

Chapter 2:

Description of the Proposed Development

(Revised January 2017)

2.1 Introduction

The purpose of this chapter is to provide a description of the proposed development in sufficient detail, which, if taken together with the descriptions of the existing environment provided in this EIS, will allow an independent reader to understand the significant environmental impacts likely to arise from the proposed development. The description considers the location of the project together with its main physical characteristics including design, size, scale and land-use requirements of all relevant phases of the existence of the project from its construction through to operation and decommissioning. Further descriptions of specific elements of the proposed development and the existing environment are also provided in individual chapters of this EIS as they relate to particular environmental topics including, for example, in combination with other proposed developments; the nature and quantity of materials and natural resources used; and the potential production of residues, waste, pollution, noise and nuisances etc. This chapter should also be read in conjunction with the technical plans and drawings submitted with the planning application and photomontages provided in **Volume II** of this EIS.

The description of the proposed development also addresses other off-site/secondary developments which occur as a direct result of the proposed development, including the grid connection transmission line; haul route for turbine components; and extraction of materials and aggregates to facilitate construction. It further considers the evaluation of reasonable alternative locations in terms of project design, technology, location, size and scale, which are relevant to the proposed development and its specific characteristics together with an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

The proposed development will be commissioned as a single construction phase and the construction period is likely to last for approximately 12-18 months. The description of the proposed construction phase includes land-use requirements; proposed site construction works; off-site/secondary developments; description of materials, plant and equipment used to facilitate construction together with a description of potential emissions; waste and traffic etc.

The planning permission being sought by the developer is for a period of 10 years and the operational lifespan of the proposed development is 25 years. Any further operation beyond 25 years would be subject to a further planning application and EIA. This EIS therefore assumes full decommissioning will take place at the end of the project lifespan. There are currently no proposals for the future expansion of the project. Any future expansion would be subject to a further planning application and EIA.

2.2 Site Location & Context

The proposed development site straddles the county boundary between County Laois and County Kilkenny in the townlands of Knockardugar, Boleybawn, Garrintaggart, Ironmills(Kilrush) and Graiguenahown, County Laois; and Crutt, County Kilkenny; approximately 17km south-west of Portlaoise and 25km north of Kilkenny City. The nearest towns are Abbeyleix, approximately 8km north-west, and Castlecomer, approximately 8km south-east. The village of Ballinakill is circa 4km south-west of the subject site. There are also a number of smaller nucleated and crossroad settlements throughout the wider environs of the subject site together with numerous dispersed 'one-off' dwellings and farmsteads outside of any identified settlements. The general site location of the proposed development site is illustrated in **Figure 2.1**. A receptor survey was conducted in order to quantify the number of dwellings, farms and other properties within 1,030 metres (10 rotor diameters) of the subject site and 33 no. receptors were identified. A map at scale 1:5,000 and showing the location of all dwellings within 1,030 metres of the proposed turbines and which indicate the distance from each dwelling to the nearest turbine is provided in **Appendix 2.1**.

The topography in the wider environs of the subject site is dominated by the upland area known as the Castlecomer Plateau, characterised by undulating hills and steep escarpments at its fringes.

Dissecting the lowlands on either side of the plateau are the rivers Barrow and Nore, which lie to the east and west respectively. The lowlands are a mixture of pasture and tillage with fields typically bordered by mature broadleaf tree lines and hedgerows. Agricultural land uses extend into the upland areas in the form of more marginal grazing with scrubby hedgerow field boundaries. Extensive commercial conifer plantations emerge on higher slopes and throughout the Castlecomer Plateau. There are also occasional small patches of woodland associated with demesne landscapes within lowlands as well as narrow strips of riparian vegetation at the margins of streams and rivers. A number of quarries are also present in the wider area. The site itself is located on a generally flat section of ridgeline at the north-western edge of the Castlecomer Plateau and contains a mixture of pastoral farming, commercial conifer plantation and scrub where forest harvesting has taken place.

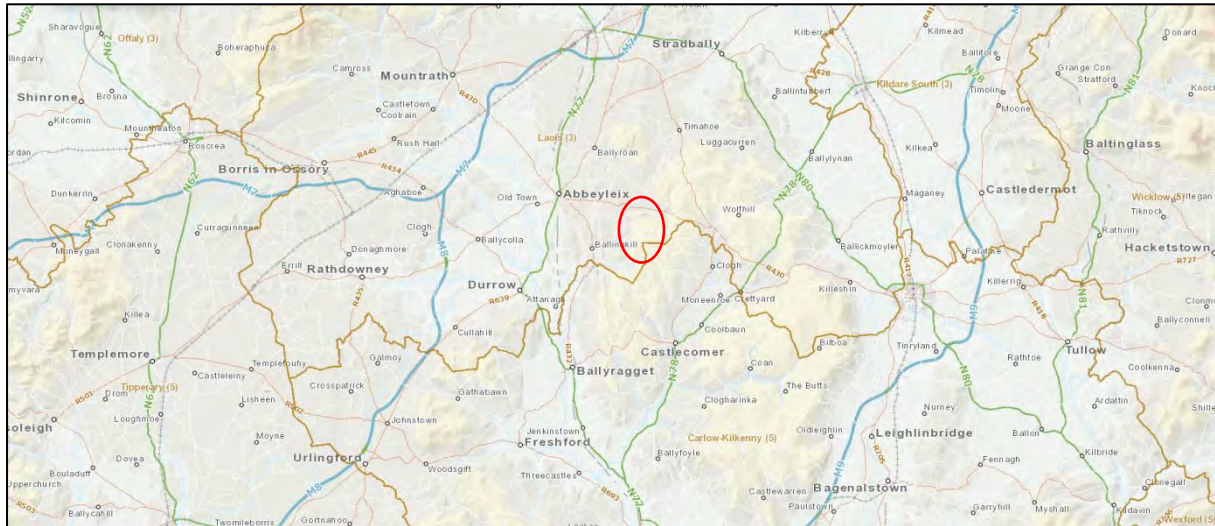


Figure 2.1: Site Location

The principal transport routes in the wider region are the M7/M8 motorways between Dublin and Cork/Limerick and the M9 motorway to Waterford is located to the east. The section of the old N8 national route, which runs between Portlaoise and Durrow is now part of the N77 national secondary road linking to Kilkenny which is at its closest to the subject site as it passes through Abbeylax. The N78 national secondary road passes through the Castlecomer Plateau in a south-westerly direction as it links between Athy and Kilkenny. It is located 8km to the south-west of the subject site at its nearest point. Running perpendicular to the N78 along the north-eastern base of the escarpment that defines the Castlecomer Plateau is the N80 national secondary road. The intersection of these roads and the nearest point of the N80 to the proposal site is 13km to the north-east. In addition to the motorways and national roads described above, there are numerous regional and local roads traversing the wider hinterland of the site including the R430, which is c.1km to the north at its closest point and the R432, which passes through Ballinakill c.4km to the west.

There are a number of important heritage features within the wider hinterland of the site. The most notable, and most prominently located, is the Rock of Dunamase. This elevated and natural defensive position was occupied by a fort as early as the 9th Century and the castle (now in ruins) was built in the latter 12th century. Castle Durrow, c.11km to the south-west, is an early 17th century stately home and demesne, which is currently in use as a hotel and wedding venue. Other heritage features of interest include Aghaboe Abbey (19km west of site) and the Tower of Timahoe (9km north of site).

An 80 metre anemometer mast for measuring wind speed and meteorological conditions is currently erected on the site (Laois County Council Register Reference 12/339). The closest operational wind farm is the Gortahile Wind Farm which consists of 8 no. turbines (Laois County Council Register

Reference 04/935 & 09/237). Planning permission has been granted for an 18 no. turbine wind farm at Cullenagh, County Laois, approximately 8km north of the subject site (Laois County Council Register Reference 13/268 & An Bord Pleanála Reference PL11.242626). Laois County Council has also granted planning permission for 4 no. turbines (Register Reference 10/129) approximately 30km west of the subject site as part of a larger application for 16 no. turbine wind farm to be known as Bruckana Wind Farm which straddles the county boundaries of Laois, Kilkenny and Tipperary (Kilkenny County Council Register Reference 10/145; Tipperary County Council Register Reference 10/510118). A single turbine development at Knocklead, Timahoe is currently the subject of a planning application to Laois County Council (Register Reference 15/401). Within County Kilkenny, the closest permitted wind farm is the 4 no. turbine Lisdowney Wind Farm near Ballyragget.

2.3 Consideration of Alternatives

The presentation and consideration of the various reasonable alternatives investigated is an important requirement of the EIA process and the single most effective means of avoiding environmental impacts. While EIA is confined to the environmental effects which influence the consideration of alternatives, it is important to acknowledge that other non-environmental factors may have equal importance e.g. project economics, engineering feasibility, accessibility etc. The consideration of alternatives also needs to be set within the parameters of the availability of land or the need for the project to accommodate demands or opportunities which are site specific. Additionally, the location of projects are informed by a hierarchy of plans, strategies and policies which have previously been decided upon at a higher administrative level and adopted by the local authority, including, for example, the County Development Plan and its Wind Energy Strategy which has been subject to Strategic Environmental Assessment in accordance with Directive 2001/42/EC. It is important to acknowledge that, in these circumstances, a developer cannot be reasonably be expected to examine locations which have already been previously excluded by the local authority based on higher level environmental assessments.

2.3.1 Alternative Locations

Site selection to avoid intrinsic environmental sensitivity is the principal mitigation option for wind farms. There is a well-established and widely used methodology for the selection of wind farm development locations. The methodology is based on a screening process by applying key criteria (not listed in order of importance), as follows:

- Available wind resource;
- Land use and site context (including spatial planning policy);
- Electricity grid connection and capacity;
- Transport accessibility;
- Residential amenity;
- Environmental constraints;
- Landscape and visual capacity;
- Energy supply and demand;
- Compliance with energy policies;
- Other Factors.

The Atlas of Wind Speeds in Ireland prepared by Sustainable Energy Authority of Ireland (SEAI) indicates that large areas of Laois/Kilkenny meet the technical resource requirements for the successful harnessing of wind energy. Accordingly, initial site investigations of potential sites in this region for a wind farm began in 2007. A number of alternative sites were originally identified and assessed for suitability, as follows:

- **Fossey Mountain**, which is circa 13km south-east of Portlaoise, was assessed as this area as identified as being located in a 'Preferred Area' and 'Areas Open for Consideration' for wind energy development in the Laois County Development Plan 2011 – 2017. However, the site

was excluded due to its potential visibility from the village of Timahoe and the larger number of potential visual and other receptors in the area;

- **Lamberton Demense**, which is approximately 8km south east of Portlaoise, was assessed but was excluded due to a number of features of architectural and cultural heritage significance in the area. There is a ringfort at Lamberton Demesne (LA018-011) which also the subject of a preservation order (No. 197). There are also a number of architecturally significant buildings and structures in the vicinity including a 19th Century gate lodge which is listed on the National Inventory of Architectural Heritage (NIAH) (Reg. No.12801803; NGR 251463/194802) and is also included in the Record of Protected Structures (RPS) for County Laois (Ref. 617). This location is also currently unclassified for wind energy development in the Laois County Development Plan 2011-2017;
- The area around **Ballyprior**, south of Stradbally and 16km south-east of Portlaoise, was also assessed. This area is partly designated as 'Open for Consideration' and 'Areas Not Open for Consideration' for wind energy in the Laois County Development Plan 2011-2017. It was decided not to proceed with this location as the environs of the site is designated as part of the Ballyprior Grasslands Special Area of Conservation (SAC) (Site Code: 002256), a designated European site which consists of orchid rich semi-natural dry grasslands and scrubland on calcareous substrates. The site is also located proximate to the Stradbally Hill Proposed Natural Heritage Area (pNHA) (Site Code: 001800).

Following detailed evaluation of all potential sites, the subject site as described in **Section 2.2** above was selected for the following reasons:

- The available wind resource is calculated at approximately 8.25 metres per second (m/s) at 85 metres which makes the site economically viable for a wind energy development. This has been confirmed from the results gathered from the meteorological mast which has been placed on the site;
- Spatial planning policy context with particular regard to the fact that the subject site is identified as being located in a 'Preferred Area' and 'Areas Open for Consideration' in the Laois County Development Plan 2011-2017, and which has been subject to SEA;
- Immediate proximity to the national grid, available grid capacity and ability to connect directly into the permitted 110kV Laois-Kilkenny Grid Reinforcement Project (An Bord Pleanála Reference PL11.VA0015) which passes through the subject site, and which has been subject to EIA;
- Convenient access to the national motorway network and good quality national/regional road access in order to transport turbine components and other construction materials to the subject site;
- The site's remoteness from population centres and the sparsely populated environs of the site with just 33 no. receptors identified within 1,030 metres of any proposed wind turbine;
- The ability of the subject site to provide a minimum of 500m setback from all wind turbines to dwellings in accordance with the *Wind Energy Development Guidelines for Planning Authorities, 2006*;
- The reasonable scientific certainty as to the absence of impacts on any designated nature conservation sites, particularly in respect of hydrological pathway connectivity;
- The absence of any special landscape designations or special areas of development control attached to the subject lands or immediate environs. Furthermore, there are no scenic routes or views orientated towards the subject lands either within County Laois or County Kilkenny. The Landscape Character Assessment in the Laois County Development Plan identifies the subject lands as being located in the 'Hills and Uplands Areas' landscape character type which is of moderate value and where the Planning Authority's Wind Energy Strategy has identified these upland areas for consideration in terms of future wind energy development;

- Current European and national policy and legislation and binding targets which clearly establishes a need to rapidly increase energy production from renewable resources for energy security and climate change reasons;
- The absence of any constraints in respect of aviation, telecommunication or existing infrastructure such as roads, rail or pipelines;
- The availability of land with initial consultation with the landowners beginning in 2008 and all landowner agreements secured.

Of prime importance in selecting the subject site is that it is identified as being located in a 'Preferred Area' and 'Areas Open for Consideration' for wind energy development in the Laois County Development Plan 2011 – 2017. Accordingly, the land use and planning context has previously been assessed by Laois County Council and considered at a strategic policy level as a suitable location for a wind energy development of this general scale, including during the SEA process. The Laois County Development Plan 2011 – 2017 has categorised four distinct areas for wind energy generation, as follows:

- **Strategic Areas:** Areas deemed eminently suitable for wind farm development and reserved for such purposes. No strategic areas have been identified;
- **Preferred Areas:** Areas deemed suitable for wind farm development that should be granted planning permission unless specific local planning circumstances within the context of the development plan support a decision to refuse. Four areas are identified, with the subject site identified as: '*Preferred Area No. 3A – Spink and Ballinakill*';
- **Areas Open for Consideration:** Applications in these areas will be treated on their merits with the onus on the applicant to demonstrate why the development should be granted permission. Four areas are identified, with the primary area an extension of Area No. 3 identified in the 'Preferred Areas' category described above;
- **Areas Not Open for Consideration:** These are areas identified as particularly unsuitable for wind farm development. The major area identified as being unsuitable for wind energy is the Slieve Bloom Mountains in the north-west of the county.

The criteria identified in the Laois County Development Plan for designating a 'Preferred Area' are as follows:

- Relatively low sensitivity to wind development;
- Have a viable wind regime;
- Avoid most designations;
- Are sparsely populated;
- In close proximity to a grid connection;
- An approved or built wind farm in the vicinity.

Within the Kilkenny County Development Plan 2008-2014, the proposed development site was formerly located in an area designated as 'Acceptable in Principle' for wind energy. However, this designation was altered in the Kilkenny County Development Plan 2014 – 2020 and the site is currently unclassified for wind energy development. However, it is noted that only the site access road for the proposed wind farm is located within County Kilkenny and no wind turbines are proposed within this jurisdiction.

2.3.2 Alternative Processes

The proposed development is for the generation of renewable energy from wind resources. No alternative processes were considered.

2.3.3 Alternative Designs

Site layout and design to achieve appropriate orientation, spacing, setbacks and alignment is an appropriate secondary mitigation measure. The process of designing a wind farm and assessing the

potential environmental effects arising from the project is a highly complex, iterative and non-linear process. The design of the project informs the need for environmental mitigation and which in turn iteratively informs the project design through on-going circular scoping. **Figure 2.2** below illustrates the various stages taken to determine a final site design layout for the proposed development.

Careful consideration has been given to alternative designs including turbine sizes, models, number of turbines, spacing and layout. The EIS process and output efficiency proved the greatest influences on the final design and the site layout was amended on several occasions throughout the EIS process. This proposed layout has been particularly influenced by the following considerations:

- Visual impact/Inter-visibility;
- Setback to existing/permitted residential dwellings;
- Existing access tracks within the site.

