows, for example, failed to find any consistent variation in fertility, hormone levels, milk fat content or dry matter intake beyond what would be expected due to normal variation even when exposed to ELF-EMF far stronger than would occur from the Irish transmission system.
Other research on sheep has examined the effect of ELF-EMF on weight gain, wool production, behaviour, onset of puberty and immune function. None of the studies showed consistent or replicated evidence of adverse effects.

Crops, Plants and Trees

As scientific literature has accumulated, both from laboratory and field studies, on the potential effect of EMF from transmission lines on plants, including agricultural crops and trees, and forest and woodland vegetation, no adverse effects on plants have been reported from electric and magnetic field exposures at levels comparable to those near high-voltage transmission lines.

WHERE CAN I FIND MORE INFORMATION ON EMFS?

The following sources are recommended should you require more detailed information on EMFs.

- The World Health ORGANISATION – International EMF Project(2007)
  www.who.int/mediacentre/factsheets/fs322/en/index.html
- The European Health Risk Assessment Netw ork on Electromagnetic Fields Exposure (2010)
  http://efhran.polimi.it/docs/EFHRAN_D2_final.pdf
- Health Protection Agency
  www.hpa.org.uk/Topics/Radiation/UnderstandingRadiation/UnderstandingRadiationTopics/ElectromagneticFields/ElectricAndMagneticFields/HealthEffectsOfElectricAndMagneticFields/
- Department of Communications, Climate Action & Environment
  www.dccae.gov.ie
- European Commission
  http://ec.europa.eu/enterprise/sectors/electrical/documents/lvd/electromagnetic-fields/
- International Agency for Research on Cancer
  www.iarc.fr/en
- International Commission on Non-ionising Radiation Protection
  www.icnirp.de
- Scientific Committee of the European Commissions
  http://ec.europa.eu/health/scientific_committees/consultations/public_consultations/scenihr_consultation_19_en.htm

WHAT IS ESB'S POSITION AND COMMITMENT?

ESB's position on EMF and health is based on the authoritative conclusions and recommendations of established national and international health and scientific agencies which have reviewed the body of scientific research.

These agencies have consistently concluded that the research does not indicate that EMF cause any adverse health effects at the levels encountered in our everyday environment and that compliance with the existing ICNIRP standards provides sufficient public health protection.

ESB recognises that some individuals are concerned about issues regarding EMF and health. ESB is committed to addressing these concerns. By continuing to closely monitor engineering and scientific research in this area and provide information to the general public and to ESB staff on this issue.

ESB's policy in relation to this issue is as follows:

i. ESB shall apply all legal requirements relating to EMF in Ireland, Northern Ireland, UK and in other jurisdictions where local legislation does not set as high a standard.
ii. ESB shall design and operate generation, transmission and distribution networks and telecommunications infrastructure in compliance with legislation and with due regard to the latest recommendations and guidance of leading international experts and independent bodies on EMF.
iii. ESB shall closely monitor and support engineering / scientific research on EMF.
iv. ESB shall comply with the requirements of 1999/519/EC regarding the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz).
v. ESB shall provide information for the public on its website about the hazards and risks associated with EMF arising out of ESB equipment and/or premises.

AC ELECTRIC FIELDS

Graph 1. The graphic shows some examples of different sources of electric fields and how they compare to typical electric fields associated with overhead electricity lines that make up part of the electricity grid in Ireland.

