CONTENTS

TABLES

FIGURES

5 DESCRIPTION OF THE PROPOSED DEVELOPMENT

5.1 Introduction

This section of the EIAR describes the Proposed Development which is the subject of this application for planning permission to An Bord Pleanála. The application is for a 10-year duration planning permission and a 35-year operational life from the date of commissioning of the entire wind farm.

The Proposed Development comprises:

- 11 no. three-blade wind turbines with an overall ground to blade tip height range of 176.5m to 180m, a rotor diameter range of 133m to 150m and a hub height range of 105m to 110m;
- Construction of associated reinforced concrete foundations, crane pad hard-standing areas and associated plant/switching gear;
- Construction of new permanent, internal site tracks and upgrading of existing tracks and associated drainage infrastructure including a clear-span bridge (circa 10m length), concrete culverts and the installation of an on-site Sustainable Drainage System (SuDS);
- 2 no. temporary spoil storage areas (one in the western DA and one in the eastern DA;
- Erection of 1 no. permanent meteorological mast in the western development area with a height of 100 m above existing ground level;
- All associated internal, underground electrical and communications cabling connecting the wind turbines to an on-site substation located in the western DA;
- Provision of underground interconnecting 33kV IPP cabling and underground cable joint bays circa. every 750-1,000m for circa. 10.6km (joining eastern and western DAs) within the public road network including the R471;
- Provision of 1 no. 110kV onsite substation and parking in the western DA (Townland of Oatfield), along with associated control and switchgear;
- All works associated with the connection of the wind farm to the national electricity grid, which will be via a loop-in 110kV underground cable connection in the townland of Ballycar North, with 2 no. new 16m steel lattice end masts & associated overhead line (OHL) electrical infrastructure, located at the interface with the existing 110kV OHL. Two tie-in options to the existing overhead 110kV lines are proposed as follows:
    - Option A (loop-in to Ardnacrusha to Ennis 110kV OHL via 3.83km of double circuit underground cables and joint bays every 700 m from the onsite 110kV substation to two new 16m steel lattice loop-in masts located in the townland of Ballycar North.

- Option B (loop-in to Ardnacrusha to Drumline 110kV OHL via 4.16km of double circuit underground cables and joint bays every 700 m from the onsite 110kV substation to two new 16m steel lattice loop-in masts located in the townland of Ballycar North.

- 2 nos. temporary construction compounds, including offices/meeting rooms, parking and transformer;
- 10 no. individual site access points and tracks to turbines, on-site sub-station, met mast, temporary spoil storage & temporary construction compound areas from the local road network/public trackway running north of the R471;
- Forest & tree felling to facilitate construction and operation of the proposed development;
- Temporary works to accommodate turbine delivery route (TDR) in the townland of Knockbrack Lower;
- All associated site development works including Construction, Operation and Decommissioning stage site-lighting, fencing and signage.

5.1.1 Site Location and Environs

5.1.1.1 Site setting and existing land use

The site of the Proposed Development is located in the Oatfield and Gortacullin areas. At the nearest point, the Proposed Development site is approximately 1.3km to the South of Broadford, 4.7km to the East of Sixmilebridge, 7.6km North of Ardnacrusha, 9.2km North of Limerick, and 19.7km South of Ennis.

The Proposed Development site boundary (which is the planning boundary) includes:

- Two distinct areas containing the wind farm infrastructure, including turbines and on-site substation. Each distinct area is referred to as the Western DA and the Eastern DA (comprising principally of conifer plantation, transitional woodland scrub, mixed forest, pastures, agricultural lands, and peat lands.
- An IPP connection route from the Eastern DA to the 110kV substation located in the Western DA. The IPP cables will be installed within the body of the local public road network and public access trackway on approach to the Western DA. The overall length of this interconnecting IPP cable route is ca. 10.6km.
- Electrical energy generated from the wind farm will be exported to the national grid via double circuit underground grid connection cables to the proposed 110kV loop-in masts at Ballycar North, County Clare, where it will connect to the existing overhead 110kV line. Two options for the interconnection with the OHL are proposed.
    - The first is a loop-in to the existing Ardnacrusha – Ennis 110kV OHL at Ballycar North (ca. 3.83km cable length) and the second is a loop-in to the existing Ardnacrusha – Drumline 110kV OHL, also at Ballycar North (ca. 4.16km cable length).
    - Once the 110kV double circuit export cable leaves the Proposed Development site, the grid connection infrastructure will be installed

within the body of the public road network along the route until it reaches third party lands where the loop-in towers will be located, beneath the existing OHL in the townland of Ballycar North.

- An area of land take required for accommodation works along the proposed turbine delivery route from Foynes Port to the Proposed Development site (see **Section 5.2.8.4** below for further details).

The location of the Eastern and Western DA, including the layout of the proposed development is presented in **Figure 5.1**.

Existing land use in the area comprises coniferous forest, mixed forest, transitional woodland scrub, pastures, agricultural lands, and peatlands. Details of the land use type associated with the Proposed Development is illustrated in **Figure 5.2** below.