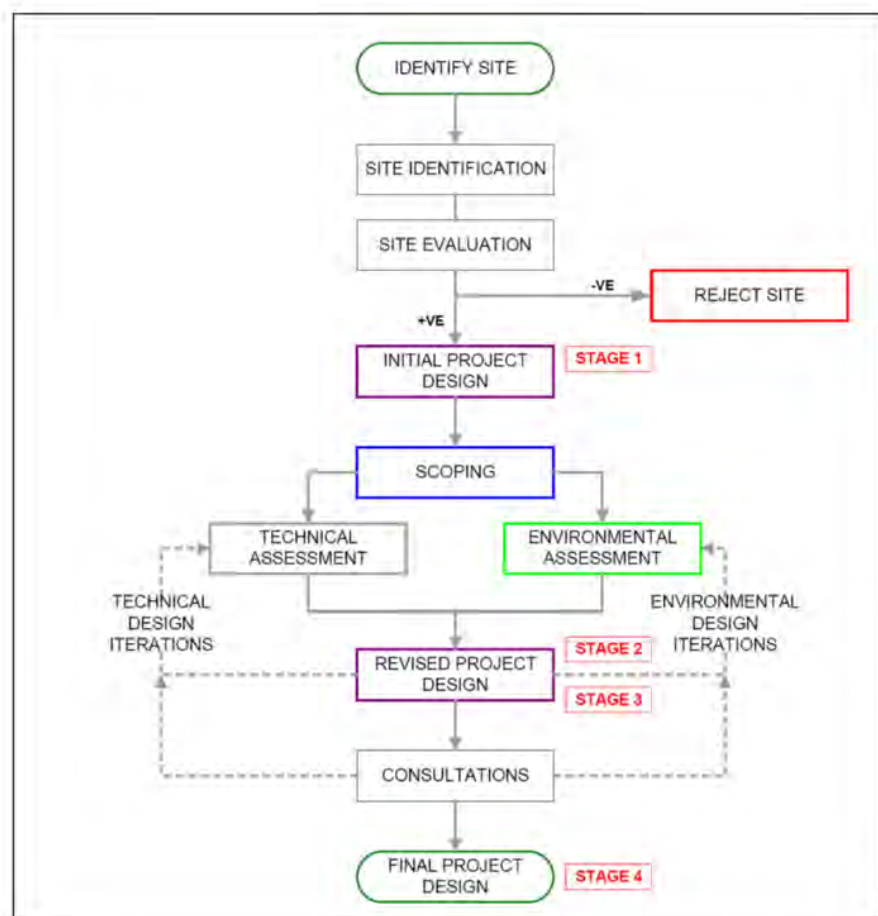


Figure 2.2: Stages of the Project Design/EIS Process

In 2013, a planning application was submitted on the subject site for 8 no. turbines with a maximum height of 152m with a total output of 22.8 MW (Laois County Council Register Reference 13/262 & Kilkenny County Council 13/397) (see **Figure 2.3**). Following, the withdrawal of this planning application, a series of wind modelling analyses using specialist software was undertaken to establish the revised optimal location and dimensions for the turbines. It was considered that the overall renewable energy output of the proposed development could be enhanced to take advantage of this strategically located site through a revised layout/design and the installation of 11 no. turbines each with an overall height maximum height of up to 136.5m. In terms of layout and spacing, to ensure optimal performance and to account for turbulence and wake effects, the proposed turbines have been spaced using three rotor diameters (309m) in the crosswind direction and five rotor diameters (515m) in the prevailing downwind direction. Furthermore, and also taking

residential amenity into consideration, a minimum setback buffer of 500m was applied to all dwellings. The resulting spacing pattern is regular and geometric which provides a distinct cluster of wind turbines and responds to the underlying field pattern and existing forest tracks. These forest tracks are generally in good condition and require little upgrading, thus minimising construction phase impacts. A balance was therefore struck in order to achieve optimum performance and respond to environmental constraints as best as possible in order to minimise the spatial extent of the proposed wind farm and provide a visually coherent pattern of development. Further ‘mitigation by design’ amendments prior to the selection of the final layout proposal were as follows:

- On the advice from the archaeological specialist consultant, the access road was slightly amended to take account of a water well recorded during the site visit on the south side of the access road between Turbines 1 and 2 and which is not recorded on the First Edition map;
- On the advice from the ecological specialist consultant, the access road was slightly amended to avoid an unoccupied badger sett found during the ecological site walkover. Also the access road between Turbine 7 and Turbine 8 was slightly rerouted on advice from the project ecologist in respect of bats;
- On the advice of the ecological consultant, the temporary construction site compound was relocated away from a small stream which runs through the site.

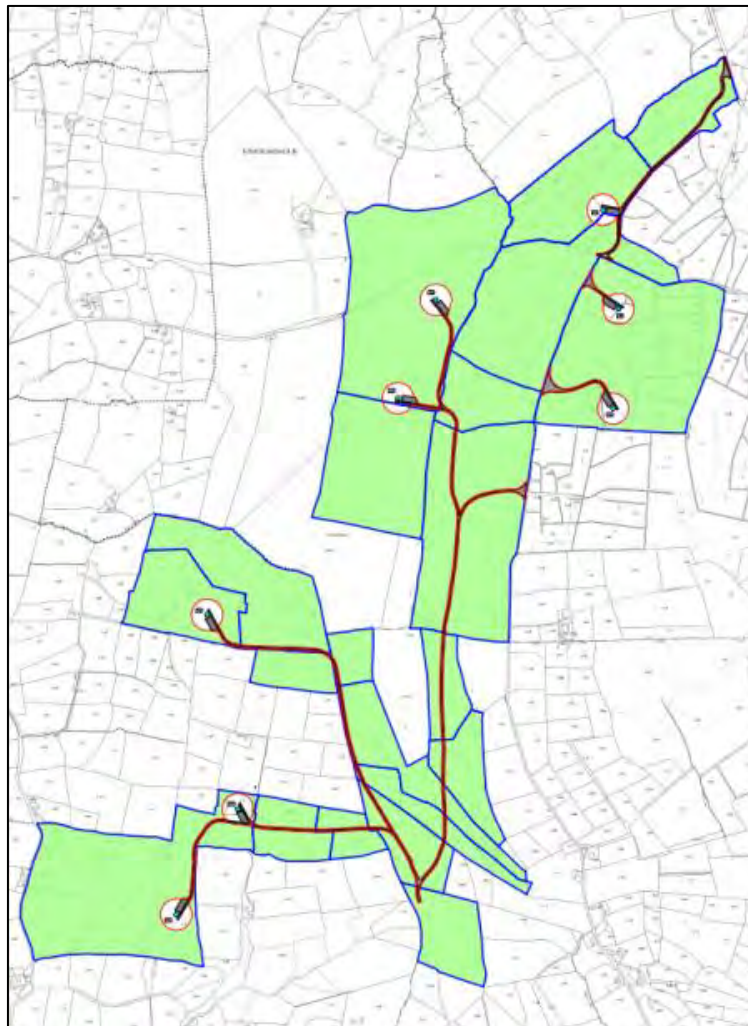


Figure 2.3: Previous alternative layout submitted as part of Laois County Council Register Reference 13/262 & Kilkenny County Council 13/397

2.4 Description of the Proposed Development

The proposed development (the 'project') comprises of 11 no. wind turbines and all associated development works to accommodate their installation, operation, maintenance and the export of electrical power to the national grid. This will include a permanent meteorological mast 85m in height; site access tracks; foundations; hardstanding areas; underground cabling; single storey substation and switchroom, accompanying equipment and compound area. The co-ordinates of the proposed wind turbines are set out in **Table 2.1**.

<i>Turbine</i>	<i>Eastings</i>	<i>Northings</i>	<i>Hub Height (m)</i>	<i>Rotor Diameter (m)</i>	<i>Max Height (m)</i>	<i>Electrical Output (MW)</i>	<i>Approx. Altitude (mAOD)</i>
T1	251604	182460	85	103	136.5	3.2	258.7
T2	251693	182105	85	103	136.5	3.2	267.5
T3	251676	181781	85	103	136.5	3.2	273.2
T4	250937	181833	85	103	136.5	3.2	297.7
T5	251205	181628	85	103	136.5	3.2	299.3
T6	250756	181489	85	103	136.5	3.2	302.7
T7	250403	181186	85	103	136.5	3.2	278.9
T8	250682	180984	85	103	136.5	3.2	292.8
T9	250742	180675	85	103	136.5	3.2	291.0
T10	250826	180372	85	103	136.5	3.2	287.6
T11	250276	180413	85	103	136.5	3.2	260.8

Table 2.1: Turbine Locations and main features

**Note: Micro-siting and immaterial deviations to the proposed development within an overall development envelope are included in this EIS assessment.*

The total direct footprint of the proposed development site area ('red line' boundary) is 39.96 hectares including turbine locations, meteorological mast, cables routes, access tracks and substation/switchroom compound. Each element of the proposed development is discussed in turn below and all technical plans and drawings are included in Volume II of this EIS.

2.4.1 Wind Turbines

Given the available wind resource and relatively low terrain, a turbine with an overall height of up to 136.5 metres is presently considered to be the most suitable wind turbine currently available in the market for this site. Each of the 11 no. turbines shall have a rated electrical output of 3.2MW, giving a total electrical output of 35.2MW. The proposed turbine typically has a hub height of 85 metres, a rotor diameter of 103 metres, a rotor speed of 14.8 rpm (rotations per minute) and rotates clockwise. The turbine has a cut-in wind speed of 3 m/s and a cut-out speed of 25 m/s. At the cut-out speed the turbines will automatically shut down. The proposed turbines will each consist of a three-bladed rotor attached to a nacelle (hub) which contains the mechanical drive train and electrical generation mechanisms. The blades will be constructed of glass reinforced plastic and lightning protection conduits are integral to their construction. The nacelle is supported on a steel tower of tubular construction. The colour of the proposed turbines and blades will be white, off-white or light grey in accordance with the Wind Energy Development Guidelines for Planning Authorities (2006) and as determined by the Planning Authority.

It is important to stress that the exact model and manufacturer of the turbine has not yet been chosen and options will remain open until the construction tender stage. A number of other turbine models could be potentially suitable for the subject site. Turbine technology changes rapidly and the final turbine model to be installed will be subject of a competitive tendering process at the time of the commencement of construction. It may also be the case that the proposed turbine will not be

available at the time of competitive tendering due to the rapid obsolescence of individual models. A 136.5 metre turbine has therefore been used as a template for the basis of the assessments in this EIS as it is currently the turbine available in the Irish market that best fits the required profile for the subject site. Any immaterial deviations to turbine dimensions caused by a change in the turbine model eventually installed on-site (in terms of hub height, rotor width, dimensions, finishing or micro-siting within the overall height envelope of 136.5m) will not impact on the substantive conclusions of this EIS.

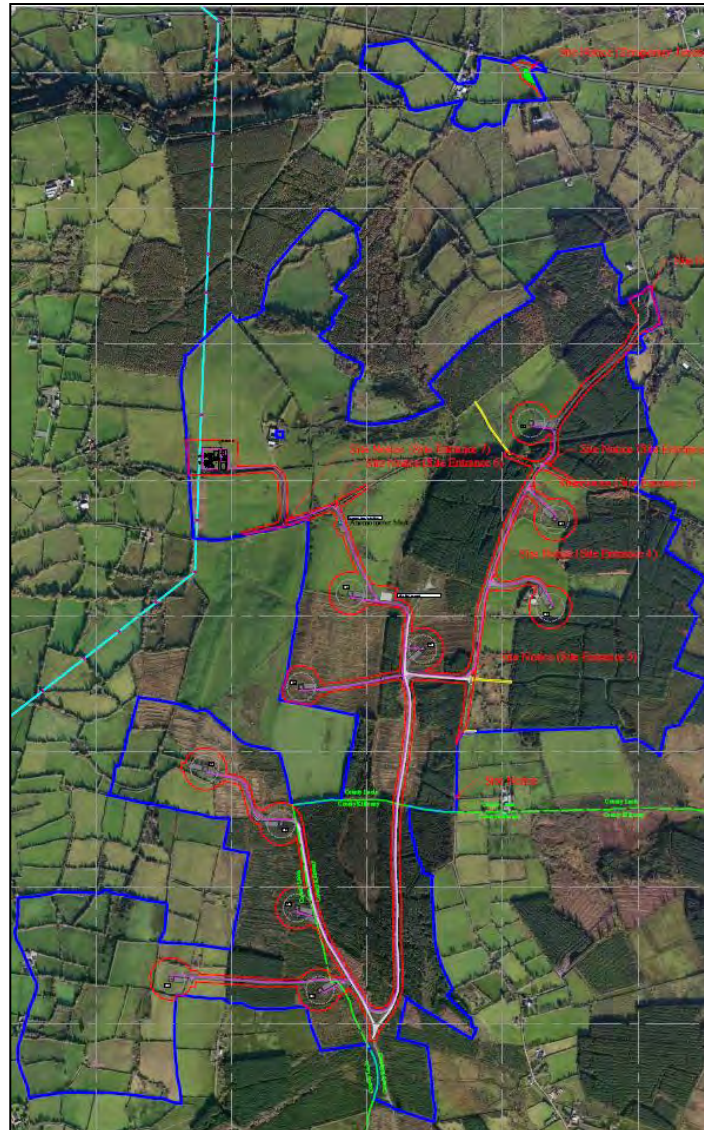


Figure 2.4: Proposed Site Layout

2.4.2 Turbine Foundations

Each turbine tower is bolted down to a steel ring foundation which can comprise either a reinforced concrete raft foundation or a piled foundation. The type of foundation used for each turbine will depend upon the specific ground conditions at each location. This shall be established through detailed technical design and post-consent geotechnical investigations prior to construction, as is normal best-practice in all construction projects. Geotechnical investigations carried out at each of the turbine locations demonstrate that the subsoil conditions are suitable for the construction of turbine foundations (see **Chapter 5**). It is proposed that, where possible, concrete, aggregates and materials for foundations shall be sourced locally, a process which has the advantage of reducing the overall vehicle movements (see **Chapter 13**). The typical foundation depth for each turbine will be

c.3 metres, including granular fill area. This depth may materially vary slightly depending on the depth to bedrock. The area of each turbine base will occupy approximately 18.5m x 18.5m and construction will involve the excavation of approximately 1,260m³ of material. Excavations will be undertaken by conventional mechanical methods and no blasting shall be required. Rock, topsoil and vegetation removed during construction of turbine foundation bases will be appropriately stockpiled and, in so far as is practicable, reused onsite to form access tracks and site reinstatement,

2.4.3 Hardstandings

Hardstanding areas shall be established adjacent to each turbine to facilitate crane operations for erection and occasionally for maintenance and decommissioning. Each hardstanding area shall typically be 45-55m x 20m for the construction phase and will allow for two large cranes to operate simultaneously. However, this may be immaterially altered within the micro-siting tolerance threshold depending on the final turbine model selected. Following installation of the turbine, the hardstanding will be covered in topsoil and grassed over to approximately 10m x 20m for the operational phase in order to minimise environmental and visual impact. During the decommissioning phase, or in the event of operational maintenance, the hardstanding can be re-exposed for crane operations to decommission and/or maintain the turbines.

2.4.4 Micro-siting

Following further detailed pre-construction site investigations and geotechnical analyses, immaterial micro-siting of turbines, access tracks and other components of the proposed development form part of the proposed development and the assessment in this EIS. This will allow scope for further detailed post-consent environmental mitigation should it be considered necessary. A micro-siting allowance of 20m in any direction is proposed for turbines and access tracks in accordance with Section 5.3 of the Wind Energy Development Guidelines for Planning Authorities (2006) and subject to the environmental constraints and mitigation measures included in this EIS. It is anticipated that the agreed tolerance micro-siting distance will form a condition accompanying a grant of planning permission. Any immaterial micro-siting will have no impacts on the substantive conclusions of this EIS.

2.4.5 Electrical Substation

The turbines will be connected to the proposed single-storey substation and from there electricity will be exported to the national grid via the 110kV Laois-Kilkenny Grid Reinforcement Project which passes through the subject site. Two single circuit strain towers of up to 26.5 metres in height will be required to connect into this 110kV transmission line. The substation will be approximately 203m² with an overall height of 6 metres. The switchroom 90m² and also with an overall height of 6 metres. The substation and switchroom will contain connection points and associated equipment such as incoming and outgoing circuit breakers, earth fault, protection devices, the grid transformer, metering equipment, computer and server. The proposed substation and switchroom shall be constructed of blockwork and will be finished in sand and cement render, slate roof covering and steel doors. For safety and security reasons, the substation, switchroom and ancillary equipment compound will be enclosed by a 2.4m high steel palisade fence and screened with landscaping to reduce visual impact.

2.4.6 Connection to the National Grid

The proposed development will connect to the national grid, for the export of energy, via the permitted 110kV Laois-Kilkenny Grid Reinforcement Project (An Bord Pleanála Reference PL11.VA0015) which passes directly through the site¹. A map at scale of 1:2,500 and 1: 5,000 metres together with an overall reference map of the permitted Laois-Kilkenny Grid Reinforcement Project Route is provided in **Appendix 2.2**.

¹ <http://www.eirgridlaoiskilkenny.ie/index.html>

Following detailed discussions with Eirgrid it has been agreed that the proposed development can loop directly into this 110kV line via a substation/switchroom at the subject site. This will include the erection of two single circuit strain towers of up to 26.5 metres in height. From there, the proposed development will have a fully consented transmission path to either the permitted 400/110kV substation at Coolnabacky or the permitted 110kV upgraded substation at Ballyragget which are both equidistant from the subject site. An assessment of the environmental impact of the proposed development in-combination with the permitted 110kV Laois-Kilkenny Grid Reinforcement Project is discussed in **Section 2.7.2**.

2.4.7 Meteorological Mast

A temporary meteorological (anemometer) mast currently exists on the western portion of the site for measuring wind speed and meteorological conditions. This mast is 80m in height and is installed pursuant to Laois County Council Register Reference 12/339. It has recorded an average wind speed for the site of approximately 8.25 at 85 metres (adjusted). It is proposed that this mast will be removed and replaced with the permanent mast.

A permanent meteorological mast will remain on-site during the operational phase of the development (permanent as per the life span of the wind farm). The proposed permanent mast is 85m in height and will consist of a steel lattice structure to which various measurement instruments will be attached. Some ground works, including the construction of concrete foundations and hardstanding area, will be required to erect the mast.

The purpose of the mast is to monitor wind speeds and climate conditions for the efficient operation of the wind farm. The data from the mast is sent remotely to a computer system located off-site so that the data can be analysed and to extrapolate the long-term wind resource at the site. The mast is also required to carry out power curve performance tests, a typical condition of the wind turbine warranty.

2.4.8 Transformers & Cables

Each turbine will utilise its own transformer, which will be located either inside or outside the turbine tower. Depending on the final turbine model selected, transformers will either be oil-filled (and banded to prevent spillage) or of a solid cast resin type which is effectively non-polluting should a spillage occur. The transformers will increase the electrical voltage on site and buried cables adjacent to the site access tracks will connect the turbines to the substation for export to the national grid.