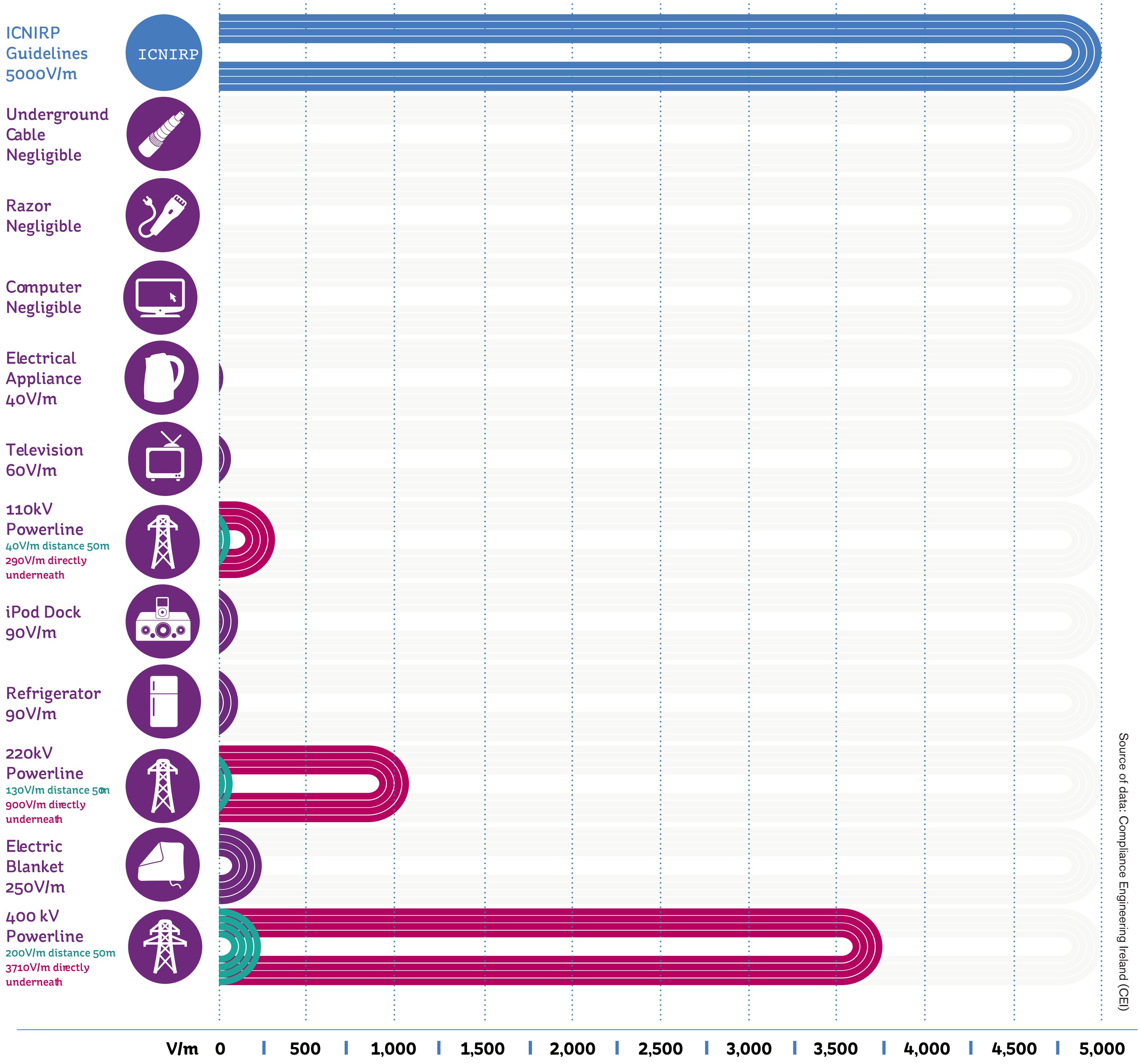
The graph also references the ICNIRP guidelines for exposure to electric fields set to ensure public health and safety.

The International Commission on Non-Ionising Radiation Protection (ICNIRP) was established in 1992.

This independent scientific commission was established to advance non-ionising radiation protection for the benefit of people and the environment. It provides science-based guidance and recommendations including independent international guidelines and recommended limits of exposure. ICNIRP is formally recognised by the World Health Organisation and the European Union as the non-governmental standard setting body for EMF.