Figure 5.1: Location of the Eastern and Western DA

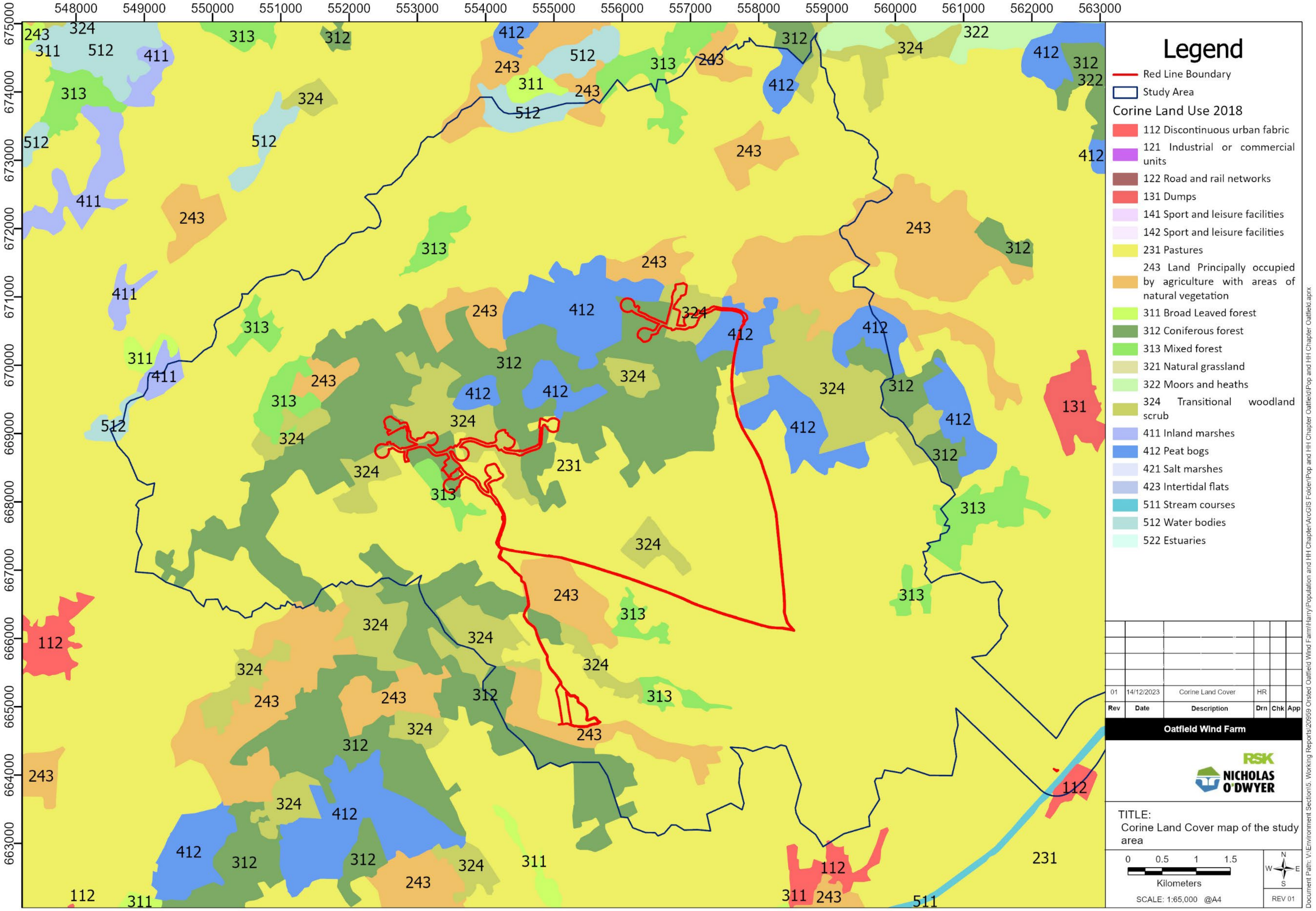


Figure 5.2 Corine land cover map of the proposed development area

5.1.1.2 Land ownership

The Proposed Development lands described in the previous sections include lands under private ownership. Consent letters from all involved landowners (where legal owner of the landholdings defined by the blue line boundary in **Figure 5.1**) are included with the planning application (See **Part 1: Planning Application Documents**).

5.1.1.3 Removal of Forestry and Replant Lands

The construction of the Proposed Development will require the clear-felling of commercial conifer plantation and replanting in accordance with the licensing requirements of the Forest Service of the Department of Agriculture, Food and the Marine. A total of ca. 54 hectares of conifer forest plantation will be felled to facilitate the Proposed Development.

The felling will be the subject of a felling licence application to the Forest Service prior to construction as per the Forest Service's policy on granting felling licenses for wind farm developments. The Forest Service Policy requires that a copy of the planning permission for the wind farm be submitted with a felling license application. Therefore, the felling license cannot be applied for until planning permission is received for the Proposed Development. Felling will be carried only upon receipt of the appropriate permits and will be undertaken by a licenced felling contractor.

See **Section 5.2.10** and **Figure 5.3** for a summary of the proposed biodiversity enhancement measures for the Proposed Development.

Replacement replanting of forestry in Ireland is subject to license in compliance with the Forestry Act 2014 as amended. The consent for such replanting is covered by the Forestry Regulations 2017 (S.I. No. 191 of 2017). The associated afforestation of alternative lands equivalent in area to those lands being permanently clear felled is also subject to licensing ('afforestation licensing').

The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing. In light of the foregoing and for the purposes of the Proposed Development, the developer commits that the location of any replanting (alternative afforestation) associated with the Proposed Development will be greater than 10km from the wind farm site and also outside any potential hydrological pathways of connectivity i.e. outside the catchment within which the proposed development is located. In addition, the developer commits to not commencing works until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority.

5.2 Elements of the Proposed Development

5.2.1 Wind farm layout

Figure 5.3 shows the locations of the proposed wind turbines and associated hardstanding areas including crane pads; the electrical substation; the meteorological mast; the temporary construction compounds; the areas for temporary storage of excavated materials; the permanent internal access tracks; and biodiversity management areas.

The layout of the Proposed Development has been designed to minimise likely significant adverse effects while at the same time maximising the energy yield of the wind resource available at the Proposed Development site. The layout of the Proposed Development was informed by the following objectives and constraints relevant to project design, to:

- Maintaining a setback from proposed turbines of 720m (four times the tip height) to the nearest point of non-financially involved dwellings), subject to a mandatory minimum distance of 500m for all dwellings (per Section 6.18 of the 2019 Draft Revised Wind Energy Guidelines);
- Maintaining a buffer of at least 20m from known archaeological monuments and cultural heritage features;
- Maintaining a buffer of at least 15m from minor watercourses and land drains (except where they are crossed by tracks or, in in the case of minor land drains, where a lesser buffer is applied or where the drain is re-directed);
- Maintaining a buffer of at least 50m from major surface water features;
- Maintaining a buffer of at least 25m from known karst features;
- Avoiding known buffers of existing telecommunications infrastructure links; and,
- Avoiding defined buffers for known areas of protected nesting birds, in accordance with good practice guidance (**refer to EIAR Chapter 7: Biodiversity, Appendix 7.1 SHMP**).

In cases where these objectives cannot be met, mitigation measures will be applied to ensure the project design, following consideration of reasonable alternatives, does not result in any significant environmental effects. The alternative layouts and locations of ancillary infrastructure considered in the project design are described in further detail in **Chapter 4 Policy Context, Project Need and Alternatives Considered**.