The buried cables will be of a solid polymeric construction with either aluminium or copper conductors and will follow the alignment of the on-site access tracks insofar as is practical. Cable installation trenching will be by a mechanical digger. The proposed depth of the cable trench is approximately 1 metre and the proposed width of the cable trench is 50 centimetres. The excavated material will be laid alongside the trench for use in reinstatement following the laying of cables.

2.4.9 On-Site Access Tracks

A total of approximately 7.4km of on-site access tracks (excluding public roads) will be required for construction purposes and for site access during the operational phase. The access tracks proposed shall be similar to normal agricultural or forestry tracks but with a slightly wider typical running width of approximately 5 metres. Good quality forestry access tracks already exist within the site and these existing tracks will be upgraded and new tracks constructed, where necessary, to provide access to the proposed turbine locations. The location of these existing access tracks was a key consideration in the design and layout of the proposed development, in order to limit environmental impact.

Additional excavated strips will be required alongside the tracks to accommodate drainage and cable trenches. Track variations shall be made to accommodate turning of long loads and passing traffic, as required. Access tracks will be unsealed and constructed of inert crushed stone material on compacted sand to allow for permeability. Material will, where possible, be sourced from on-site construction

activities (e.g. foundation excavations) and local quarries, as necessary (see **Chapter 13**). In order to prevent inundation, a textile layer may be needed to avoid later access problems. Some cut/fill of the access tracks may also be necessary to ensure that gradients and crossfalls are suitable to accommodate vehicles, abnormal loads and adequate drainage. The selected wind turbine manufacturer shall be consulted during detail design of access tracks. Various hardstandings and turning areas will also be required in the vicinity of each turbine location to allow for crane operations.

No major watercourses exist within the site. However, a number of drainage ditches do exist together with the upper reaches of one first order stream (typically dry in summer). Where it is necessary for access tracks to cross any drains or identified water features, the relevant bodies (e.g. Inland Fisheries Ireland) will be consulted prior to construction and all mitigation measures proposed in the EIS will be fully adhered to. A minimum 50m buffer zone will be observed around all surface water features during the construction phase and no fuel/chemicals will be handled or stored within this buffer zone.

2.5 Construction Phase

The construction period is likely to last for approximately 12-18 months from commencement of detailed site investigation, survey and design work, through to the installation and commissioning of the turbines and ending with reinstatement of the construction compound. The construction phase of the development will comprise a 6 day week with normal working hours from 7.30am to 6.30/8.00 pm Monday to Friday and 7.30am to 1pm on Saturdays.

No construction works are envisaged during the operational phase. Works during this period will typically involve the routine inspection and servicing of the turbines and ancillary structures, as necessary. In exceptional circumstances there may be a requirement for more substantial works e.g. replacing a turbine blade, or gearbox/generator replacement.

Further details of the construction phase and specific mitigation measures for the construction phase are provided in each chapter of this EIS as they relate to each environmental topic.

2.5.1 Construction Method

The construction method will consist of the following general sequence:

- The construction of the site entrances;
- Construction of the temporary construction compound for off-loading materials and components, and to accommodate temporary site offices;
- Construction of bunded areas for oil, fuel and lubricant storage tanks;
- Progressive construction of internal on-site access tracks;
- As the internal access tracks progress to each turbine location, foundation excavations for the turbines and substation will commence and foundations laid. The hardstanding areas and the substation, switchroom and compound will be constructed as the track advances;
- Once the tracks are completed, the trenching and laying of underground cabling will begin;
- Installation of turbines will commence once the site tracks, hardstandings, foundations and drainage measures are in place and the temporary road junction upgrade is complete. It is anticipated that each turbine will take 2 to 3 days to install. Two cranes will be used for this operation. As each turbine is completed, the electrical connections will be made;
- Hardstandings will be partially resodded, where necessary, following construction phase crane operations;
- Decommissioning of the temporary meteorological mast and installation of the permanent meteorological mast will then take place;
- Progressive site reinstatement and restoration including removal of temporary construction compound.

Once the turbines are installed, the substation and electrical system completed, the turbines will be tested and commissioned.

A detailed Environmental Management Plan (including a Construction Management Plan) will be prepared in advance of all construction activities and will incorporate all mitigation measures proposed in this EIS. The site will be supervised by a project manager during the construction phase who will liaise closely with the on-site environmental engineer monitoring construction works. The Environmental Management Plan will be submitted to Planning Authority for approval prior to any works commencing on the site. The Construction Management Plan shall provide details of intended construction practices, including:

- Location of the site and materials compound including areas identified for the storage of construction waste;
- Location of areas for construction site offices and staff facilities;
- A plan for the timing and routing of construction traffic to and from the construction site and associated directional signage, to include in particular proposals to facilitate and manage the delivery of oversized loads to the site;
- Construction stage details of the proposed construction methodology, certified by a suitably qualified civil engineer;
- Measures to prevent the spillage or deposit of clay, rubble or other debris on the public road network;
- A Traffic Management Plan and alternative arrangements to be put in place for pedestrians and vehicles in the case of the temporary closure of any public road or footpath during the course of site development works;
- Details of appropriate mitigation measures for construction stage noise, dust and vibration, and monitoring of such levels;
- Containment of all construction related fuel and oil within specially constructed bunds to ensure that fuel spillages are fully contained; such bunds shall be roofed to exclude rainwater;
- Appropriate provision for re-fuelling of vehicles;
- Off-site disposal of construction/demolition waste and construction-stage details of how it is proposed to manage excavated soil;
- Means to ensure that surface water run-off is controlled such that no silt or other pollutants enter water courses in full compliance with this EIS;
- Details of the intended hours of construction.

The Environmental Management Plan and Construction Management Plan will take full cognisance of the Surface Water Management Plan and Habitat and Species Management Plan proposed as a key mitigation measure in this EIS.

2.5.2 Site Entrances

Given the pre-existing local road network, seven site entrances are proposed, four of which are already in existence. The proposed entrances will be of sufficient width to facilitate turbine delivery and adequate visibility splays, and may involve the removal of short sections of road boundaries and hedgerows. It is not anticipated that any significant works will be required to the public road and all drains will be appropriately culverted.

2.5.3 Construction of Hardstanding Areas and On-Site Access Tracks

The areas of hardstanding for crane operations and on-site access tracks will generally be constructed as follows:

- Topsoil and subsoil will be removed and stored in separate mounds in appropriate areas adjacent to the crane site/access tracks;
- Crushed stone will be laid on a geo-textile mat to an appropriate depth;
- For hardstandings, after turbines are erected the topsoil will be used to cover the hardstanding where appropriate, to reduce the visual and environmental impact, but the

hard-standing shall be retained in situ for the operational phase of the wind farm. In the event that maintenance work requiring a large crane is needed (e.g. replacement of a blade set), the crane hardstanding areas will be re-exposed and will again be recovered with topsoil and reseeded on completion of the work;

- Where access tracks require to cross any drainage ditches or water feature, appropriate span bridges will be constructed to prevent any interference with watercourses;
- The hardstanding and on-site access tracks will be removed during the decommissioning phase, unless the Planning Authority agree to their retention for forestry/agricultural activities.

2.5.4 Temporary Construction Compound

During the construction period, a temporary construction compound will be required and will comprise:

- Temporary cabins to be used for the site office, the monitoring of incoming vehicles and welfare facilities for the construction staff, including temporary toilets;
- Parking for construction staff, visitors and construction vehicles;
- Secure storage for tools, plant and small parts;
- Safe bunded storage of components and materials including fuels, lubricants and oils;
- Security fencing around the compound.

Temporary portaloo chemical toilets for construction staff will be sealed chemical units to ensure that no discharges will escape into the local environment. These will be supplied and maintained by a licensed supplier. Potable drinking water (for drinking, food preparation, hand washing etc.) will be supplied on-site by water dispensers and this will be sourced and maintained through a licensed supplier.

The compound will be marked out and fenced to prevent any environmental impact. The compound will be fully re-instated at the end of the construction period. Reinstatement will involve removing crushed stone and underlying geotextile and covering with topsoil and seeded out.

2.5.5 Construction Drainage & Effluent Disposal

The proposed development site is located in the catchment of the specified Freshwater Pearl Mussel populations as set out in First Schedule of the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (S.I. No. 296/2009). Sedimentation poses the biggest threat to the Freshwater Pearl Mussel which is the qualifying interest of the River Barrow and River Nore SAC (Site Code: 002162). All surface water run-off shall be strictly controlled such that no silt or other pollutants enter water courses and that no artificially elevated levels of downstream siltation or no plumes of silt arise when substratum is disturbed in accordance with the Fourth Schedule of the Regulations.

Construction works will be carried out in accordance with the soil and water assessments and mitigation measures included in this EIS in order to minimise any risks of pollution of nearby watercourses by debris, silt and oils (see **Chapter 5 & 6**). The potential impacts during construction on water environment will include increased volumes of surface water runoff; the generation of silt laden surface water runoff from excavations and the storage of stockpiles; surface water and groundwater contamination due to leakage oils/fuel from site vehicles, spillage during refuelling operations; and leakage from chemical, waste and fuel storage areas. Specific mitigation measures are presented in the relevant chapters of this EIS in relation to each of these issues.

During the construction phase, stockpiles of excavated materials will be stored appropriately in a designated area of the site (a minimum of 50m from nearby watercourses or drains), in order to minimise the risk of silt laden surface water runoff entering surrounding water courses. All surface

water runoff from stockpiles, excavations or from dewatering operations will be passed through a silt trap.

The refuelling of vehicles/machinery will normally take place off-site. In the event that refuelling occurs on-site, it will be under a strict protocol and will be carried out only by trained personnel. Storage areas for oils, chemicals and waste will be comprised of bunded areas of hardstanding of sufficient capacity. Bunds will have a watertight roof structure and will be supplied by a licensed manufacturer to enable adequate safe storage for the quantities of material required. An adequate supply of spill kits will be available in order to clean up any minor spillages should they occur. A hydrocarbon interceptor will be installed within the surface water drainage system during the construction phase to trap any hydrocarbons that may be present. A 50m buffer will be observed around all surface water features and no fuel/chemicals shall be handled or stored within this zone.

2.5.6 Spoil Management

The overall indicative volume of subsoil excavation for the proposed development has been established as being approximately 10,969m³ from roads and 9,072m³ from hardstands and the substation. The estimated volume of subsoil to be re-used on site is 20,038m³. A small section of road in County Kilkenny will be excavated amounting to 288m³ of subsoil excavated and a volume of 192.5m³ re-used in a roadside berm. Therefore the indicative volume of subsoil excavation within County Laois has been established as being approximately 10,681m³ from roads and 9,072m³ from hardstands and the substation. The estimated volume of subsoil to be re-used on site within County Laois is 19,845.51m³. Please refer to **Appendix 2.3** for indicative subsoil excavation volumes and repository areas and drawings of the locations of repository areas. Subsoil reinstatement will be possible through the following methods:

- Saving the top layer of the subsoil excavated for landscaping uses over any backfilled areas.
- Placing the excavated subsoil along roadside berms.

In the unlikely event that excess subsoil is encountered, which cannot be reused on site, this subsoil will be disposed of in an environmentally sensitive manner by a licensed waste contractor in consultation with the Planning Authority.

A detailed Subsoil Management Plan will be prepared prior to the commencement of construction at the site, for agreement with the Planning Authority. The preparation, application and documentation of this Subsoil Management Plan will enable all parties – including contractors, designers and competent authorities – to learn from the systematic implementation and assessment of best practice, particularly through the recording of summary information on performance outcomes.

The Subsoil Management Plan will also cover the storage and restoration of all subsoil excavated during the construction phase. Subsoil with a volume of approximately 20,038m³ will be re-used during the construction phase as follows:

- Resurfacing of hardstanding and splay areas
- Reinstatement of splays, stilling ponds, etc
- Roadside berms and landscaping
- Landowner land reclamation/improvement activities

Subsoil will not be placed:

- Within 50 m of natural watercourses
- Within 20 metres of a major arterial drain or 10m of any minor drain or drains containing dry weather flows greater than 1 litre/second
- Within areas of gradient greater than 1:20
- Within areas designated as sensitive habitat

The following methodology is proposed for such work:

- Prior to excavation, all grass areas shall be cut into turves and will be carefully stacked and re-used within one week of cutting during the period 1st April to 31st August or within two weeks of cutting during the remainder of the year. Turves not used within these periods shall be regarded as topsoil.
- Subsoil will be re-used to form berms either side of the track for the first 418m and on the western side of the track as far as Entrance 2. Berm heights will not exceed 0.5m.
- All reinstatement areas will be suitably fenced and signs warning the public will be erected.
- Bare subsoil will be seeded with a wild flower mix to enhance biodiversity.
- Any bare areas to be seeded shall be covered with topsoil to a minimum depth of 100mm which shall be reduced to a fine tilth, free from stones and debris with any dimensions greater than 35mm. The topsoil shall be graded and lightly compacted to a 100mm thickness or existing thickness-whichever is greater. Any upstanding debris or stones exceeding 35mm dimension shall be removed.
- Due regard will be paid to the season and weather condition before sowing the wild flower seed. Immediately prior to sowing the seed, the topsoil shall be reduced to a fine tilth. An even distribution of the approved mix will be applied. The seed shall be covered by lightly raking into the surface of the topsoil.
- All work will be carried out in an environmentally sensitive manner in consultation with the Planning Authority and the National Parks and Wildlife Service, as appropriate.
- A waste license will be obtained from the Local Authority / Environmental Protection Agency prior to any disposal of subsoil as per the Waste Management Regulations 2006 and the Waste management Act 1996 to 2008.

The proposed method of disposal will have no likely significant environmental impact. The proposed measures and methodology will help in the reinstatement of worked out areas of subsoil and aid in the attenuation of run off at these locations. It will further assist in the regeneration and landscaping of the area and result in no threat to existing drains, streams or their aquatic habitats.

2.5.7 Construction Waste Management

Waste will be generated during the construction phase and the main items of anticipated construction waste are as follows:

- Hardcore, stone gravel, concrete, plaster, topsoil, timber, concrete blocks and miscellaneous building materials;
- Waste from chemical portaloo toilets;
- Plastics;
- Oils, diesel.

Waste disposal measures proposed are:

- On-site segregation of all waste materials into appropriate categories including, for example, topsoil, bedrock, concrete, bricks, tiles, oils /diesels, metals, dry recyclables e.g. cardboard, plastic, timber;
- All waste materials will be stored in skips or other suitable receptacles in a designated area of the site;
- Wherever possible, left over materials (e.g. timber off-cuts) and any suitable demolition materials shall be re-used on-site;
- Uncontaminated excavated material (rock, topsoil, sub-soil, etc.) will be re-used on-site in preference to importation of clean inert fill;
- Bedrock may be encountered during foundation excavation. If bedrock is encountered it will be crushed appropriately onsite and used for infill during construction;

- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably licensed or permitted facilities and will be recycled, recovered or reused, where possible;
- All waste leaving the site will be recorded in accordance with legal requirements and copies of relevant documentation maintained.

2.5.8 Construction Employment

On average, approximately 53 people (based on 1.5 jobs per MW) will be employed at any one time on site during the construction of the scheme. The actual number will depend on the activities being undertaken at any given time and will vary throughout the course of the construction programme. Employment will be the responsibility of the construction contractor but it is likely that the workforce will include labour from the local area. Additional temporary employment will be created in any post-development environmental assessments and ongoing monitoring.

2.5.9 Construction Traffic

Vehicular traffic required for the construction phase is likely to include:

- Articulated trailer trucks to bring initial equipment onto site and later to bring the turbine components, electrical cables, steel reinforcement for foundations, anemometer mast, and ancillary equipment;
- Tipper trucks and excavation plant involved in site development and excavation works;
- Cranes to erect the turbines;
- Miscellaneous vehicles and handling equipment, including vehicles associated with construction workforce.

Potential impacts from construction traffic include temporarily increased local traffic levels and traffic noise. Construction traffic on the local road system would be managed in accordance with a Traffic Management Plan and the requirements of the local authority. This may include the installation of temporary road signage and traffic lights as appropriate. Noise arising from construction traffic would be localised, temporary and of a short term duration.

The site has good accessibility with close proximity to regional routes. This will greatly assist the logistics of delivering the components to site. Some temporary works to the L7800 junction will be required to facilitate abnormal oversized loads of turbine components and which will be fully reinstated post construction phase. Deliveries will take place at times to avoid peak traffic periods. All abnormal loads will be accompanied by an advance escort vehicle. Once the turbines are operational, the traffic movements will be greatly reduced to, on average, once/twice a week by a light commercial vehicle for maintenance purposes. There may be a need to replace some turbine components but these are unlikely to be frequent.

Traffic mitigation measures will be implemented during the construction phase, as follows:

- Signage at site entrances giving access information;
- Temporary traffic restrictions kept to minimum duration and extent;
- Diversions put in place to facilitate continued use of roads where restrictions have to be put in place;
- Construction traffic management – one way systems where possible and strictly enforced speed limits;
- Provision of a designated person to manage access arrangements and act as a point of contact to the public;
- All temporary road alterations and junction upgrades to be carried out in full consultation with the Local Authority;
- No hedgerows or potential breeding habitats to be removed during the breeding season.

2.6 Operational Phase

The operational phase of the proposed development is 25 years. During this period the wind turbines will be operational and, other than routine maintenance and monitoring, there will be no other activities on site and agricultural/forestry activities can continue as normal. On average the site will be serviced once/twice a week by a light commercial vehicle for maintenance purposes. In exceptional circumstances there may be a requirement to replace a turbine component which would require more substantive works on site.

Waste will be generated during the operational phase including, for example, cooling oils, lubricating oils and packaging from spare parts or equipment. All waste will be removed from site and reused, recycled or disposed of in accordance with best-practice, in a licensed facility and in accordance with all regulations.

Further details on the operational phase and specific mitigation measures are provided in each chapter of this EIS as they relate to each environmental topic.