This provides an indication of approximate fields from lines and appliances.

COMPARISON OF AC ELECTRIC FIELDS FROM COMMON SOURCES



5kV/m is a reference value, 9.2KV/m is maximum allowable electric field as per the ICNIRP recommendations (using the Dimbylow calculations).

AC MAGNETIC FIELDS

Graph 2. The graphic opposite shows some examples of different sources of magnetic fields and how magnetic field levels from these sources compare to typical magnetic field levels from electricity lines or cables that make up part of the electricity grid in Ireland.

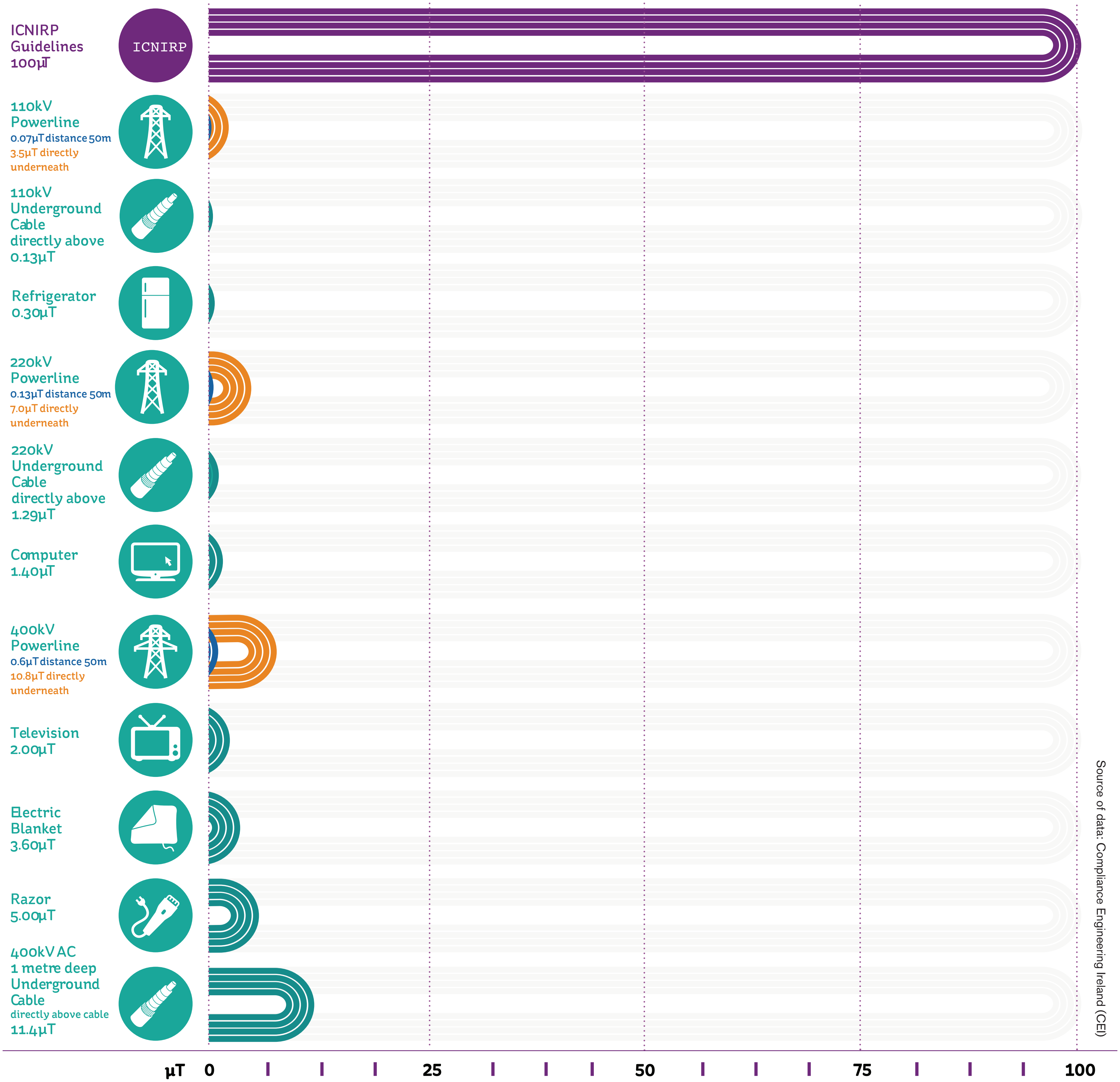
The graph also references the ICNIRP guidelines for exposure to magnetic fields set to ensure public health and safety.