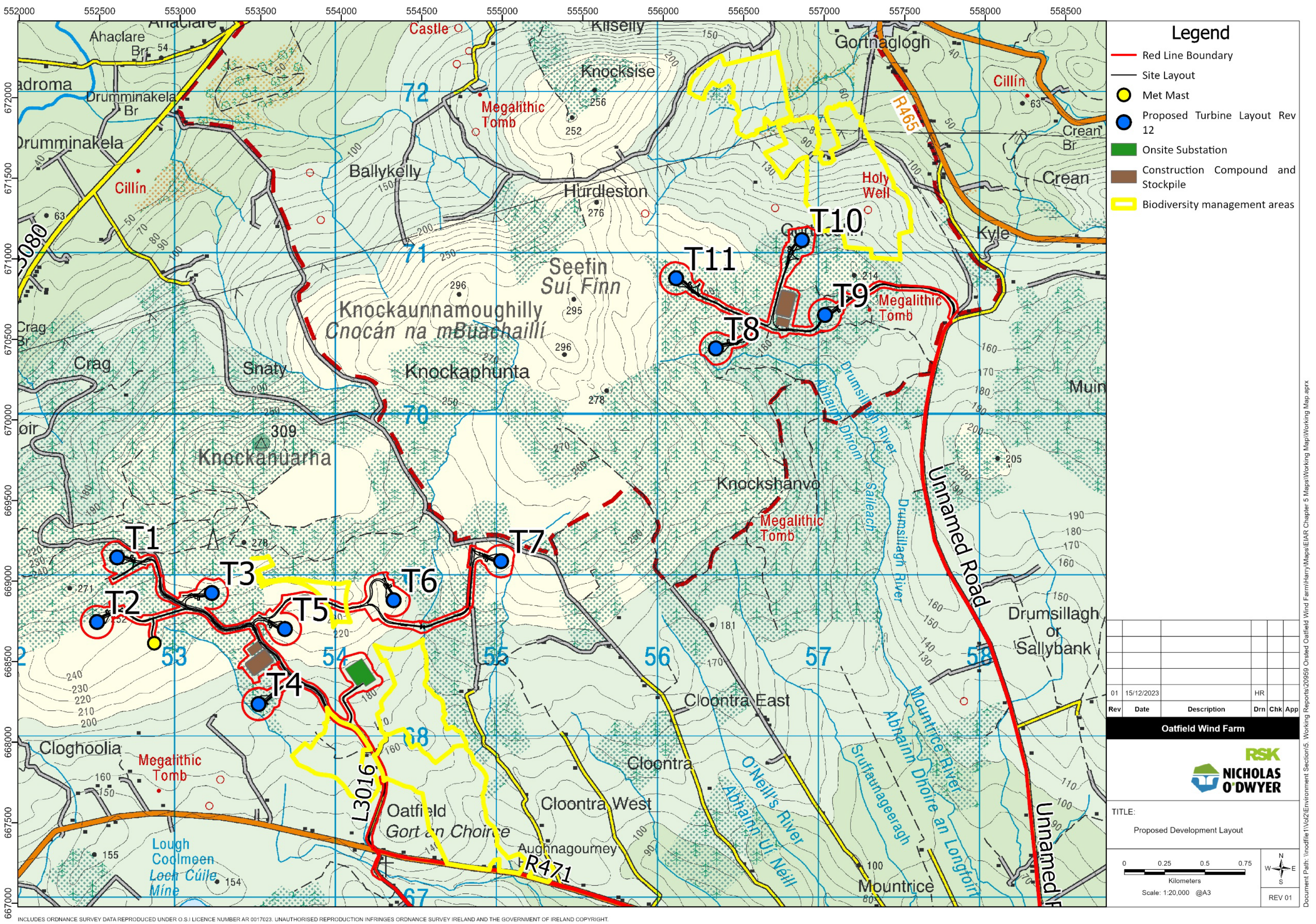


Figure 5.3 Proposed Development Layout

5.2.2 The turbines

5.2.2.1 Turbine locations

The Grid Reference coordinates of the proposed turbine locations are listed in **Table 5.1**. The final ground level of the turbine foundations will be determined by the actual ground conditions at each proposed turbine location and may differ slightly from the levels indicated.

The redline planning boundary defines the area within which the Proposed Development will be constructed.

Table 5.1: Proposed wind turbine indicative locations

Turbine ID	ITM Co-ordinates		Elevation of top of foundation (m)
	Easting	Northing	
T1	552608.55	669147.23	258.05
T2	552482.73	668745.45	249.65
T3	553196.19	668926.00	242.20
T4	553486.18	668236.68	181.05
T5	553650.23	668703.10	218.65
T6	554325.00	668880.93	209.80
T7	554992.40	669123.70	233.80
T8	556327.26	670443.47	193.55
T9	557004.30	670651.94	193.65
T10	556860.50	671116.45	189.25
T11	556079.75	670879.30	222.90

5.2.2.2 Turbine details

Three wind turbine models are assessed in the EIAR and are applied for in terms of planning permission, within the range of specifications listed below; the Vestas V-150, Nordex 149 and Nordex 133. These are three bladed, horizontal axis turbines, light grey in colour (RAL 7035 – Light Grey) and with the specifications set out in **Table 5.2** below.

Table 5.2: Proposed wind turbines considered for the Proposed Development

Turbine Type	Output (MW)	Hub Height (m)	Rotor Diameter (m)	Tip Height (m)	Ground Clearance (m)
Nordex N149	5.7	105	149	179.5	30.5
Vestas V150	6.0-6.6	105	150	180.0	30.0
Nordex N133	4.8	110	133	176.5	43.5

Following a grant of planning permission, the selected model (within the ranges specified in **Table 5.3**) will be decided, subject to a competitive tender process.

The turbine selected for the Proposed Development will not exceed the dimensions above as assessed in the EIAR and specified in the planning application. The wind turbine front and side elevations are shown on **Planning Drawing No. 20959-NOD-XX-XX-DR-C-08104_S4_P01**. A plan view of the wind turbines and hardstanding areas is shown on **Drawing No. 20959-NOD-XX-XX-DR-C-08105**.

5.2.2.3 Power output

The anticipated total Maximum Export Capacity (MEC) range of the wind farm will be in the range of 52.8MW – 72.6MW. It must be noted that this is an indicative range and the exact MEC will be dependent on the output power of the turbine model available at procurement stage.

5.2.2.4 Turbine foundations

The proposed turbine foundation design is a traditional gravity-based foundation. These are concrete structures that depend on their own weight to ensure stability against overturning and sliding.

Each turbine will be erected on a reinforced concrete foundation. The turbine foundation diameter is 12m of concrete foundation, a 45-degree excavation angle and 1m around for workspace), down to a level where the underlying soil or rock can bear the weight of a structure without shifting or compressing. This will be done by excavating soil, subsoil and rock to a depth which will vary depending on ground conditions at each turbine location. See **Planning Drawing No. 20959-NOD-XX-XX-DR-C-08108** for a general arrangement drawing of the wind turbine foundation.

Soil and subsoil excavated from the turbine foundation location will be stockpiled temporarily within the temporary storage areas identified on the Western DA and Eastern DA, respectively. It is proposed that each foundation will have a maximum depth of approximately 3m. The rock type present on site is predominantly red sandstone and will be broken out by tracked excavator with occasional rock breaker required. No crushing or screening of excavated rock material is proposed on site. Any rock material excavated from the Proposed Development site will be taken to a plant off-site, where it will be crushed and screened. This processed rock material will then be returned and used on the Proposed Development site as fill material sub-base for site access track construction, such that the loss of local geological material from the site is minimised.

The central part of the foundation (plinth) of each turbine will be raised from the main foundation to ground level, where it is originally below ground level. It will encompass a cast-in insert or bolts to connect to the bottom of the turbine tower and reinforced bar structural elements. The method of construction for a turbine foundation is described as follows:

- install temporary drainage around the perimeter of the excavation;
- excavate soil and rock;
- back fill the foundation with imported stone;
- install formwork and reinforcement;

- pour the concrete; and
- once the concrete has set and the earthing system is in place, backfill the foundation with suitable excavated material.

The area around and above the turbine foundation will be backfilled with compacted stone or crushed rock and subsoil excavated from the site with the topsoil reinstated.