2.7 Off-Site & Secondary Developments

2.7.1 Haul Route

Detailed consideration has been given to a number of alternative haul route options to the site as part of the EIS process (see **Chapter 13**). It is envisaged that the turbines will be transported from Dublin Port using the M50, M7, M9, N78 and the R430. At the junction of the R430 and the L7800 local road leading to the site entrance some temporary upgrade works are proposed at this junction to facilitate the turning movement of abnormal oversized loads. As the transport route will utilise mainly motorways and regional roads, no road widening along these routes will be necessary to accommodate oversized loads. At roundabouts and junctions along the route, road signs may need to be temporarily removed, as necessary, to accommodate the irregular loads and will be immediately reinstated in full. This will be agreed in advance with the relevant local authority. An Garda Síochána will be informed prior to transportation and appropriate escorts for abnormal oversized loads will be arranged to accompany the vehicles as necessary. Haul route access to the site will be via the existing forestry access point. Local improvement works to L7800 and L78001 are proposed to widen the site access point and undertake road strengthening to accommodate construction traffic, irregular loads and to provide appropriate visibility splays. A full Transport Impact Assessment has been carried out which demonstrates that the amount of traffic generated by the proposed development during both the construction and operation phases will be low-negligible. There will be consultation on all road works which will be carried out with all affected local authorities and fully reinstated following the construction phase, as required. The likely cumulative impact of the haul route in combination with the proposed development and other activities and permitted developments in the vicinity is considered to be temporary and low-negligible.

2.7.2 Grid Connection

The Wind Energy Development Guidelines for Planning Authorities (2006) state that:

“it is not always possible due to reasons outside the applicants control to provide details of the grid connection and in these instances details of indicative and feasible options for grid connection lines and facilities should in general be adequate for a planning authority to consider a wind energy application as the precise capacity required for connection will not be known until planning permission is obtained.”

However, a High Court judgement of December 2014 (*O’Grianna & Ors v An Bord Pleanála*) held that, notwithstanding that the design and specification of the grid connection would be controlled

by the transmission system operators, for the purposes of EIA the grid connection could not be separated from the balance of a project for the purposes of EIA, and therefore the cumulative effect of both the wind farm and its grid connection must be assessed in order to comply with the EIA Directive. It should be noted that the *O’Grianna* case does not require that the proposed development and its connection to the national grid be part of a single planning application, but assessed in a single EIA.

Two alternative options for connection to the national grid were considered as part of the design phase of the proposed development, as follows:

- **Option A - Underground line (UGL) along the public road to the existing substation at Ballyragget (see Figure 2.5):** This grid connection option would involve the digging of a trench and the laying of grid cables along public road, backfilling and reinstatement which will be carried out in accordance with the ESBI guidance ‘*HV Cables – General Construction Methodology*’ (PE424-F7001-R00-001-001). One of the advantages of laying cables under a roadway is that there is typically no permanent impact on the environment additional to that caused by the presence of the roadway (see, example, An Bord Pleanála Reference PL04.245082). When an underground cable is laid under an existing roadway there is a short-term temporary impact during the construction phase only. The underground cables would be of a solid polymeric construction with either aluminium or copper conductors. Cable installation trenching will be by a mechanical digger, with full reinstatement of the top layer to its original wearing course. Cables are laid in a granular bed and backfilled with surround material. This material offers protection to the cables and the contrasting material helps identify location should the need arise later. The proposed depth of the cable trench is approximately 1 metre and the width of the cable trench is 50 centimetres. The proposed cable duct is a very standard design and capable of accommodating a 38kV or 110kV cable. The duct would be constructed in agreement with the local authorities, including a bond for reinstatement works. It is estimated that the total construction phase will be 9 – 12 months in duration.
- **Option B - Connection to the permitted 110kV Overhead Line (OHL) Laois-Kilkenny Grid Reinforcement Project:** One of the distinct advantages of the subject site from an environmental impact perspective is that the permitted 110kV Laois-Kilkenny Grid Reinforcement Project (An Bord Pleanála Reference PL11.VA0015) passes directly through the site². The permitted OHL, which has been subject to full EIA and AA, now has capital approval and is moving to detailed design stage with ESB Networks. Following detailed discussions with Eirgrid it has been agreed that the proposed development can loop directly into this 110kV line via a substation/switchroom at the subject site. This will include the erection of two single circuit strain towers of up to 26.5 metres in height to connect into this 110kV transmission line. From there, the proposed development will have a fully consented transmission path to either the permitted 400/110kV substation at Coolnabacky or the permitted 110kV upgraded substation at Ballyragget which are both equidistant from the subject site. An extract of the line of permitted Laois-Kilkenny OHL is illustrated in **Figure 2.6**. The line of the permitted transmission line passing through the subject site is illustrated in **Figure 2.4** and in **Appendix 2.2**.

For the purposes of this EIS it is proposed that the proposed development will take advantage of the permitted grid infrastructure passing through the subject site and Option B is the preferred option. A cumulative assessment of the likely significant impact of the proposed development in-combination with this permitted OHL is included in the EIS – where appropriate and relevant - in accordance with the *O’Grianna* judgement. Overall the likely cumulative impact of the proposed development in

² <http://www.eirgridlaoiskilkenny.ie/index.html>

combination with the permitted 110kV Laois-Kilkenny Grid Reinforcement Project is considered to be low-negligible, as summarised below:

- **Human Beings:** The project will directly affect the social, economic or enterprise status of the area. The provision of a higher quality and more secure power supply to the overall area and local employment will, however, have considerable positive social and economic effects on the region and the area. Local amenities have the potential to be impacted through visual impacts, shadow flicker, noise or effects on biodiversity – these impacts are considered in the relevant EIS chapter and it is concluded that there is unlikely to be any significant environmental impact. Avoidance of major towns during detailed project design together with the appropriate setbacks to one-off house locations provides for the optimum location and route for the project.
- **Flora & Fauna:** The EIS for the Laois-Kilkenny Grid Reinforcement Project concludes that, taking into consideration the sum of the residual impacts of the various elements of the project, no significant cumulative impacts are foreseen. Considering the small amount of habitat that will be affected and the overall significance of these habitats, it is predicted that the in-combination impact of the project will have a negligible cumulative impact on ecology. The loss of habitat jointly arising from the project is deemed to be of low significance. The off-site and in-combination impacts on flora, terrestrial and aquatic habitats, birds and mammals will be negligible and are not considered significant. Subject to correct implementation of all mitigation measures, there is reasonable scientific certainty as to the absence of impacts on the integrity of any Natura 2000 sites having regard to their conservation objectives.
- **Soil & Geology:** The design of the project - turbines, proposed substation and electricity line routes - has taken account of the potential in-combination impacts on the soils and geology environment local to the area where construction is taking place. Comprehensive measures have been incorporated in the design to mitigate the potential effects on the surrounding soils and geology environment. A project-specific Construction Environmental Management Plan (CEMP) will be established for both the Laois-Kilkenny Grid Reinforcement Project and the proposed development and maintained by the contractors during the construction and operational phases. The mitigation measures for decommissioning phase would be the same as the measures highlighted for the construction phase. The implementation of the mitigation measures will ensure that the soils and geology environment is not adversely impacted by the project and no soil or silt, as a consequence of the proposed development, will enter into watercourses during normal and/or emergency construction activities. The cumulative impact will therefore be short term and negligible and the mitigation measures proposed will provide reasonable scientific certainty as to the absence of impacts on the integrity of any Natura 2000 sites having regard to their conservation objectives.
- **Water:** The design of the project has taken account of the potential in-combination impacts of the proposed works on the water environment local to the area where construction is taking place. Measures have been incorporated in the design to mitigate the potential effects on the surrounding water environment. A project-specific Construction Environmental Management Plan (CEMP) for both the Laois-Kilkenny Grid Reinforcement Project and the proposed development will be established and maintained by the contractors during the construction and operational phases. The mitigation measures for decommissioning phase would be the same as the measures highlighted for the construction phase. The implementation of the mitigation measures will ensure that the water environment is not adversely impacted during normal and/or emergency construction activities. The cumulative impact will therefore be short term–negligible and mitigation measures proposed will provide reasonable scientific certainty as to the absence of impacts on the integrity of any Natura 2000 sites having regard to their conservation objectives.

- **Air & Climate:** Short term impacts of the project on local air quality will arise from project construction related emissions but the overall impacts on air quality will be negligible both in the national context and in the immediate receptor area. The main potential impact to air quality will come from dust during the construction phase which could potentially have a localised effect on aesthetic surroundings or cause a nuisance due to reduced visibility, soiling of gardens, buildings or vegetation and impairment of air quality. Any impacts will be short-term and can be fully controlled using good site practice and good engineering construction practices during the construction phase. To prevent dust becoming a nuisance during the construction phase, dust suppression such as wheel washing of vehicles and dampening down of sites, lanes and roadways with water will be carried out in prolonged dry periods. The cumulative impact of the project on air quality and climate will therefore be short term, localised and negligible.
- **Landscape & Visual Impact:** The project will give rise to localised changes to the appearance of the landscape in the immediate vicinity of the wind farm. North of Ballyragget the grid connection will cause localised changes that will be intermittently visible from roads close to the development with limited impacts on the wider landscape. Visibility of the grid connection against the skyline will be very localised on account of topography and vegetation, particularly from the R432, the environs of Ballinakill or Haywood Demesne. North of Ballinakill the route crosses some elevated areas that will give rise to some skyline views – affecting small numbers of houses or roads. There will be localised effects around Boleybeg Cross Roads after which the route crosses elevated and afforested lands that contain low levels of roads or dwellings. The route and project location selection process was the main method used to avoid landscape effects. It is concluded that the cumulative landscape and visual impact of the proposed development in-combination with the grid connection route is low, given that the low perceptibility of the grid connection against the skyline, which will be very localised and largely negligible. The overall landscape and visual impact is considered to be in the mid-to-lower order of magnitude (moderate to minor-negligible)
- **Archaeology and Cultural Heritage:** No significant impacts on the archaeological, architectural or cultural heritage have been identified on, or in vicinity of the proposed development site, or along the grid connection route. Where potential impacts have been identified they are mainly categorised as slight and appropriate mitigation has been recommended in order to minimise any such impact. There is one Protected Structure (Saint Lazerian's Catholic Church, Graiguenahown: RPS Ref. No. 374) within 1km of the proposed development site. There are an additional 28 Protected Structures within the 5km study area. It is considered there will be a minor visual impact on Saint Lazerian's Catholic Church (RPS Ref. No. 374). Due to the distance of the remaining Protected Structures and other archaeological sites from the proposed development area, and the nature of the undulating landscape, it is considered there will be a negligible in-combination visual impact on archaeology and cultural heritage.
- **Noise & Vibration:** There will be some minor short-term impact on nearby residential properties due to noise emissions from site traffic and other activities during construction. Traffic noise impact will be of a temporary nature and will not be excessively intrusive due to relatively low volumes. Given the setback of the project and construction traffic routes to dwellings, together with the low intensity of traffic generated, there will be no likely significant cumulative impact in terms of vibration. The noise from the operational phase of the wind farm has been assessed to be within the thresholds set in the Wind Energy Development Guidelines for Planning Authorities 2006. Noise from overhead lines can be generally classed as either aeolian (wind-induced) noise, corona (electrically-induced) noise or from gap sparking. Gap sparking occurs at tiny electrical separations (gaps) that develop between mechanically connected metal parts which give rise to electrical noise. Gap

sparkling can develop at any time on power lines at any voltage and is monitored by the network. Corona noise is localised not expected to give rise to complaints for the Laois-Kilkenny Grid Reinforcement Project. Aeolian noise rarely occurs on overhead lines and in the unlikely event of it occurring, appropriate mitigation measures will be applied. Overall, it is concluded that the cumulative noise impacts of the proposed development in combination with the overhead electrical line will be temporary-negligible.

- **Shadow Flicker:** As the proposed grid connection does not give rise to shadow flicker, there will be no cumulative impact.
- **Telecommunications:** There will be no likely cumulative impacts on telecommunications arising from the proposed development in combination with the grid connection.
- **Transport:** It is not anticipated that the presence of additional heavy vehicles associated with the construction of the project will decrease road safety or have an impact on local roads, from current trends, along the roads surrounding the project. The cumulative impact of overhead line construction and wind farm development on traffic flows generally is not significant. Construction impacts will be short term and peaks in activity will be for short durations only. Additional traffic volumes for the construction of each wind turbine, hardstands, access tracks, angle mast and polesets will generally be low and for a very limited duration. At operational phase, the project will be generally unmanned therefore traffic will be limited to a relatively small number of personnel for maintenance and servicing requirements with a low number visits to the sites. The implementation of the mitigation measures as set out in the EIS and Traffic Impact Assessment will ensure that traffic is not adversely impacted and that the impact will be short term - negligible.

In the event that the permitted Laois-Kilkenny OHL does not proceed, the developer will pursue either of two options:

- The UGL along the public roads as described above and illustrated in **Figure 2.6**; or
- Partial construction of the OHL along the route of the permitted Laois-Kilkenny grid reinforcement project in a southerly direction towards the existing substation at Ballyragget.

These abovementioned alternative options would be subject of a separate planning application but are mentioned here in order to ensure that the likely significant in-combination impacts are fully addressed in this EIS. Again, the likely cumulative environmental of the project in the event of the alternative options described above is considered to be low-negligible.



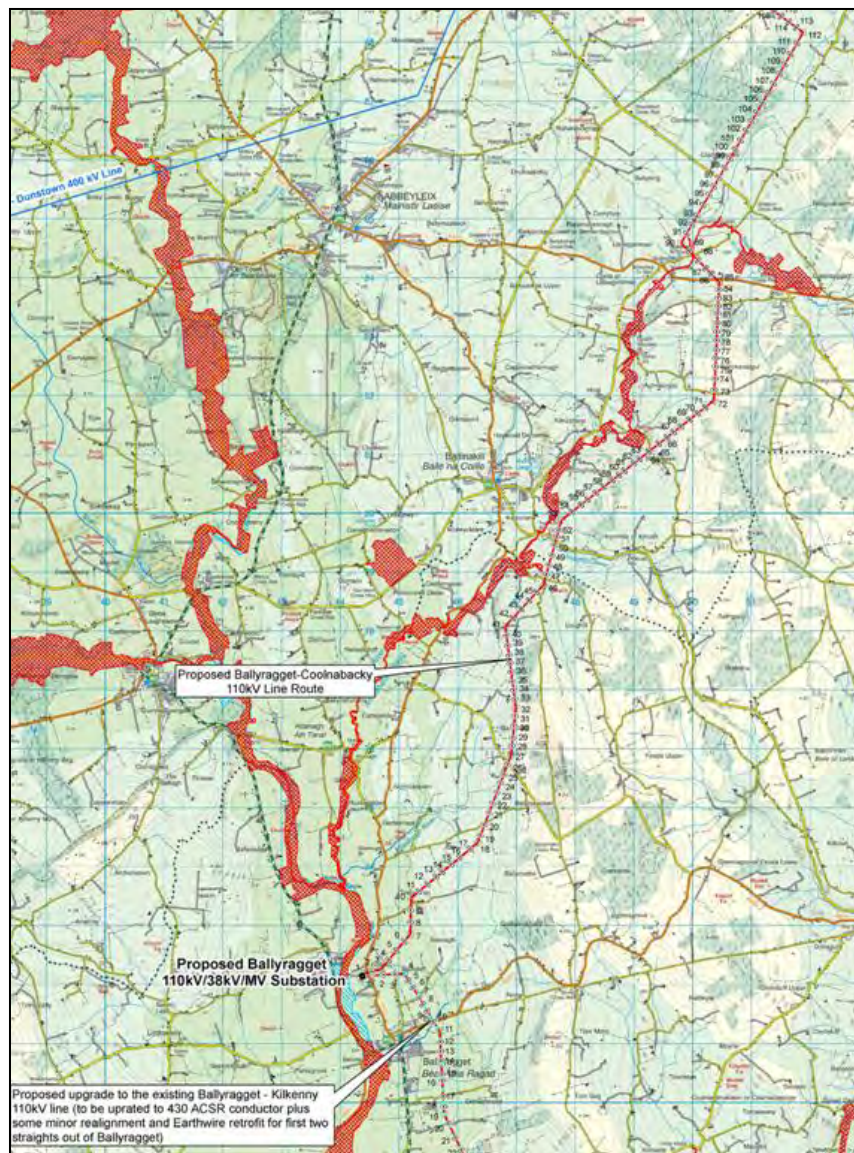


Figure 2.6: Option B: Extract of the route of permitted 110kV transmission line towards Ballyragget

2.7.3 Aggregates & Materials

To minimise the level of traffic along the national road system, all materials for the construction of the access tracks and foundations will be sourced, where possible, from construction activities (e.g. excavations) within the site and/or nearby quarries. Chapter 13 outlines the potential haul route of construction materials to the subject site from local quarries. The developer shall only use fully licensed quarries which have been subject to EIA and have appropriate planning permission for the volumes of material to be extracted. These aggregates are slated for extraction in the normal course of the quarries business and would be utilised by other consumers if same were not used in the project the subject matter of this EIS. The potential use of these quarries for aggregates in the proposed development will therefore have no additional environmental impacts above and beyond those normally entailed in the operation of the quarry. No borrow pits are proposed as part of the proposed development and no blasting of any rock will take place on-site.

2.7.4 Forestry

There are commercial forestry rotation plantations on the subject site with associated access tracks. Construction phase activities will be managed so as not to coincide with commercial forestry

operations, including felling. Accordingly, there will be no likely significant cumulative impacts in respect of forestry and the proposed development. Approximately 6 hectares of existing commercial forestry plantations will need to be removed to facilitate construction of the proposed development. Felling operations to facilitate construction works will be implemented in advance of construction activities in accordance with the Construction Management Plan. Pre-construction felling operations will only take place between April and October and, in all cases, fully in accordance with the Department of Agriculture's, Forestry and Food's (Forestry Service) *Forestry and Freshwater Pearl Mussel Requirements: Site Assessment and Mitigation Measures*.