The International Commission on Non-Ionising Radiation Protection (ICNIRP) was established in 1992.

This independent scientific commission was established to advance non-ionising radiation protection for the benefit of people and the environment. It provides science-based guidance and recommendations including independent international guidelines and recommended limits of exposure. ICNIRP is formally recognised by the World Health Organisation and the European Union as the non-governmental standard setting body for EMF.

This graphic provides an indication of approximate fields from lines and appliances.

COMPARISON OF DIFFERENT SOURCES OF AC MAGNETIC FIELDS (µT)



GLOSSARY

AC (ALTERN ATING CURRENT)
Electricity that changes direction at regular intervals is described as AC electricity. AC is the form in which electricity is delivered to our homes and businesses. This is the type of electricity used mainly on the Irish transmission system and in every other system in the world.

CARCINOGENIC
Any substance or agent, including ionising radiation, that causes cancer.

CONDUCTOR
An object or material that can carry electricity, like the power cables used in an overhead line.

CURRENT
The movement of an electrical charge similar to the rate of fluid flow in a pipeline.

DC (DIRECT CURRENT)
Electricity that flows in one direction only, like the battery in your car.

ELECTRIC FIELD
An electric field is created by the difference in electric potential (voltage) between the conductors in power cables. The strength of an electric field is expressed in units of volts per meter (V/m). Higher voltage sources produce higher electric fields.

ELECTROMAGNETIC FIELD
The term electromagnetic field is frequently used to refer to electromagnetic energy across a wide frequency spectrum ranging from the earth's natural fields to cosmic radiation.
Sometimes it refers to frequencies above about 100 kHz where electric and magnetic fields are coupled and radiate away from sources.

ELF (EXTREMELY LOW FREQUENCY)
Frequencies found at the end of the electromagnetic spectrum that contain very little energy and cannot directly break molecules apart, ie., non-ionising. 50Hz electric power operates at ELF levels.

FREQUENCY
AC Electricity is transmitted in waves. The number of times the wave repeats itself in a second is the frequency and is measured in Hertz. On the Irish transmission system, AC electricity is transmitted at 50Hz.

INDUCED CURRENT
A flow of electric current in an object created by the proximity to an AC power source.

IONISING RADIATI ON
Radiation, such as X-rays, which has sufficient energy to break molecular chemical and electrical bonds.

MAGNETIC FIELD
Created by the movement of electric charges. Magnetic fields surround magnetic materials and electric currents. In magnetic materials and permanent magnets, the field is created by the coordinated spins of electrons and nuclei within iron atoms. The magnitude of the magnetic field is expressed as magnetic flux density, also referred to as magnetic field strength. Measured in Tesla (for large fields) or μT (for small fields).

MOLECULE
The smallest particle of a substance that retains the properties of that substance.

NON-IONISING RADIATION
Electromagnetic fields at frequencies that do not have enough energy to disrupt atoms or molecules.

RADIATION
Any of a variety of forms of energy propagated through space.

VOLTAGE
Voltage is the difference in electric potential between any two conductors of a circuit. It is the electric 'pressure' that exists between two points and is capable of producing the flow of current through an electrical conductor. Voltage in a power line is comparable to pressure on a pipeline.