5.2.2.5 Hardstanding areas

The turbine hardstands are required to accommodate the delivery, laydown, and assembly of turbine components prior to turbine component lifting and assembly. For each turbine, the hardstand areas comprise a main crane hardstand, a component set down area, assist crane hardstands and vehicle parking and turning areas.

A plan of the turbine hardstands is shown in **Drawing No. 20959-NOD-XX-XX-DR-C-08030** to **20959-NOD-XX-XX-DR-C-08040**. The hardstands are needed to support the cranes during turbine construction, operation, and decommissioning stages. They will be constructed first and used to facilitate construction of the turbine foundations such as steel reinforcement delivery and pouring of concrete.

Construction of the hardstanding areas for the turbines will require the excavation of soil, subsoil and rock as required, the laying of a geotextile material on the formation surface, and placement of engineered stone and a top dressing. This will create a stable, level, finished working surface of sufficient bearing capacity to carry the anticipated loads.

5.2.2.6 Turbine installation

Once on site, the wind turbine components will follow a detailed route and plan to minimise manoeuvring. Components will be placed on turbine hardstands prior to assembly. One large main crane will be required for erecting the turbines, assisted by one or two smaller cranes. Depending on the appointed turbine supplier and installation contractor, a second assist crane may be used for lower tower section installation. During the operational phase, cranes may be required in the unlikely event that turbine components require replacement. Decommissioning of the turbines will require similar activities to that described for construction activities.

The towers will be delivered in sections, and work on assembly will be undertaken only under suitable weather conditions e.g. during appropriate wind conditions.

Turbine assembly will be in accordance with turbine supplier requirements and will follow the sequence described below.

Turbine pre-installation

1. The base section and one mid-section will be pre-installed with a 500-750 tonne crane and a 130 tonne assist crane.
2. The blades will be unloaded using two mobile cranes placed on the hardstand allowing the required outreach to place blades in the blade laydown area. The blade laydown area needs to be flat, free of obstacles and within the lifting radius of the main crane. The nacelle[1] will be delivered using a flatbed trailer or a

[1]The nacelle is the part of the wind turbine that houses the generator, gearbox, and other important components necessary for converting wind energy into electricity.

clamp/world adapter trailer, suitable for abnormal load delivery. It will be unloaded using a mobile crane and placed within the main crane working radius in such a position that it does not interfere with the later build and operation of the main crane.

3. The hub will be unloaded with a mobile crane and placed within main crane working radius.
4. The remaining tower sections will be unloaded onto the hardstand allowing space for the main crane to mobilise into position to complete assembly of the turbine.

Turbine main installation

Once the base tower has been erected, and the nacelle, blades and hub have been prepared, then the main crane will be brought to the crane pad.

1. The main crane will be placed at a required working radius from the centre of the foundation, the crane requires appropriate free space for boom assembly which takes place linearly, usually along and parallel to the road. The crane pads along the road will be used by a small crane to assemble the boom.
2. Once assembled the main crane will commence the erection of the tower sections in combination with a mobile tailing crane. The tower needs an appropriate free area within the main crane and tailing crane working radius. Additional lifts for the bolts will be necessary before the next tower section is lifted.
3. The nacelle will then be lifted from the position on the pad where it has been prepared, the hub will then follow. Depending on the crane configuration and the hub height it may be that the nacelle is lifted without the drivetrain/powertrain inside, which will then be a separate lift.
4. The blades will be the last to be lifted from the location where they have been assembled.
5. The crane is disassembled and moved to the next location.

Each turbine will take 1.5 weeks to be erected and a period of two months will be required for commissioning and testing of the wind farm before it is fully operational.

5.2.3 Site access

Site access to the wind farm will occur from the local road networks and public trackways northwards from the Regional Road R471.

5.2.3.1 Entrance to Eastern DA

- One access point to the Eastern DA from the local road running north from the regional road R471, and immediately west of the Traugh Parish Church (Mary Mother of God), through the townland of Sallybank and to the area of Gortacullin (providing access to T8, T9, T10 and T11), see **Figure 5.4**.

5.2.3.2 Entrance to Western DA

- Two access points (providing access to T7) in the Western DA from the local road running north from the Regional Road R471a (junction at Aughnagourney) (see **Figure 5.5**);

- Seven access points from the local road running north from the Regional Road R471 at Oatfield (providing access to T1, T2, T3, T4, T5, T6, Substation, temporary spoil storage area and Meteorological mast), see **Figure 5.5**.

The coordinates of the access locations are provided in **Table 5.3.**

These entrances will be used for the duration of the construction stage. These entrances will be gated and fenced and will remain in situ on completion of the construction stage. Entrances will be culverted across the roadside drainage, and measures will be put in place to ensure no drainage from the access tracks leading to the wind farm components flows onto the public road at any location.

During the operational stage, over the lifetime of the Proposed Development, these in situ entrances and access tracks will only be used to accommodate delivery of replacement turbine components requiring abnormal loads (e.g., blade, nacelle, and tower), in the unlikely event that it will be required.

The projected frequency of visits and types of vehicles (i.e., periodic visits as required) during the operational stage of the Proposed Development will not vary or add significantly to the existing situation.

In the interest of road safety, provision will be made for upgrading these entrances to provide visibility splays measuring 80m on both sides of the entrance set back 3m from the edge of the public road.

All access points to the local road network will be gated with typical single steel pole barriers with low stone pillars, similar in nature to those used by Coillte for security purposes. The site entrances are planned to be decommissioned on completion of the decommissioning phase, however, upon consultation with local landowners at the time, some may be left in situ for forestry or agriculture.

Table 5.3: Local road network access point coordinates

Development Area	Access	ITM_X	ITM_Y
Western DA	Substation	554054.15	668112.22
	T4	553757.22	668350.76
	Temporary spoil storage and construction area	553487.81	668633.49
	T2	553042.13	668830.83
	T3	553019.23	668861.27
	T1 and meteorological mast	552840.51	669122.65
	T5, T6	553449.31	668732.29
	T7 (a)	554814.07	669156.78
	T7 (b)	554783.76	668828.97
Eastern DA	T8, T9, T10 and T11, Temporary spoil storage and construction area	557787.24	670626.63