2.8 Decommissioning Phase

The operational lifespan of the project is predicted to be 25 years. At the end of this period several options will exist:

- Continued operation of the existing turbines;
- Refurbishment/replacement of the turbines and continued operation;
- Decommissioning of the wind farm.

Any further operation beyond 25 years would be subject to a further planning application and EIA. In its scope, this EIS therefore assumes full decommissioning of the proposed development will take place. All structures above ground level shall be demolished and removed from the site for reuse/recycling.

A Decommissioning Management Plan will be agreed with the local authority in advance of decommissioning works. Further details on the decommissioning phase and specific mitigation measures are provided in each chapter of this EIS as they relate to each environmental topic.

2.8.1 Wind Turbines

Wind turbines are comprised of the tower, nacelle and blades which are modular items that can be disassembled. This shall involve a process which will be similar to the construction phase in reverse. If the turbines are to be sold on or reused elsewhere they shall be removed from site by specialist vehicles similar to those used during their transportation to site. If wind turbine components are not to be reused then they shall be scrapped. This shall involve sorting the components according to their material of construction. This shall be mainly steel/ferrous metals. Transformers and generators contain significant quantities of copper so it will be the decision of the demolition contractor if they wish to segregate on-site prior to disposal. All components shall be removed off site to an approved waste handling facility for recycling or disposal.

2.8.2 Foundations

Wind turbine foundations shall be grubbed up to a depth of 1 metre below ground level using conventional mechanical diggers. Exposed rebar and holding down bolts shall be burned off and removed off site to an approved waste handling facility for recycling or disposal. The broken concrete can be processed to provide an aggregate material to be used elsewhere in construction projects. Alternatively it may be used on site as an inert fill to make up levels as part of a wider restoration plan, reducing the need for the importation of materials onto the site. Excavations shall be backfilled with excavated material, soiled over and seeded out.

Excavations shall be carried out to expose any cables buried in trenches to a depth of 1 metre below ground level and the cable removed. The majority of cables used in wind farm construction contain a core of either copper or aluminium. Both of these materials can be recycled. Any cable off-cuts shall be removed off site to an approved waste handling facility where the cores shall be recycled and the remaining material shall be disposed of at an approved facility. Excavations carried out to expose cables shall be backfilled with excavated material, soiled over and seeded out.

2.8.3 Substation & Staff Welfare Facility

The decommissioning of the substation will involve the strip-out and removal of steel, conductors, switches, transformer and other materials and equipment that can be reconditioned and reused or sold as scrap. A soft strip of the buildings shall ensure that all fixtures and fittings are removed prior demolition. Demolition of the structures shall take place using conventional demolition methods. Foundations and building services shall be grubbed up to a depth of 1 metre below ground level. The demolition waste shall comprise mainly rubble (bricks, block, broken concrete, plaster etc.) and timber. Rubble can be processed to provide an aggregate material to be used elsewhere in construction projects. Alternatively it could be used on site as fill. The timber and other waste shall be segregated according to material type with a view to recycling where possible or disposal. All demolition materials which cannot be reused on site shall be removed off site to a licensed waste handling facility for recycling or disposal. Excavations shall be backfilled with suitable material, soiled over and seeded out.

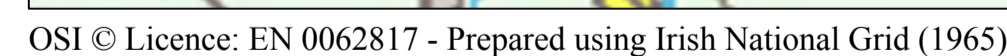
2.8.4 Hardstandings

Hardstandings shall be grubbed up to a depth of 1 metre below ground level and the excavated material shall be used to regrade the hardstand area to match existing ground contours and profile. Additional inert material derived from demolition in other areas of the site may be used if sufficient material is available. Once the area has been profiled to match the surrounding ground, 50mm of topsoil shall be spread over the reinstated area. This area shall then be seeded out. If it is decided not to retain the access tracks on site for agriculture purposes then these shall be removed using a similar methodology.

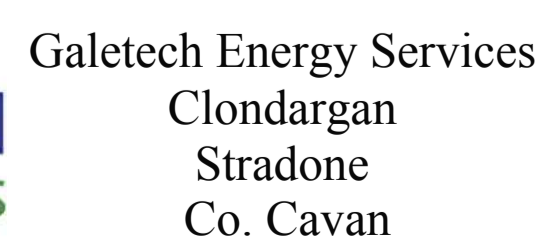
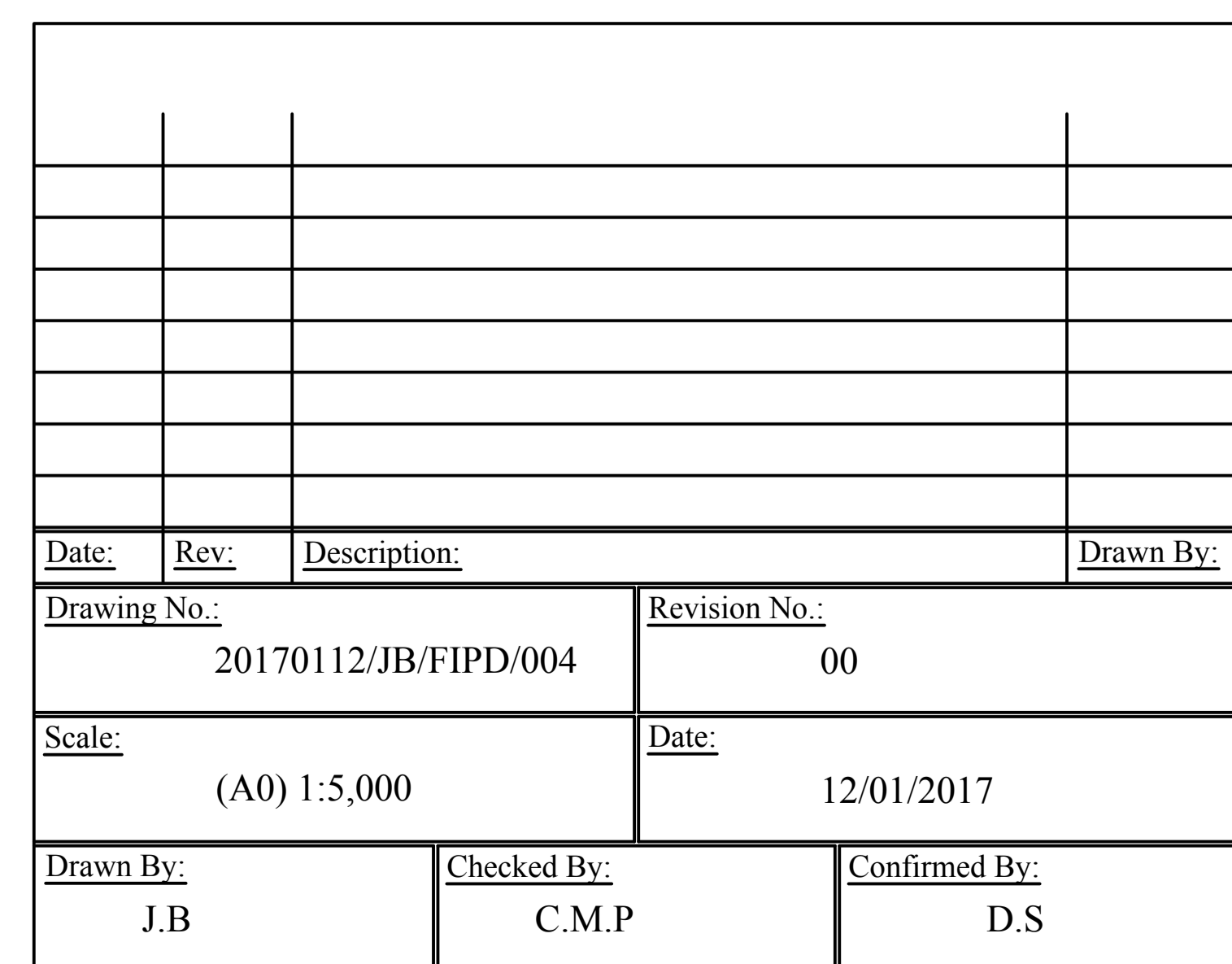
2.8.5 Monitoring

A monitoring period of two years immediately following the decommissioning and restoration activities will be provided. The monitoring period allows for the project area to experience seasonal changes and to determine if additional restoration works are required. If during this time any failure of works or reinstatements carried out occur, they shall be made good using similar process as described above.

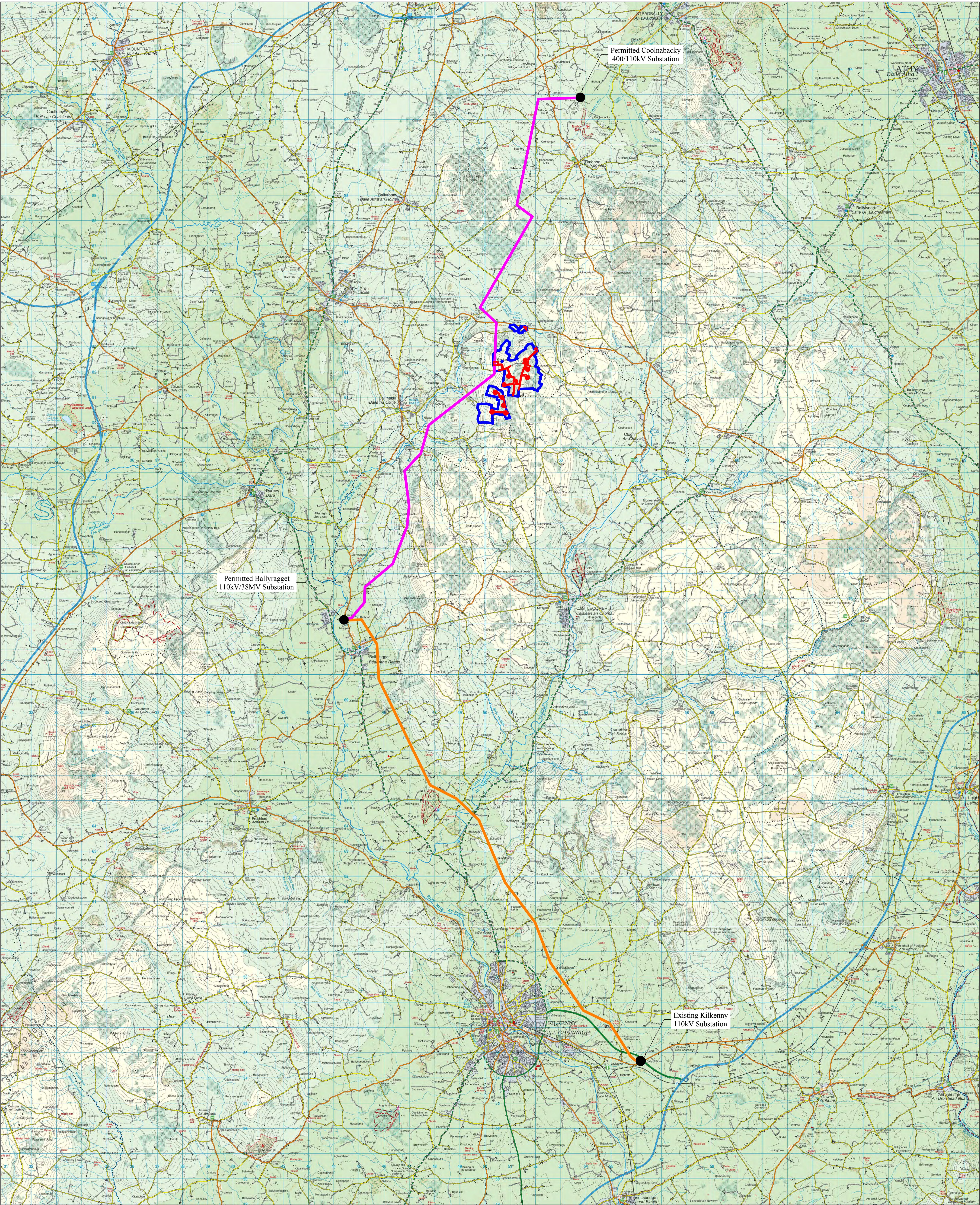
Appendix 2.1 - Map indicating all Dwellings within 1,030m of a Proposed Wind Turbine



House No.	Closest Turbine	Distance
H1	T1	896.8m
H2	T1	769.8m
H3	T1	692.5m
H4	T1	609m
H5	T1	800m
H6	T1	731.3m
H7	T1	803.1m
H8	T2	804.8m
H9	T2	822.3m
H10	T2	718.8m
H11	T2	861.9m
H12	T2	827.3m
H13-Landowner	T5	602m
H14-Landowner	T5	638.1m
H15	T10	760m
H16	T10	744.8m
H17	T10	844.4m
H18	T10	842.5m
H19	T10	944.7m
H20	T10	1035.9m
H21	T10	984.9m
H22	T10	602.8m
H23	T11	813.7m
H24	T11	925m
H25-Landowner	T11	772.4m
H26-Landowner	T11	581.8m
H27-Landowner	T11	524.3m
H28	T11	770.8m
H29	T11	914.5m
H30	T4	798.3m
H31	T4	661.8m
H32	T7	949.5m
H33	T4	1031m



Appendix 2.2: Maps of Laois-Kilkenny Grid Reinforcement Project



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Legend:

Ownership Boundary

Application Boundary

Permitted Ballyragget - Coolnabacky 110kV line route

Permitted upgrade to the existing Ballyragget - Kilkenny 110kV line

Client:

Pinewoods Wind Ltd

Galetech Energy Services
Clondorgan
Stradone
Co. Cavan

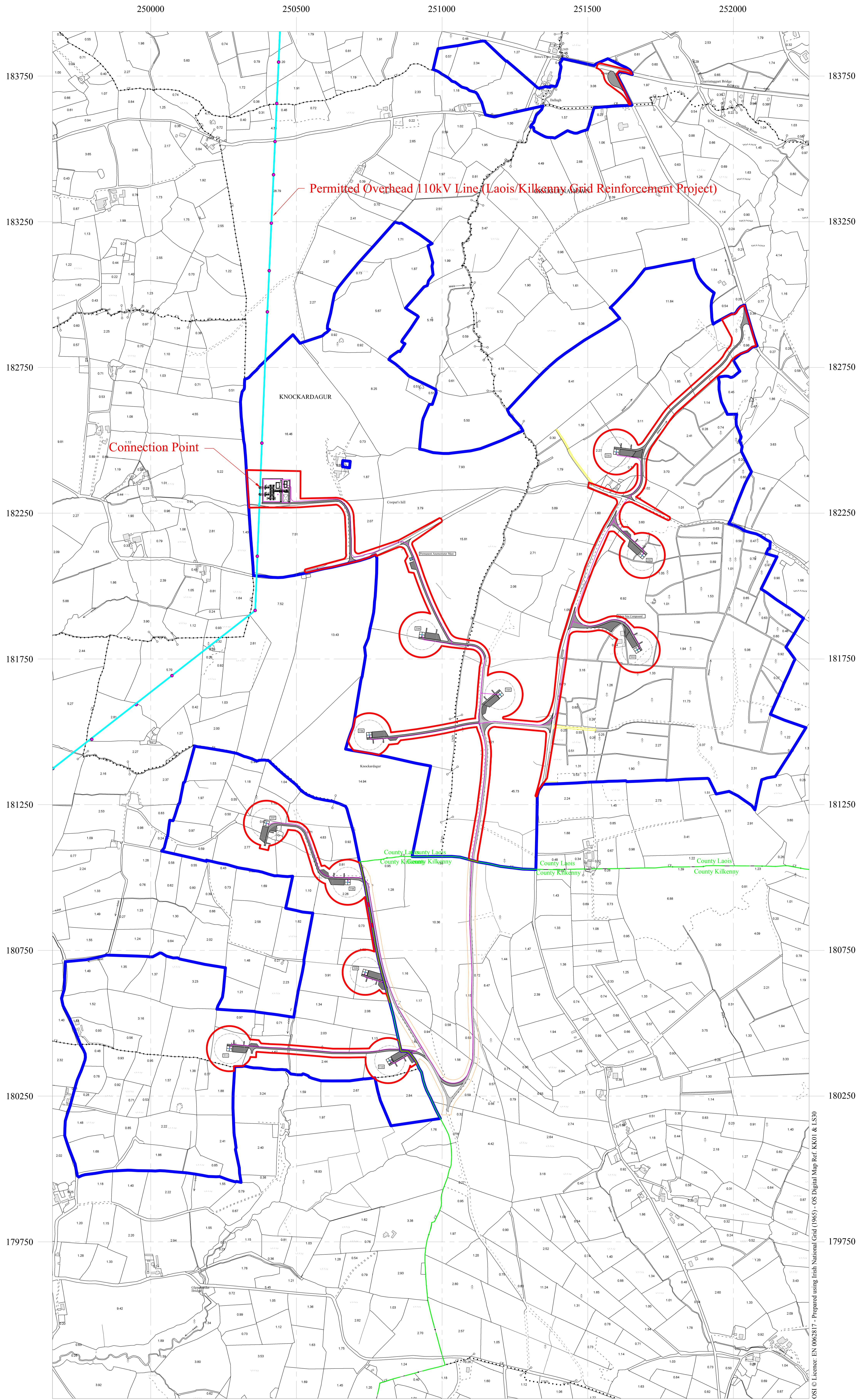
Job Title:

Pinewoods Wind Farm - Further Information Request

Drawing Title:

Laois/Kilkenny Grid Reinforcement Project Route

Date:	Rev:	Description:	Drawn By:	
Drawing No.:		20170112/JB/FIPD/001	Revision No.:	
Scale:		(A0) 1:50,000	Date:	
Drawn By:		J.B	Checked By:	
			C.M.P	
			Confirmed By:	
			D.S	



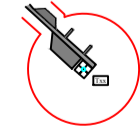
OSI © Licence: EN 0002817 - Prepared using Irish National Grid (1965) - OS Digital Map Ref. KK01 & LS30