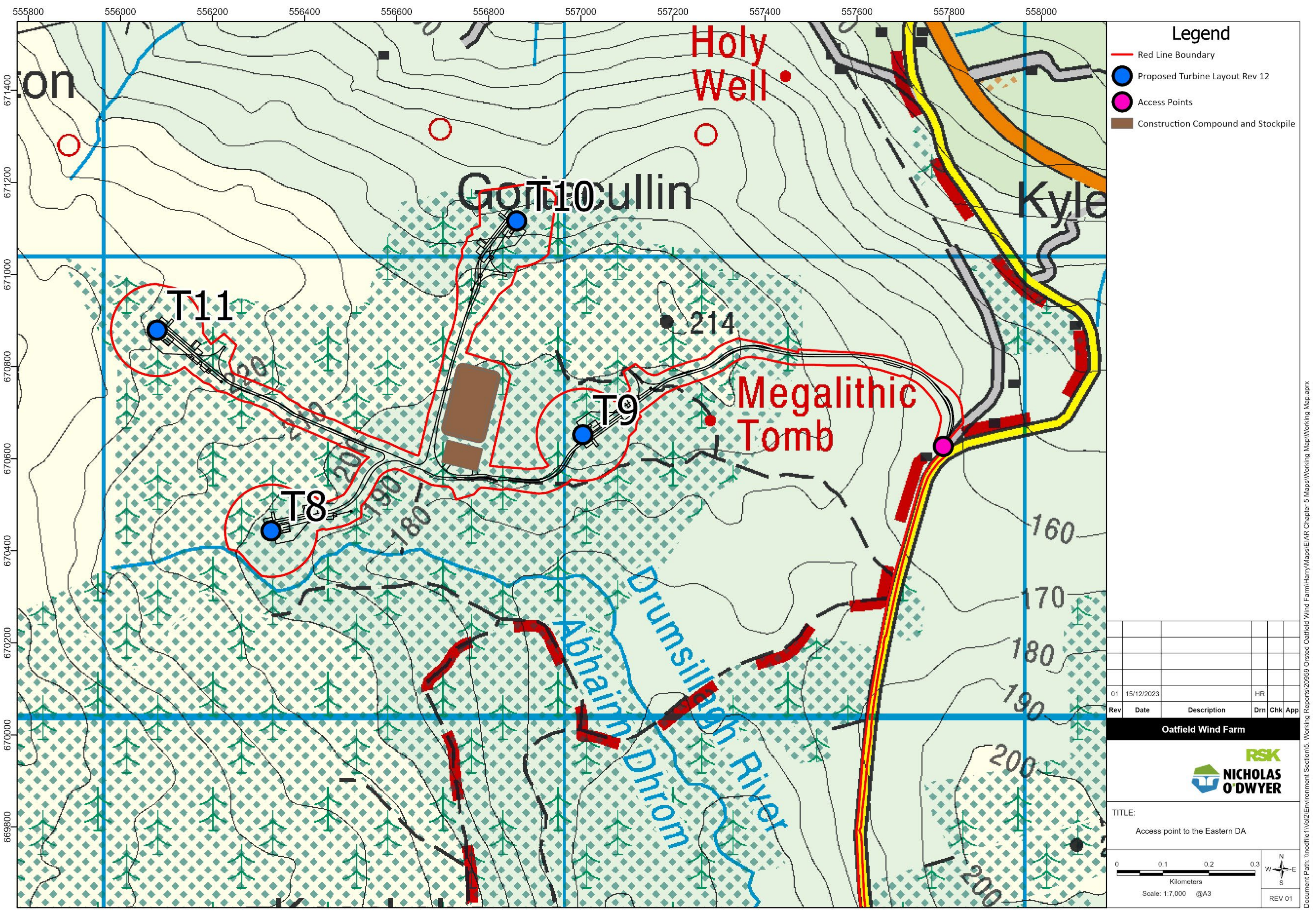


Figure 5.4: Access point to the Eastern DA

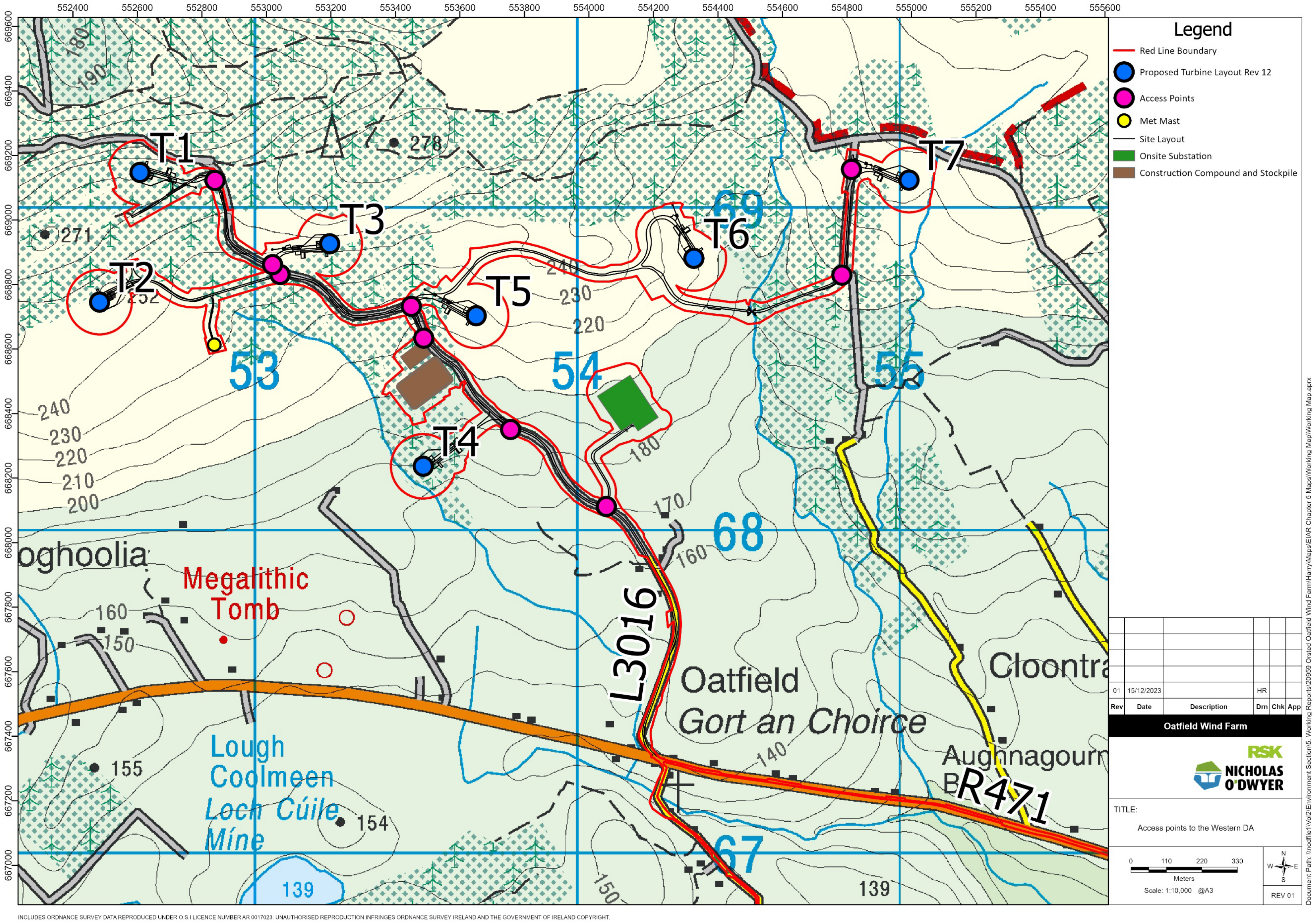


Figure 5.5: Access points to the Western DA

5.2.3.3 Signage

The Construction Traffic Management Plan (CTMP) (see **Appendix 5.2** of this chapter) outlines that it will be the responsibility of the appointed contractor to undertake consultation with the relevant authorities for the purpose of identifying and agreeing signage requirements during the construction stage. Warning signage will be posted at the site entrance directing all visitors to the site manager. Signs will be erected to provide warning to road users of the works access / egress locations and the presence of construction traffic. All signage will be provided in accordance with the Department of Transport's Traffic Signs Manual, Chapter 8 – Temporary Traffic Measures and Signs for Roadworks (2019) and will be installed prior to works commencing on site.

For the operational stage, clear signage relating to the Proposed Development will be provided at the permanent entrances to the site. Access to the Proposed Development site will be restricted to the turbine operator, ESB Networks and local landowners and Coillte only.

5.2.4 Site access tracks

5.2.4.1 New access tracks

Wind farm access tracks will consist of ca. 7.8km of permanent access tracks. These tracks are similar in nature to agricultural access tracks comprising fill with a top surface dressing of hardcore and will not be tarmacadamed or have a wearing course. They will be used to access the construction locations and for occasional operational maintenance purposes. They will be 5m in width and 0.3m in depth. All access tracks will require excavation of 0.3m of existing ground and construction of road foundation to similar finished ground level. Cut and fill operations will be undertaken, and material will be reused for grading and fill purposes to minimise material import requirements.

5.2.4.2 Upgrade of existing site tracks

Most existing site tracks will not be suitable for use by construction traffic. Where they coincide with new access track positions they will be excavated and re-constructed. In general, existing access tracks may be upgraded and widened to suit the Proposed Develpoment needs. A total length of ca. 0.8km of existing access track will be upgraded.

5.2.4.3 Existing drainage features

The site is characterised by a relatively extensive network of non-mapped natural and artificial drainage channels. The existing surface water runoff is contained within natural and artificial drainage channels that include stream and river waterbodies, drainage ditches, and other minor natural and artificial manmade drainage features.

Drainage channels identified during desk study assessment and during site surveys are presented in **Figure 5.6** to **Figure 5.10**. As noted in EIAR **Chapter 9 Hydrology and Hydrogeology,** historical maps were reviewed as part of the desktop assessment.

Drainage channels are mapped using four categories:

1. Historically Mapped Surface Water (Not mapped by EPA/WFD);
2. Forestry Drainage;

3. Inferred Drainage; and
4. Minor Drainage.

5.2.4.4 *Drainage design principles*

Constructed drainage will be provided to manage runoff from tracks, hardstanding areas, turbine bases, and storage areas for excavated materials. These will minimise the potential for silt runoff during construction works and during the operational phase. The Proposed Development will adopt a surface water management plan (see **CEMP in Appendix 5.1 to this chapter**) and site drainage design using the principles of Sustainable Drainage, promoting on-site retention of flows and the use of buffers and other silt removal techniques. All drainage-related mitigation measures will form part of a robust Sustainable Drainage System (SuDS) on the site.

Drainage design as incorporated into the Proposed Development will ensure adequate protection of the environment and will be further refined at the detailed drainage design stage within the parameters set out in this EIAR to minimise modification and disruption of the existing hydrology. SuDS features will be designed in accordance with best practice guidance in "The SuDS Manual (Document ref: C753; CIRIA (2015))". The design principles, in summary, are as described below:

- Maintaining existing overland flow routes and channels. Existing natural flow paths lateral to access roads will be maintained through the use of piped crossings under the track alignments at natural depressions and at regular intermediate intervals. The spacing and exact position of cross drains will be specified at detailed design stage;
- Avoiding transporting rainfall runoff in long linear drainage swales by providing regular channel "breakouts", where water is encouraged to flow overland, thus maintaining existing natural hydrological patterns;
- Reducing surface water flow rates and volumes by attenuating runoff from tracks and hard standings "at source" by providing attenuation via check-dams in swales, whereby the flow velocity and rate of discharge are artificially reduced to mimic natural properties;
- Providing settlement ponds at turbine hardstanding areas and other main surface water discharge locations, where runoff from significant new impermeable areas will be treated and attenuated before being released overland; and
- All swales, crossings and other hydraulic features will be engineered to ensure that dimensions are suitable to convey predicted flows and so prevent the build-up of surface water and / or flooding.

5.2.4.5 *Preliminary drainage design*

There is one new watercourse crossing over a mapped stream between T6 and T7 which is included as part of the Proposed Development within the Western DA. This crossing will be achieved by a new clear span bridge. There a several existing drainage culverts to be upgraded on site. Drainage details are indicated in planning **Drawing Nos. 20959-NOD-XX-XX-DR-C-08301** and **20959-NOD-XX-XX-DR-C-08302.**

In order to avoid any impact to the lands due to construction, operation and decommissioning works, berms with a drainage ditch are proposed on either side of the permanent access tracks and around the turbine hardstands. These will be located such that any waste generated will be collected at check dams along the proposed drainage ditch before being rerouted towards existing stilling ponds. Refer to **Drawing No. 20959-NOD-XX-XX-DR-C-08301_S4_P01** for details on the proposed drainage ditch and roadside berms.