Legend:

Ownership Boundary



Wind Turbines



Application Boundary (Co. Laois)



Co-ordinates Gridlines



Application Boundary for concurrent application made in Co. Kilkenny



County Boundary



Indicative Cable Route



Recorded Way Leave Areas



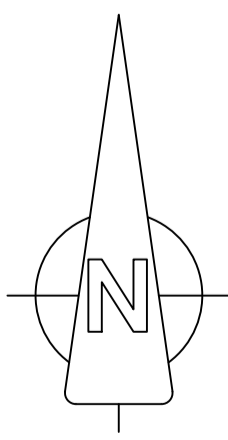
Wind Farm Tracks



Permitted Overhead 110kV Line (Laois/Kilkenny Grid Reinforcement Project)



Existing Tracks (requiring upgrade)



Galetech Energy Services
Clondorgan
Stradone
Co. Cavan

Client:

Pinewoods Wind Ltd

Job Title:

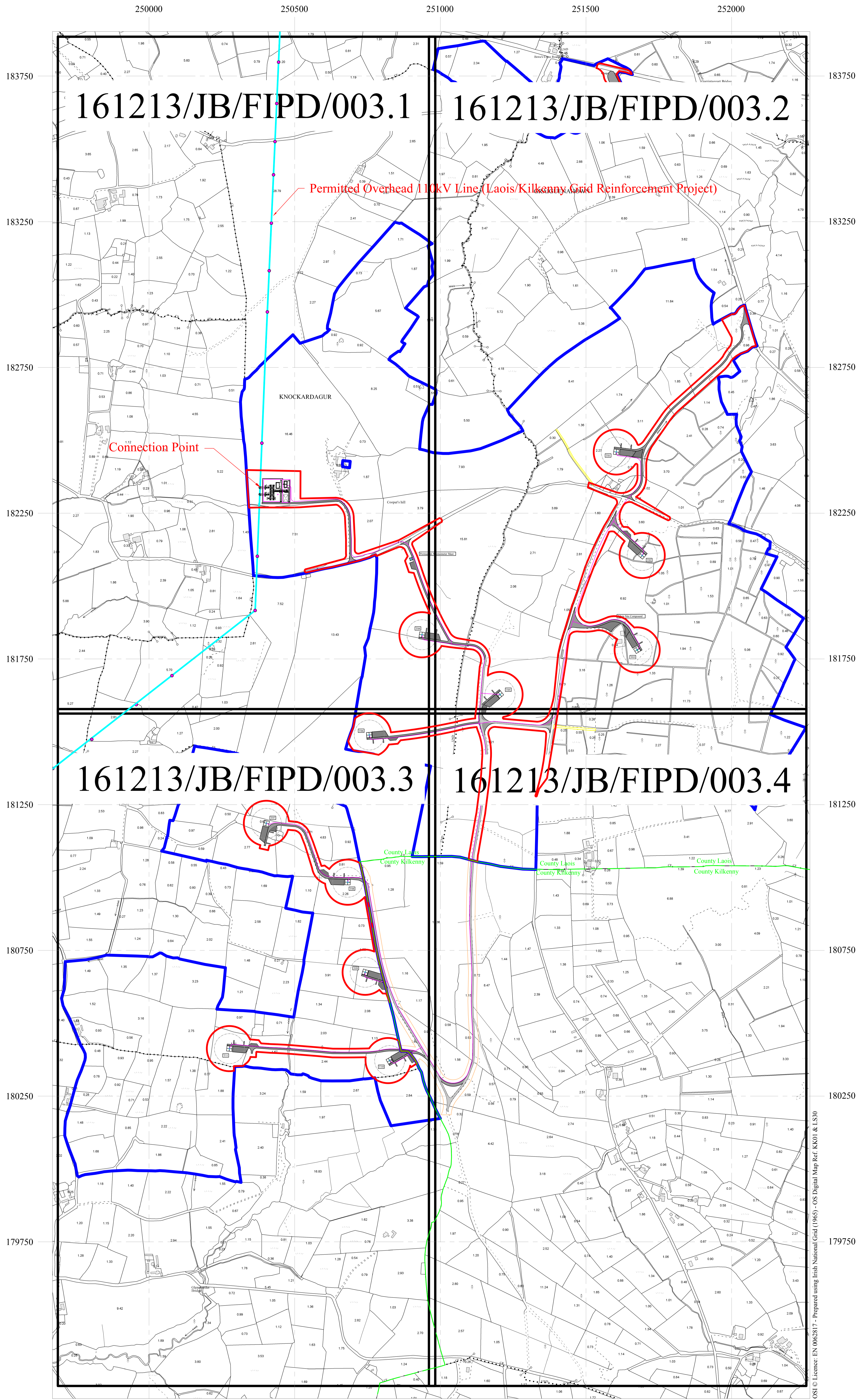
Pinewoods Wind Farm - Further Information Request

Drawing Title:

Location of Laois/Kilkenny Grid Reinforcement Project Map

Regarding Item 5 of Further Information Request

Date:	Rev:	Description:	Drawn By:
Drawing No.:	20170112/JB/FIPD/002	Revision No.:	00
Scale:	(A0) 1:5,000	Date:	12/01/2017
Drawn By:	J.B	Checked By:	C.M.P
		Confirmed By:	D.S



Legend:

Ownership Boundary

Application Boundary (Co. Laois)

Application Boundary for concurrent application made in Co. Kilkenny

Indicative Cable Route

Wind Farm Tracks

Existing Tracks (requiring upgrade)

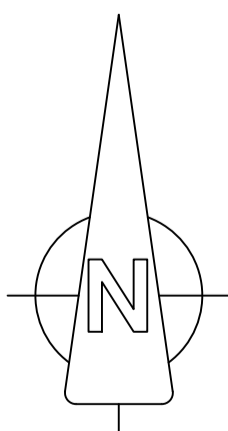
Wind Turbines

Co-ordinates Gridlines

County Boundary

Recorded Way Leave Areas

Permitted Overhead 110kV Line (Laois/Kilkenny Grid Reinforcement Project)



Galetech Energy Services
Clondorgan
Stradone
Co. Cavan

Client:

Pinewoods Wind Ltd

Job Title:

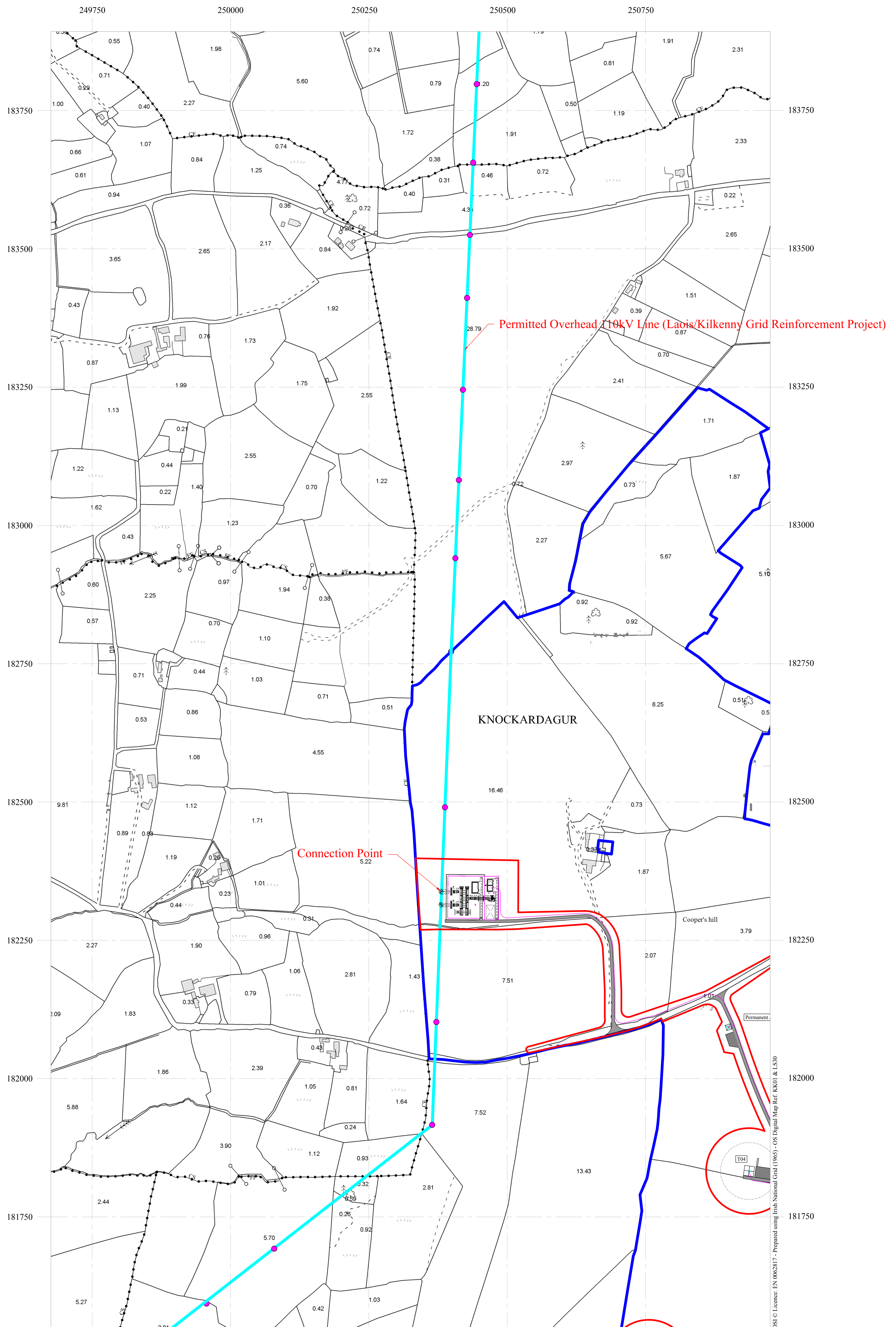
Pinewoods Wind Farm - Further Information Request

Drawing Title:

Fig. 3.0 Overall Map showing Location of Laois/Kilkenny
Grid Reinforcement Project Map

Regarding Item 5 of Further Information Request

Date:	Rev:	Description:	Revision No.:	
			00	
Scale:	(A0) 1:5,000		Date:	12/01/2017
Drawn By:	J.B.	Checked By:	C.M.P.	Confirmed By:
				D.S.



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Legend:

Ownership Boundary

Application Boundary (Co. Laois)

Application Boundary for concurrent
 Kill

Indicative Cable Route

Wind Farm Tracks

Existing Tracks (requiring upgrade)

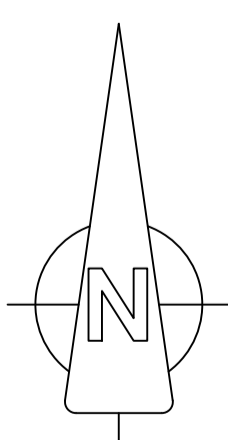
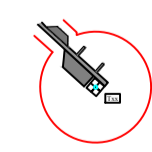
Wind Turbines

Co-ordinates Gridlines

County Boundary

Recorded Way Leave Areas

Permitted Overhead 110kV

Line (Laols/Kilkenny Grid
Reinforcement Project)

Client:

Pinewoods Wind Ltd

Job Title:

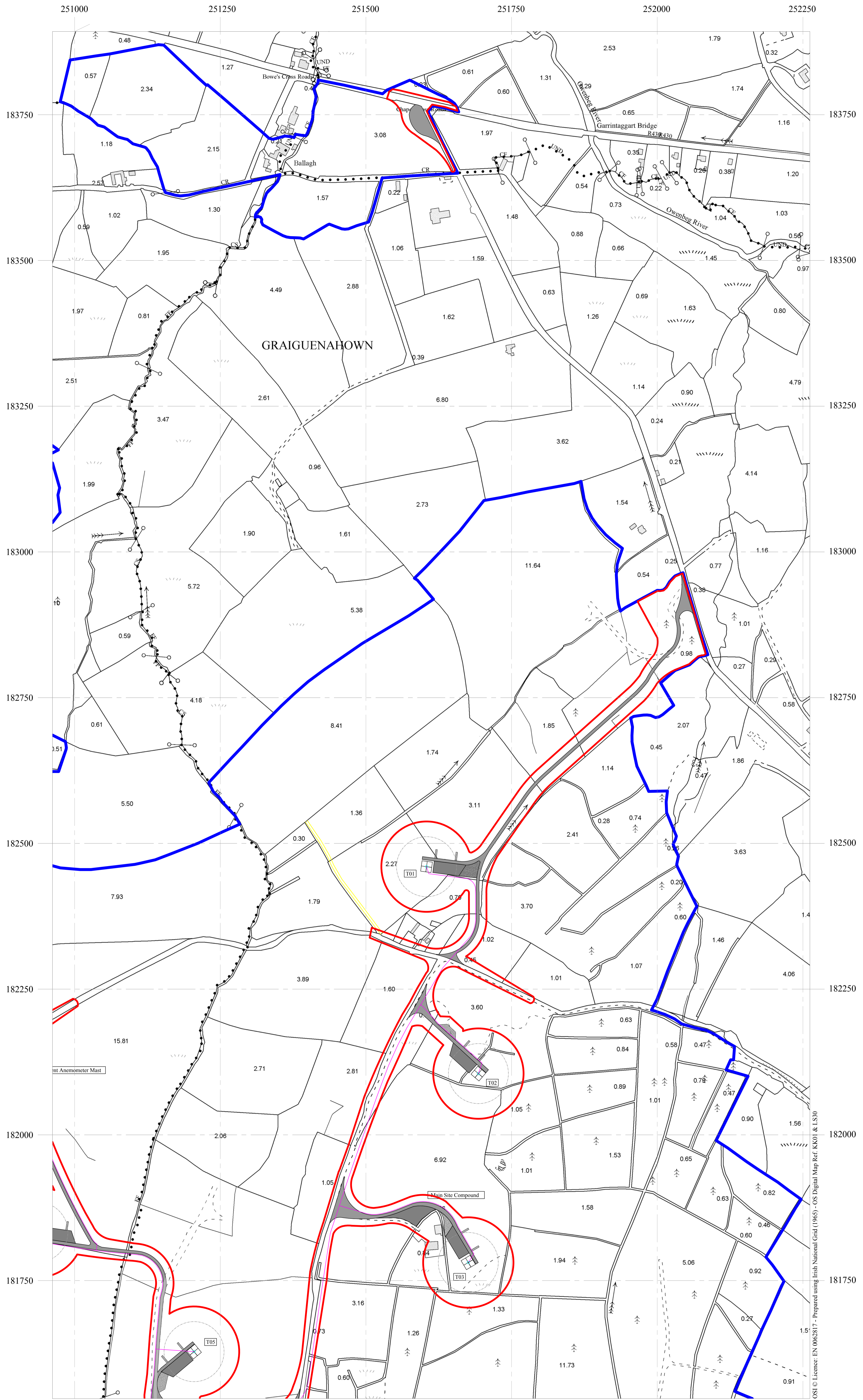
Pinewoods Wind Farm - Further Information Request

Drawing Title:

Fig. 3.1 Location of Laois/Kilkenny Grid Reinforcement Project Map
(1:2,500)

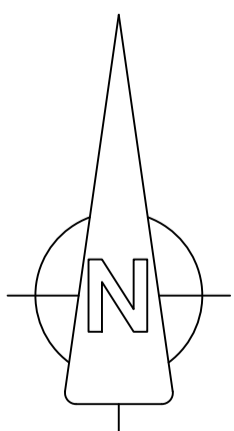
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(A0) 1:2,500	12/01/2017		
Drawn By:	Checked By:	Confirmed By:	
J.B	C.M.P	D.S	



Legend:

- | | | | |
|--|-----------------|---|------------------------------|
| Ownership Boundary | Blue line | Wind Turbines | Red circle with turbine icon |
| Application Boundary (Co. Laois) | Red line | Co-ordinates Gridlines | Grey dashed line |
| Application Boundary for concurrent application made in Co. Kilkenny | Orange line | County Boundary | Green line |
| Indicative Cable Route | Pink line | Recorded Way Leave Areas | Yellow line |
| Wind Farm Tracks | Grey line | Permitted Overhead 110kV Line (Laois/Kilkenny Grid Reinforcement Project) | Blue line with cross-ticks |
| Existing Tracks (requiring upgrade) | Light grey line | | |



Client:

Pinewoods Wind Ltd

Job Title:

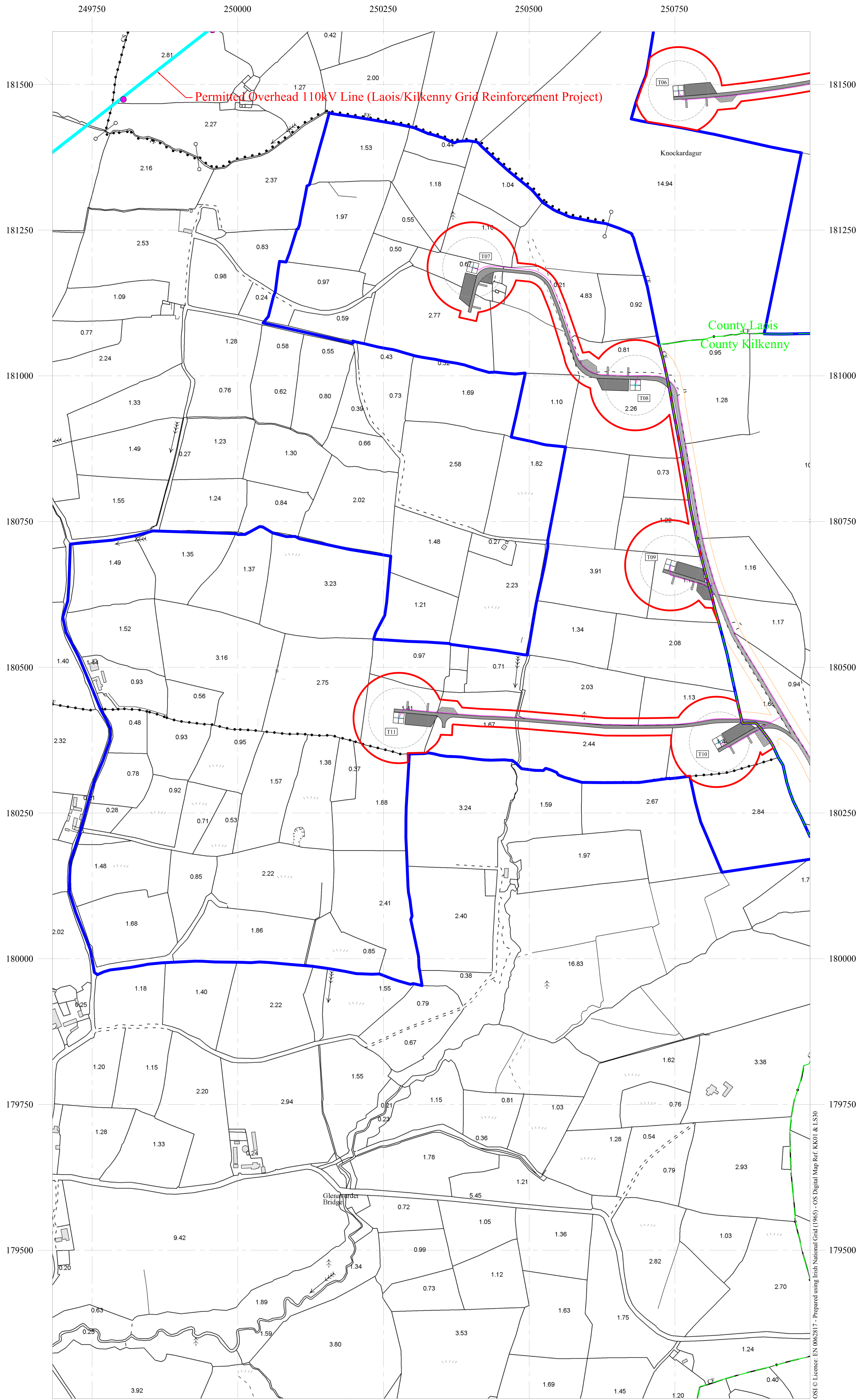
Pinewoods Wind Farm - Further Information Request

Drawing Title:

Fig. 3.2 Location of Laois/Kilkenny Grid Reinforcement Project Map (1:2,500)

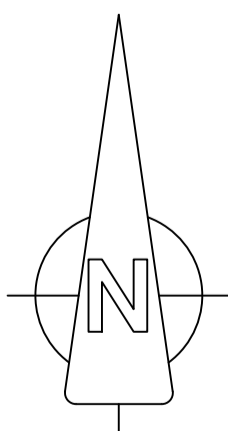
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Scale:		Checked By:		Confirmed By:
(A0) 1:2,500		J.B		D.S



Legend:

- | | | | |
|--|--|---|--|
| Ownership Boundary | | Wind Turbines | |
| Application Boundary (Co. Laois) | | Co-ordinates Gridlines | |
| Application Boundary for concurrent application made in Co. Kilkenny | | County Boundary | |
| Indicative Cable Route | | Recorded Way Leave Areas | |
| Wind Farm Tracks | | Permitted Overhead 110kV Line (Laois/Kilkenny Grid Reinforcement Project) | |
| Existing Tracks (requiring upgrade) | | | |



Galetech Energy Services
Clondargan
Stradone
Co. Cavan

Client:

Pinewoods Wind Ltd

Job Title:

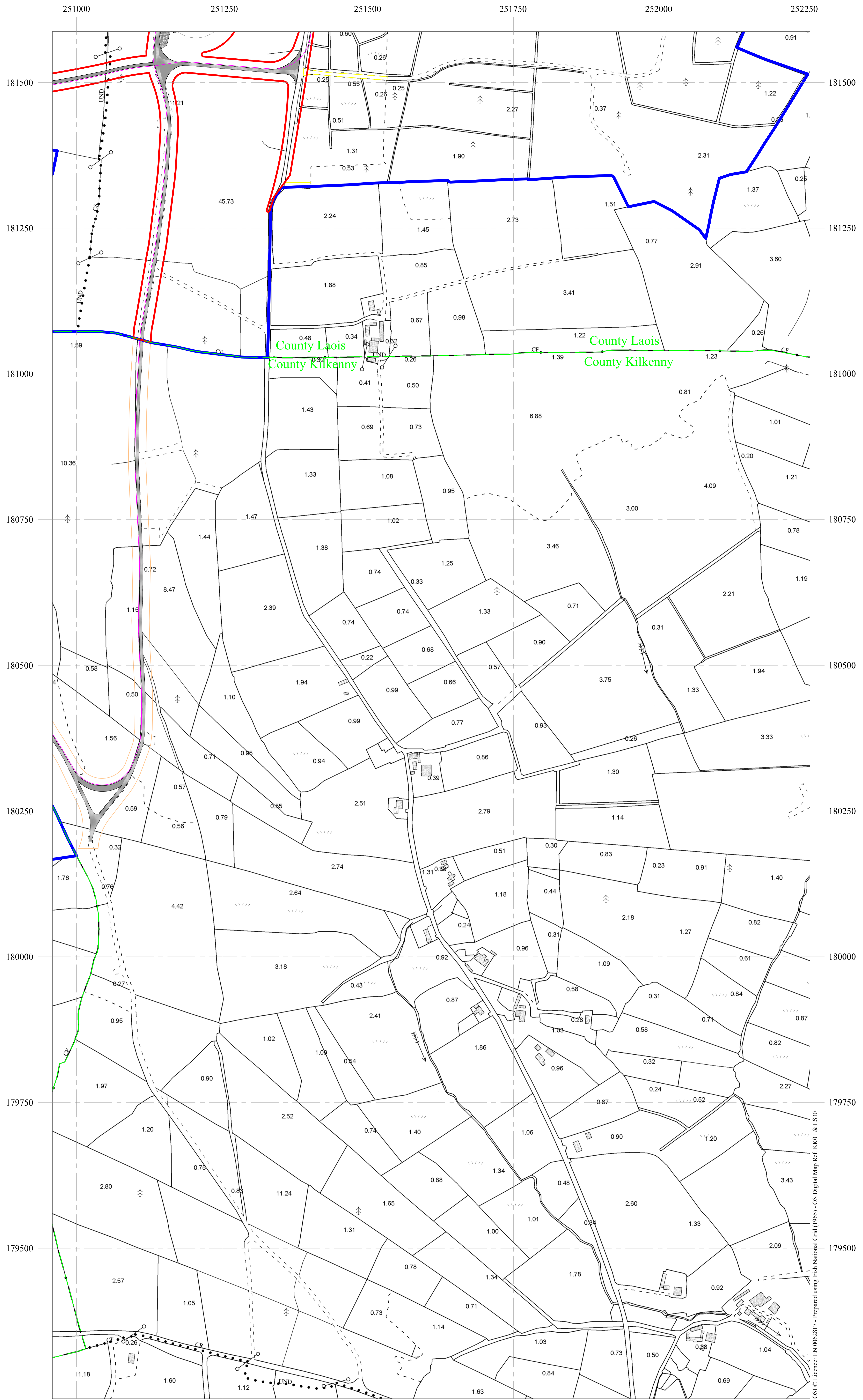
Pinewoods Wind Farm - Further Information Request

Drawing Title:

Fig. 3.3 Location of Laois/Kilkenny Grid Reinforcement Project Map (1:2,500)

Regarding Item 5 of Further Information Request

Date:	Rev:	Description:	Drawing No.: 20170112/JB/FIPD/003.3	
Scale: (A0) 1:2,500			Revision No.: 00	
Drawn By: J.B			Date: 12/01/2017	
Checked By: C.M.P			Confirmed By: D.S	



Legend:

- | | | | |
|--|--|---|--|
| Ownership Boundary | | Wind Turbines | |
| Application Boundary (Co. Laois) | | Co-ordinates Gridlines | |
| Application Boundary for concurrent application made in Co. Kilkenny | | County Boundary | |
| Indicative Cable Route | | Recorded Way Leave Areas | |
| Wind Farm Tracks | | Permitted Overhead 110kV Line (Laois/Kilkenny Grid Reinforcement Project) | |
| Existing Tracks (requiring upgrade) | | | |



Client:
Pinewoods Wind Ltd

Job Title:
Pinewoods Wind Farm - Further Information Request

Drawing Title:
Fig. 3.4 Location of Laois/Kilkenny Grid Reinforcement Project Map (1:2,500)

Regarding Item 5 of Further Information Request

<u>Date:</u>	<u>Rev:</u>	<u>Description:</u>	<u>Drawn By:</u>
<u>Drawing No.:</u> 20170112/JB/FIPD/003.4		<u>Revision No.:</u> 00	
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<u>Drawn By:</u> J.B		<u>Checked By:</u> C.M.P	<u>Confirmed By:</u> D.S

Appendix 2.3: Indicative Subsoil Excavation Volumes and Repository Areas

Site Location	Spoil Excavated m ³		Repository		
	Road	Hardstand	Area		Volume
				m ²	m ³
Site Entrance 1 To Site Entrance 2	3211	495	1	891	425.405
			2	1123	530.965
			3	1071	497.305
			4	4019	1848.645
			5	414	198.37
			6	445	232.475
			7	221	120.555
At T02	965	495	8	417	199.735
			9	2803	1295.365
At T03	1958	495	10	1362	649.71
			11	2213	1757.205
At T05	294	495	12	2783	1286.265
At T04	1234	495	13	3593	1654.815
Substation		3627	14	3527	3733.35
At T06	750	495	15	2099	985.045
T7 to T8	415	990	16	1778	652.3
			17	385	135.5
			18	1570	491
At T09	10	495	19	1992	448.32
T10 to T11	1844	990	20	1920	961.2
			21	530	287.05
			22	1274	617.89
			23	540	271.9
			24	1124	565.14
Total in County Laois	10681	9072			19845.51
Total in County Kilkenny	288		25	385	192.5
Overall Wind Farm Total	10969	9072			20038.01



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 3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES.
 4. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS AND SPECIFICATIONS.
 5. ALL LEVELS REFER TO ORDNANCE DATUM (MALIN HEAD).

Legend:

- Ownership Boundary
- Application Boundary (Co. Laois)
- Application Boundary for concurrent application made in Co. Kilkenny
- County Boundary
- Wind Farm Tracks
- Existing Tracks (requiring upgrade)
- Indicative Cable Routes
- Proposed Wind Turbines
- Recorded Way/Leave Areas
- Existing Watercourse Shown Thus
- Watercourse Buffer 50m Shown Thus
- Existing Watercourse Crossings Shown Thus
- Proposed Watercourse Crossings Shown Thus
- Proposed Primary Settlement Pond / Lagoon Type Sediment Trap Shown Thus
- Proposed Final Settlement Pond / Lagoon-Type Sediment Trap Shown Thus
- Proposed Buffeted Outfall Shown Thus
- Proposed Clean Water Drain Shown Thus
- Proposed Dirty Water Drain Shown Thus
- Proposed Check Dam Shown Thus
- Proposed Culvert Shown Thus
- Proposed Precast Piped Drainage Channel Shown Thus
- Proposed Silt Fence Shown Thus
- Proposed Lagoon - Type Sediment Trap Shown Thus
- Proposed Spoil Repository Shown Thus

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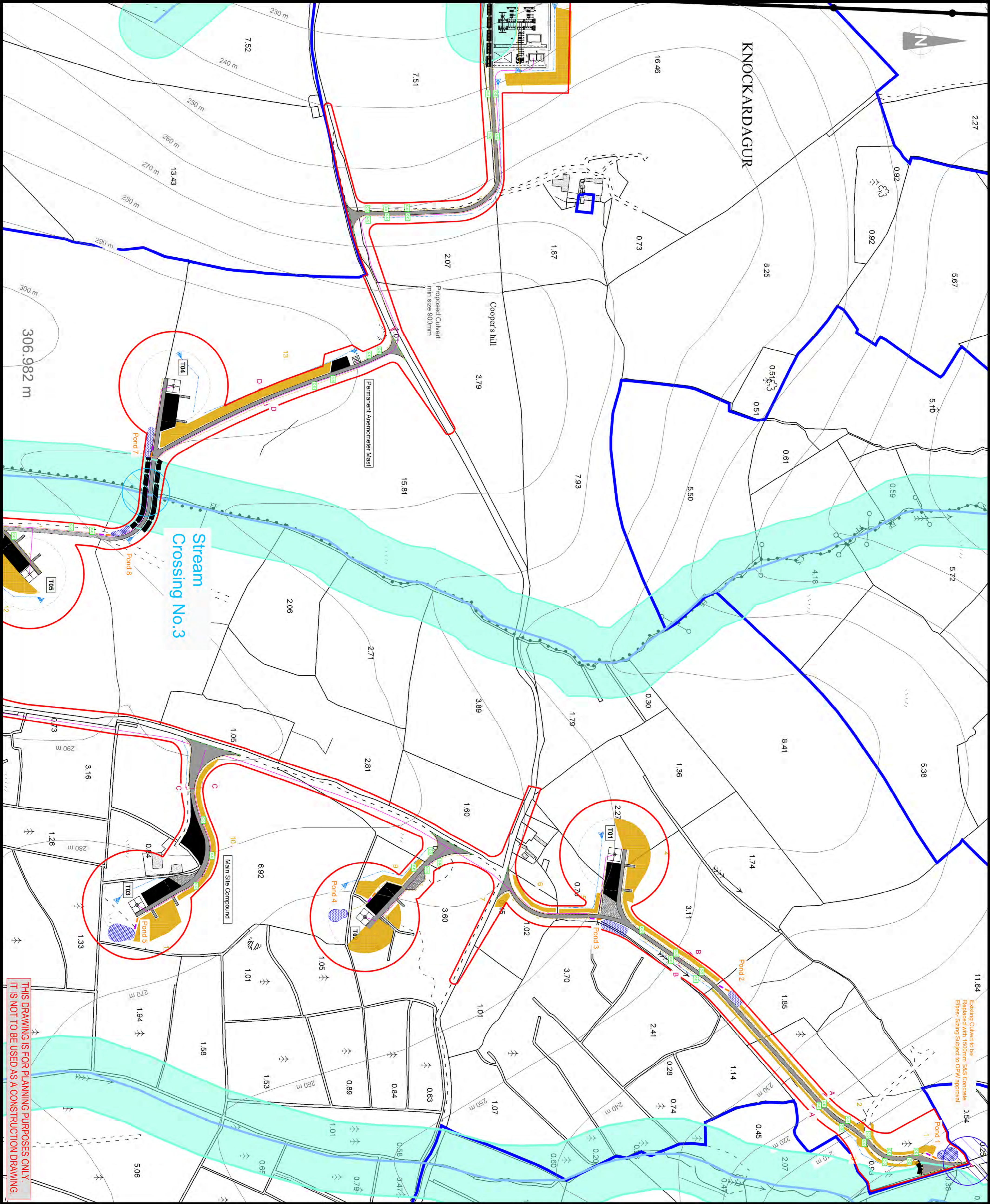
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rev.	modifications			
Layout Ref.:		by	chkd	date
file				

Client	PINEWOOD WIND FARM
Project	PINEWOOD WIND FARM
stage	FURTHER INFORMATION
title	SPOIL MANAGEMENT PLAN
MASTER LAYOUT	
scale	1:10,000 @ A1
surveyed	051
drawn	J.B.
checked	OOC
date	JAN 2017

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Email: info@jodneland.com



Job No.	Drawing no.	Revision
5538	S300-C-104	04



Existing Culvert to be
Replaced with 1500mm S&S Concrete
Pipes- Steng Subject to OPW approval

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Legend:

Ownership Boundary
Application Boundary (Co. Laois)
Application Boundary for concurrent application made in Co. Kilkenny
County Boundary
Wind Farm Tracks
Existing Tracks (requiring upgrade)
Indicative Cable Routes
Proposed Wind Turbines
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Proposed Watercourse Crossings Shown Thus
Proposed Primary Settlement Pond / Lagoon-type sediment trap Shown Thus
Proposed Final Settlement Pond / Lagoon-type sediment trap Shown Thus
Proposed Buffeted Outfall Shown Thus
Proposed Clean Water Drain Shown Thus
Proposed Dirty Water Drain Shown Thus
Proposed Check Dam Shown Thus
Proposed Culvert Shown Thus
Proposed Precast Piped Drainage Channel Shown Thus
Proposed Silt Fence Shown Thus
Proposed Lagoon - Type Sediment Trap Shown Thus
Proposed Spoil Repository Shown Thus