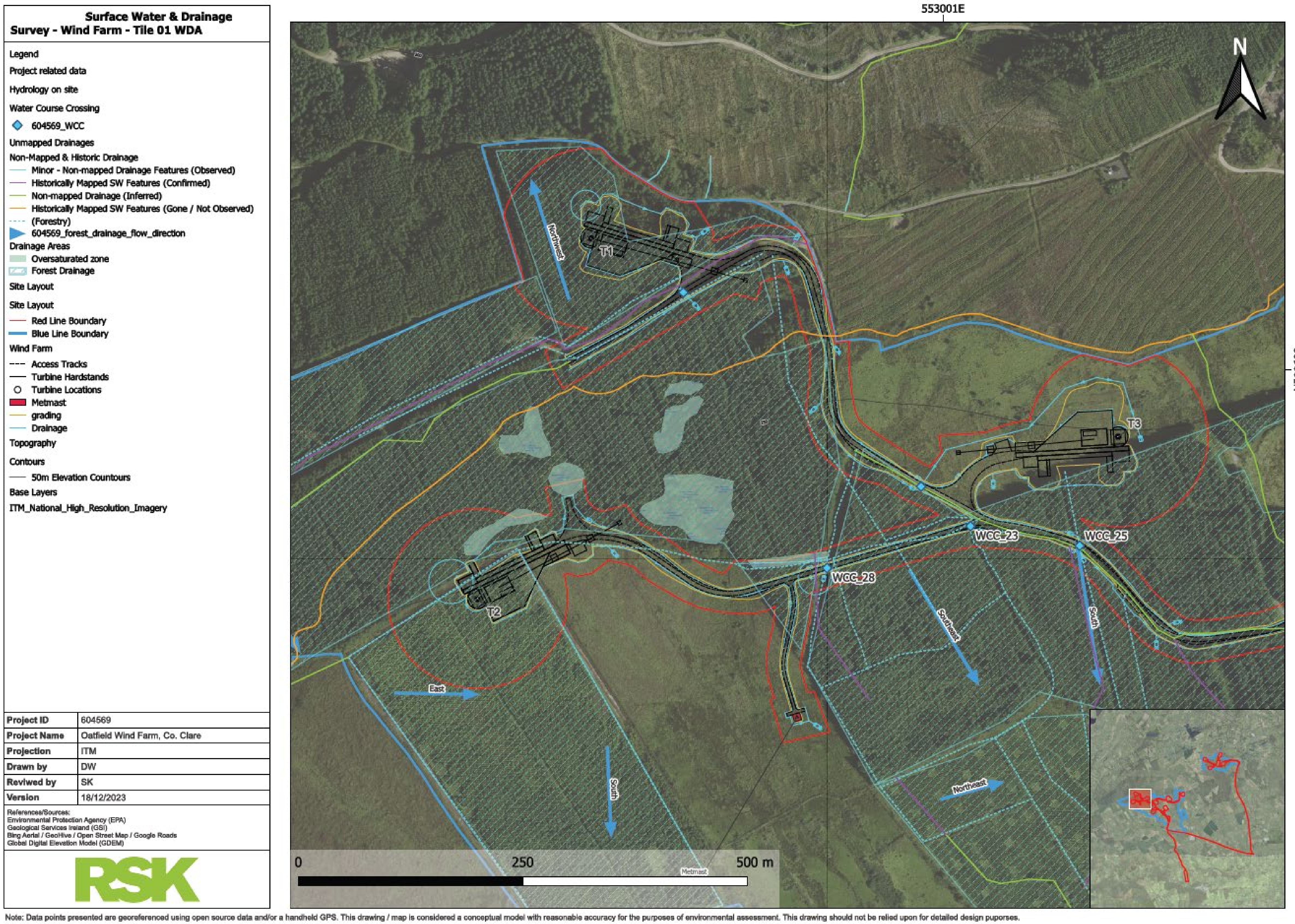
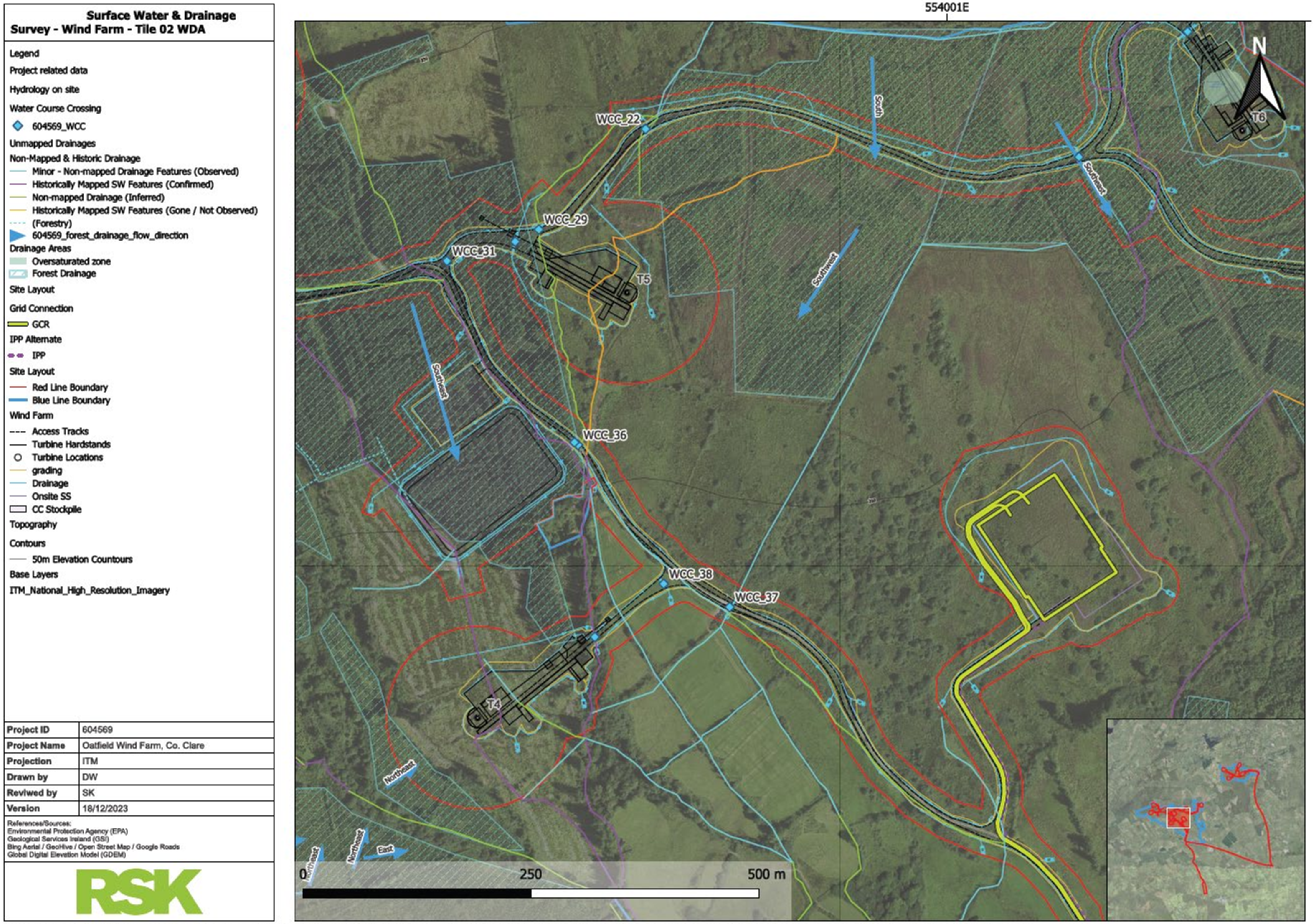


Figure 5.6: Mapped drainage of the Western DA tile 1



Note: Data points presented are georeferenced using open source data and/or a handheld GPS. This drawing / map is considered a conceptual model with reasonable accuracy for the purposes of environmental assessment. This drawing should not be relied upon for detailed design puporses.