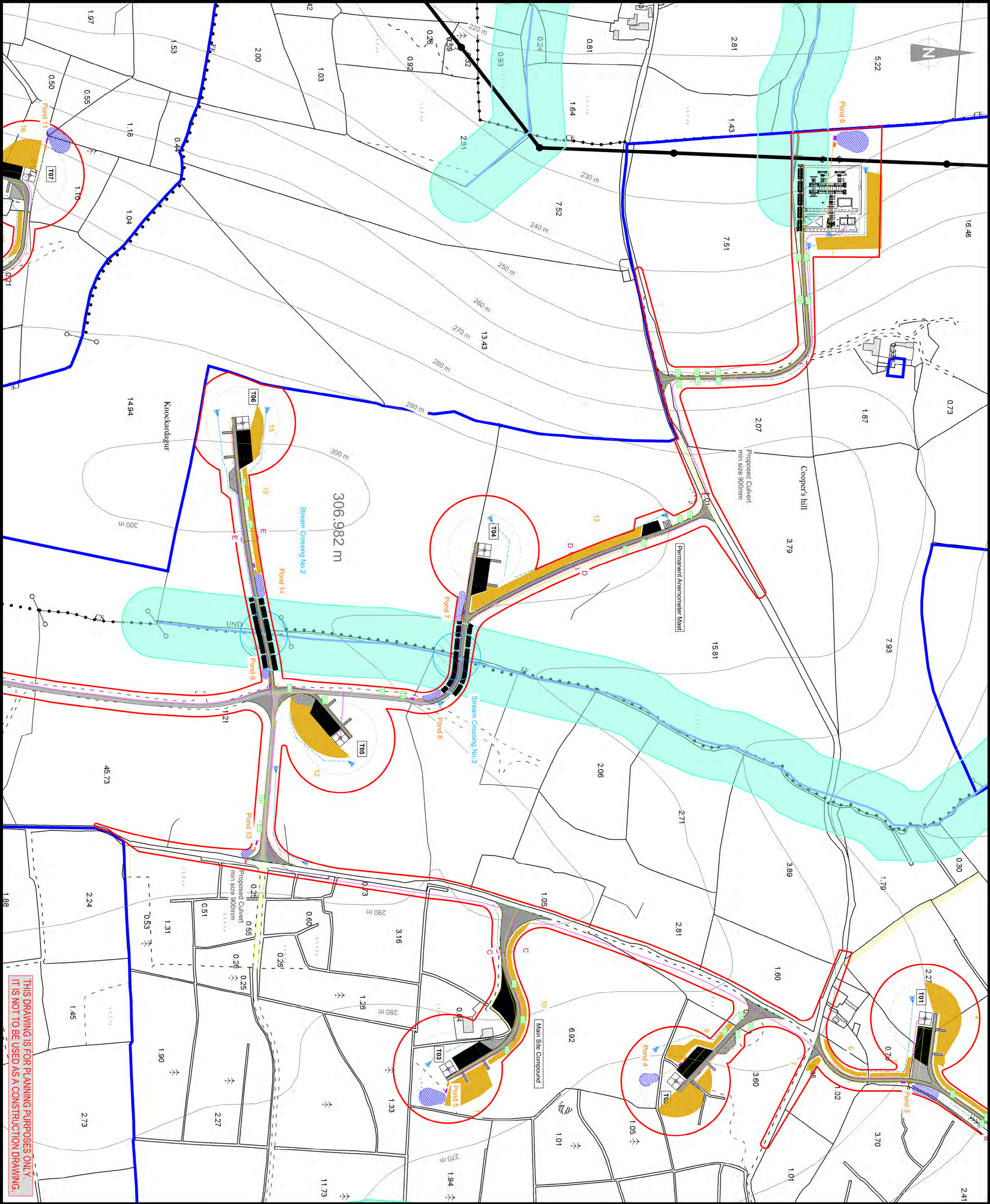
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rev.	modifications			
Layout Ref.:		by	chkd	date

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Project	PINEWOOD WIND FARM
stage	FURTHER INFORMATION
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LAYOUT DRAWING 1 of 3	
scale	1:2500 @ A1
surveyed	051
drawn	J.B.
checked	OOC
date	JAN 2017

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 5. ALL LEVELS REFER TO ORDNANCE DATUM (MALIN HEAD)

Legend:

Ownership Boundary
Application Boundary (Co. Laois)
Application Boundary for concurrent application made in Co. Kilkenny
County Boundary
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Existing Tracks (requiring upgrade)
Indicative Cable Routes
Proposed Wind Turbines
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Proposed Dirty Water Drain Shown Thus
Proposed Check Dam Shown Thus
Proposed Culvert Shown Thus
Proposed Precast Ribbed Drainage Channel Shown Thus
Proposed Silt Fence Shown Thus
Proposed Lagoon - Type Sediment Trap Shown Thus
Proposed Spoil Repository Shown Thus

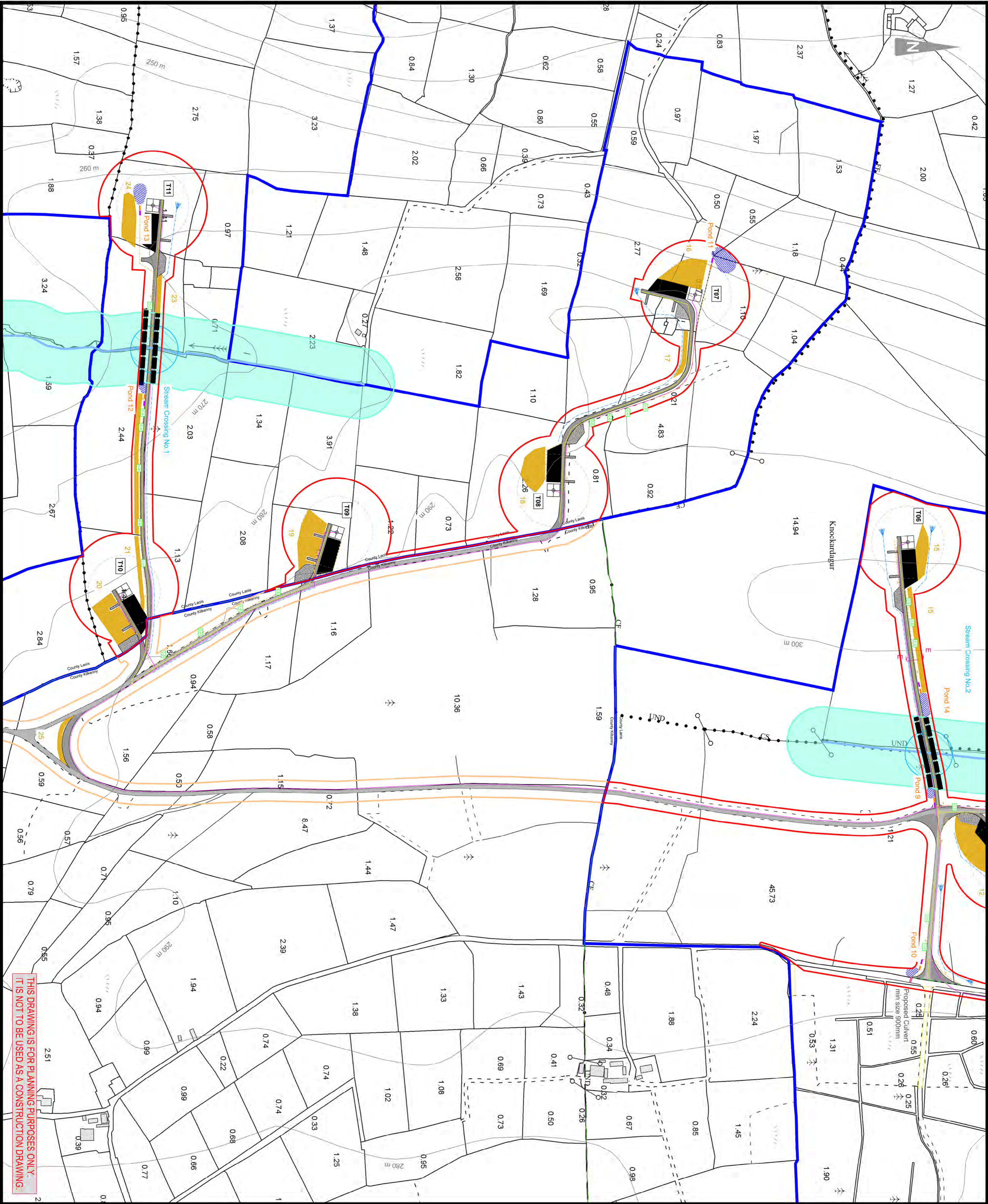
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National Mapping Agency
OS Sheet Number: K001 & L500

04.	Drainage revised	J.B.	N.C.	02/17
rev.	modifications			
Layout Ref.:		by	chkd	date
file				

client	PINEWOOD WIND FARM			
project	PINEWOOD WIND FARM			
stage	FURTHER INFORMATION			
title	SPOIL REPOSITORY LAYOUT			
LAYOUT DRAWING 2 OF 3				
scale	1:2500 @ A1			
surveyed	drawn	checked	date	
OS1	J.B.	OOC	JAN 2017	

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Job No. 5538
Drawing no. S300-C-106
Revision 04



- NOTES:
1. PROPOSED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE.
 3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES.
 4. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS AND SPECIFICATIONS.
 5. ALL LEVELS REFER TO ORDNANCE DATUM (MALIN HEAD)

Legend:

Ownership Boundary	
Application Boundary (Co. Laois)	
Application Boundary for concurrent application made in Co. Kilkenny	
County Boundary	
Wind Farm Tracks	
Existing Tracks (requiring upgrade)	
Indicative Cable Routes	
Proposed Wind Turbines	
Recorded Way Leave Areas	
Existing Watercourse Shown Thus	
Watercourse Buffer 50m Shown Thus	
Existing Watercourse Crossings Shown Thus	
Proposed Watercourse Crossings Shown Thus	
Proposed Primary Settlement Pond / Lagoon-type Sediment Trap Shown Thus	
Proposed Final Settlement Pond / Lagoon-type Sediment Trap Shown Thus	
Proposed Buffeted Outfall Shown Thus	
Proposed Clean Water Drain Shown Thus	
Proposed Dirty Water Drain Shown Thus	
Proposed Check Dam Shown Thus	
Proposed Precast Slabbed Drainage Channel Shown Thus	
Proposed Silt Fence Shown Thus	
Proposed Lagoon - Type Sediment Trap Shown Thus	
Proposed Spoil Repository Shown Thus	

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National Mapping Agency

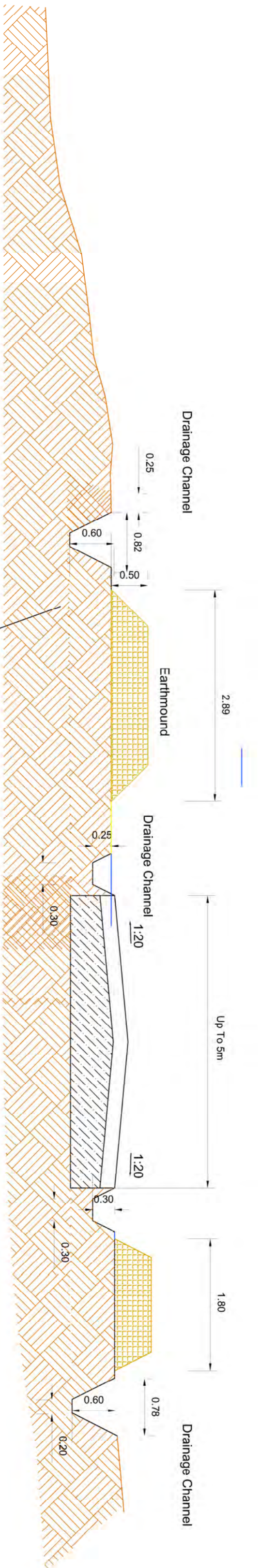
04.	Drainage Revised	J.B	N.C	02/17
rev.	modifications			
Layout Ref.:		by	chkd	date
file				

client	PINEWOOD WIND FARM			
project	PINEWOOD WIND FARM			
stage	FURTHER INFORMATION			
title	SPOIL REPOSITORY LAYOUT LAYOUT DRAWING 3 OF 3			
scale	1:2500 @ A1			
surveyed	drawn	checked	date	
OSI	J.B.	OOC	JAN 2017	

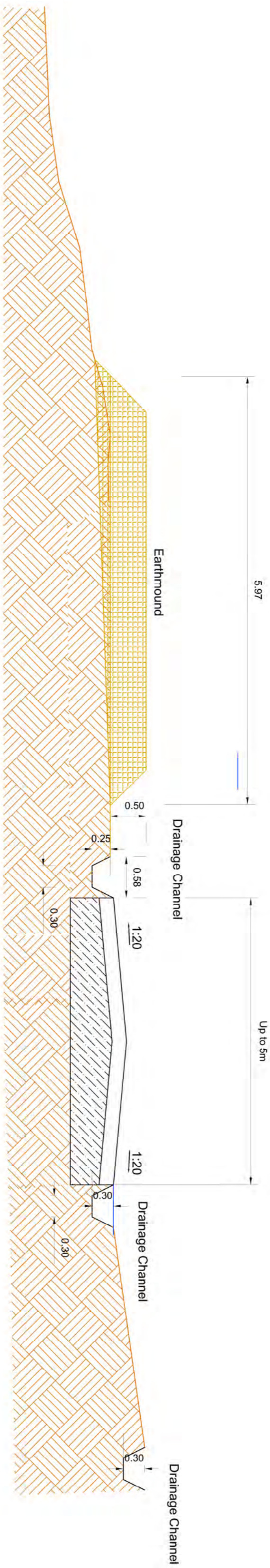
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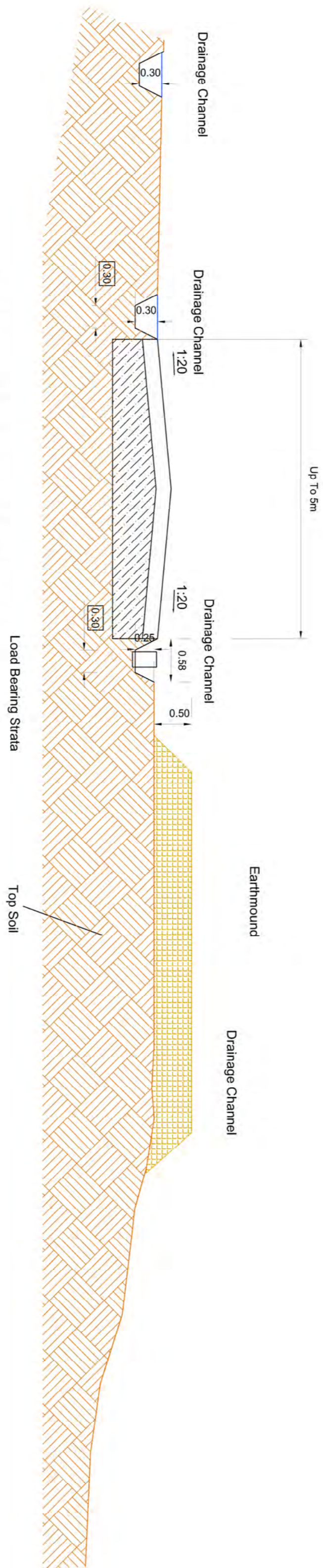
Job No. 5538 Drawing no. S300-C-107 Revision 04



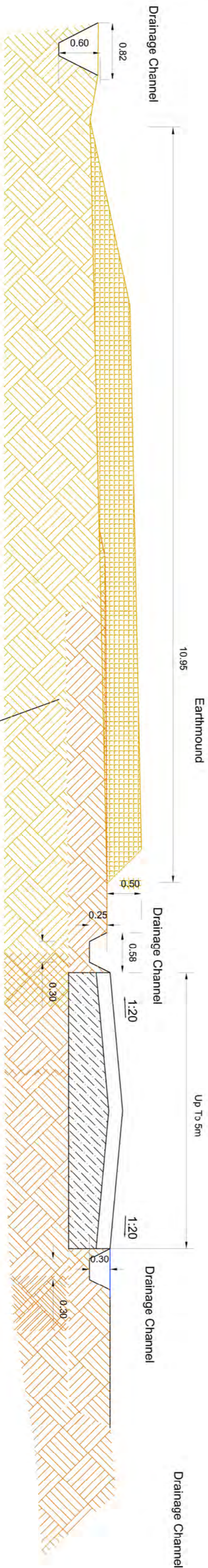
Top Soil
Load Bearing Strata
**ROAD CONSTRUCTION & SPOIL
STORAGE DETAIL A - A**
Scale 1:100



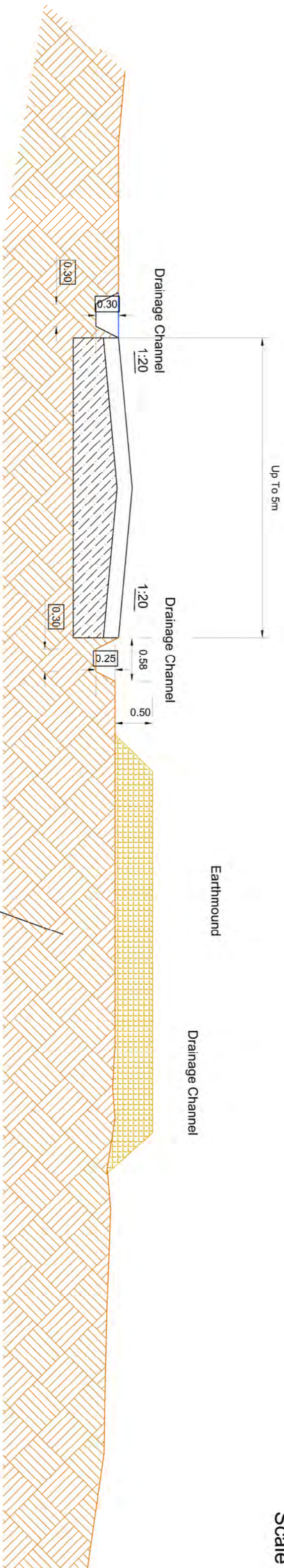
Load Bearing Strata
**ROAD CONSTRUCTION & DRAINAGE
DETAIL - B - B**
Scale 1:100



**ROAD CONSTRUCTION & DRAINAGE
DETAIL - C - C**
Scale 1:50 @ A1



Top Soil
Load Bearing Strata
**ROAD CONSTRUCTION & DRAINAGE
DETAIL - D - D**
Scale 1:50 @ A1



Load Bearing Strata
Top Soil
**ROAD CONSTRUCTION & DRAINAGE
DETAIL - E - E**
Scale 1:50 @ A1

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rev.	modifications	by	chkd	date
Layout Ref.:				
file				

client			
PINEWOOD WIND FARM			
project			
PINEWOOD WIND FARM			
stage			
FURTHER INFORMATION			
title			
SPOIL REPOSITORY SECTION			
scale			
1:50 @ A1			
surveyed	drawn	checked	date
OS1	J.B	OOC	JAN 2017

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Job No.	Drawing no.	Revision
5538	S300-C-108	02

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