Figure 5.7: Mapped drainage of the Western DA tile 2

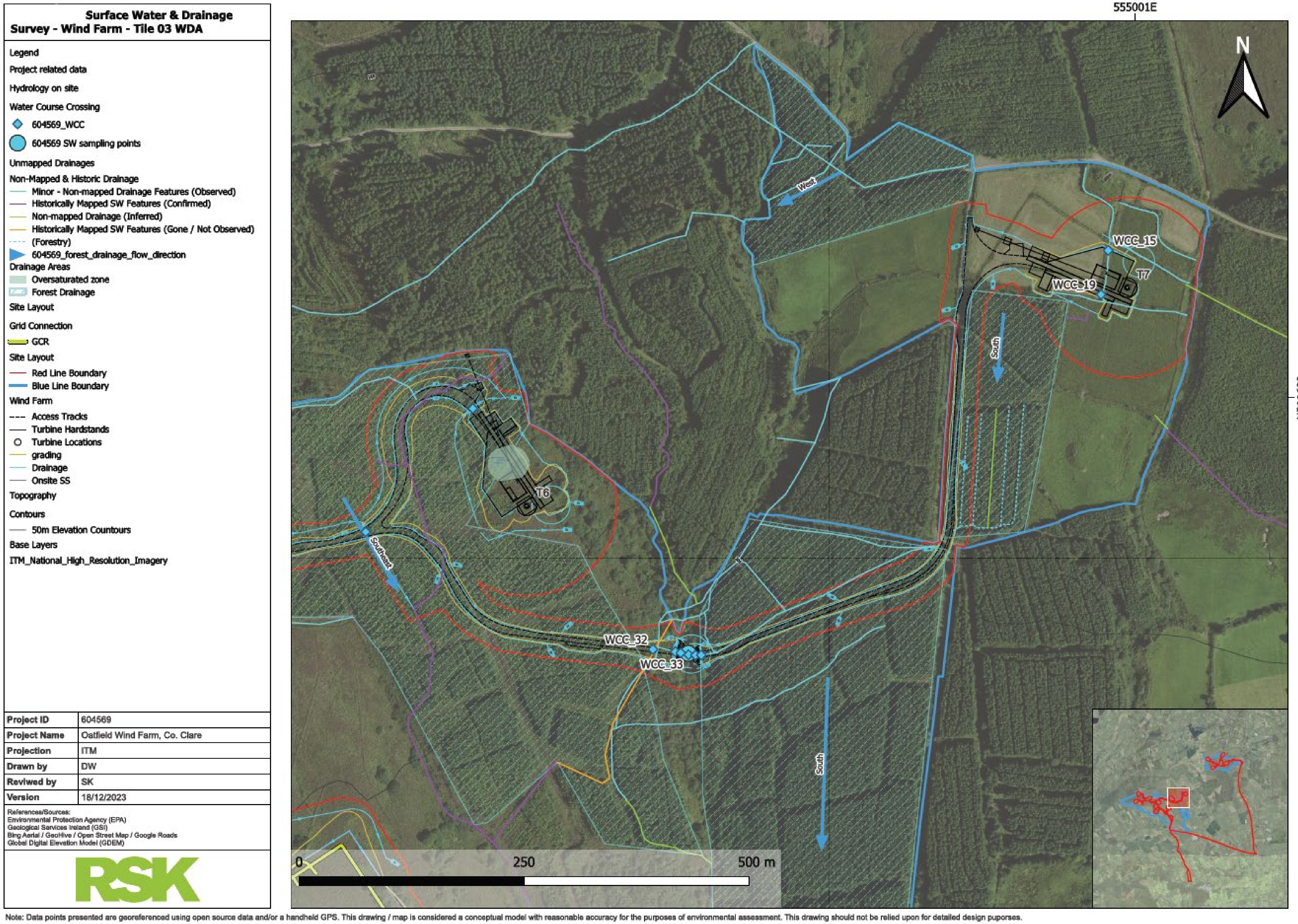


Figure 5.8: Mapped drainage of the Western DA tile 3

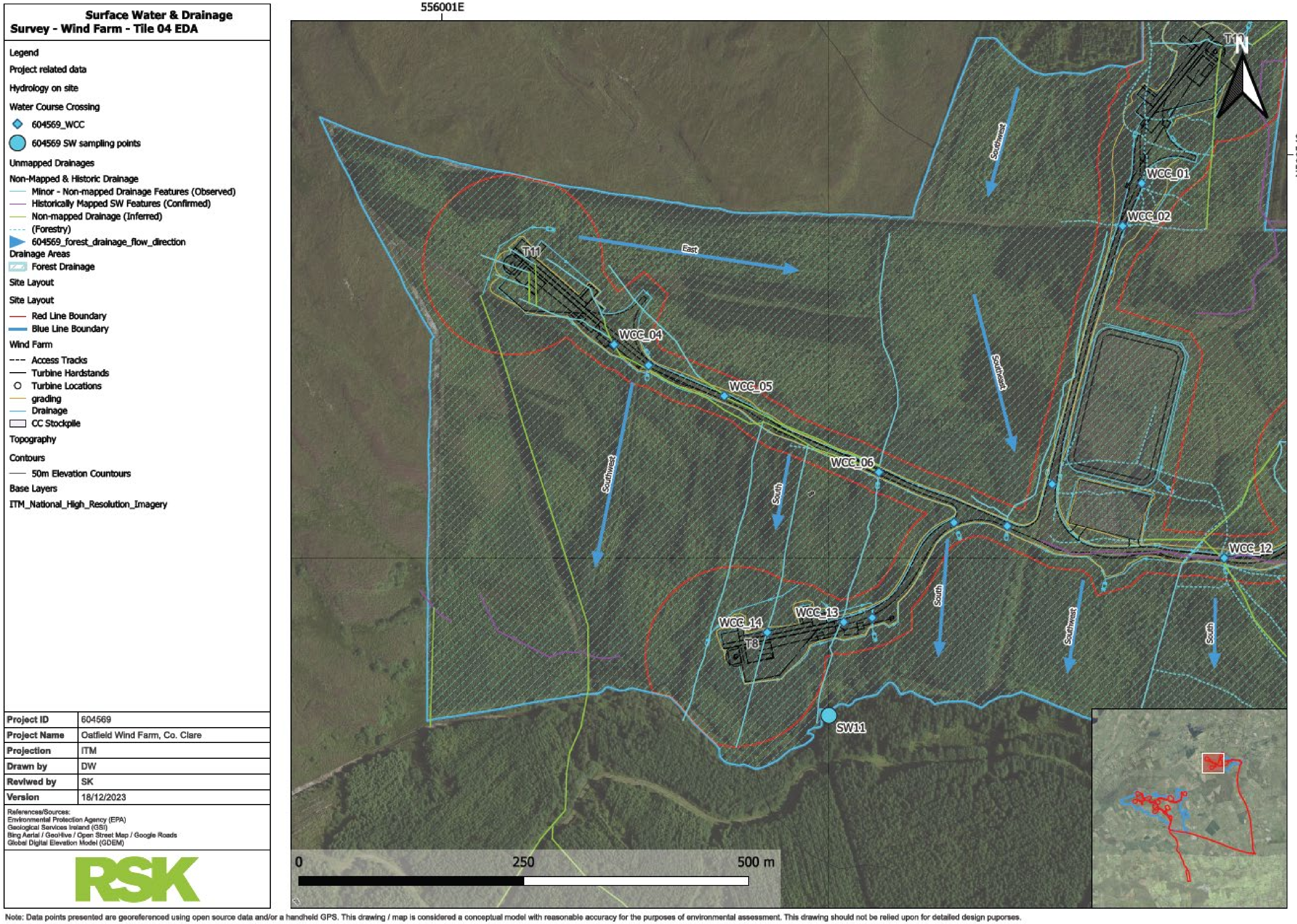


Figure 5.9: Mapped drainage of the Eastern DA tile 4

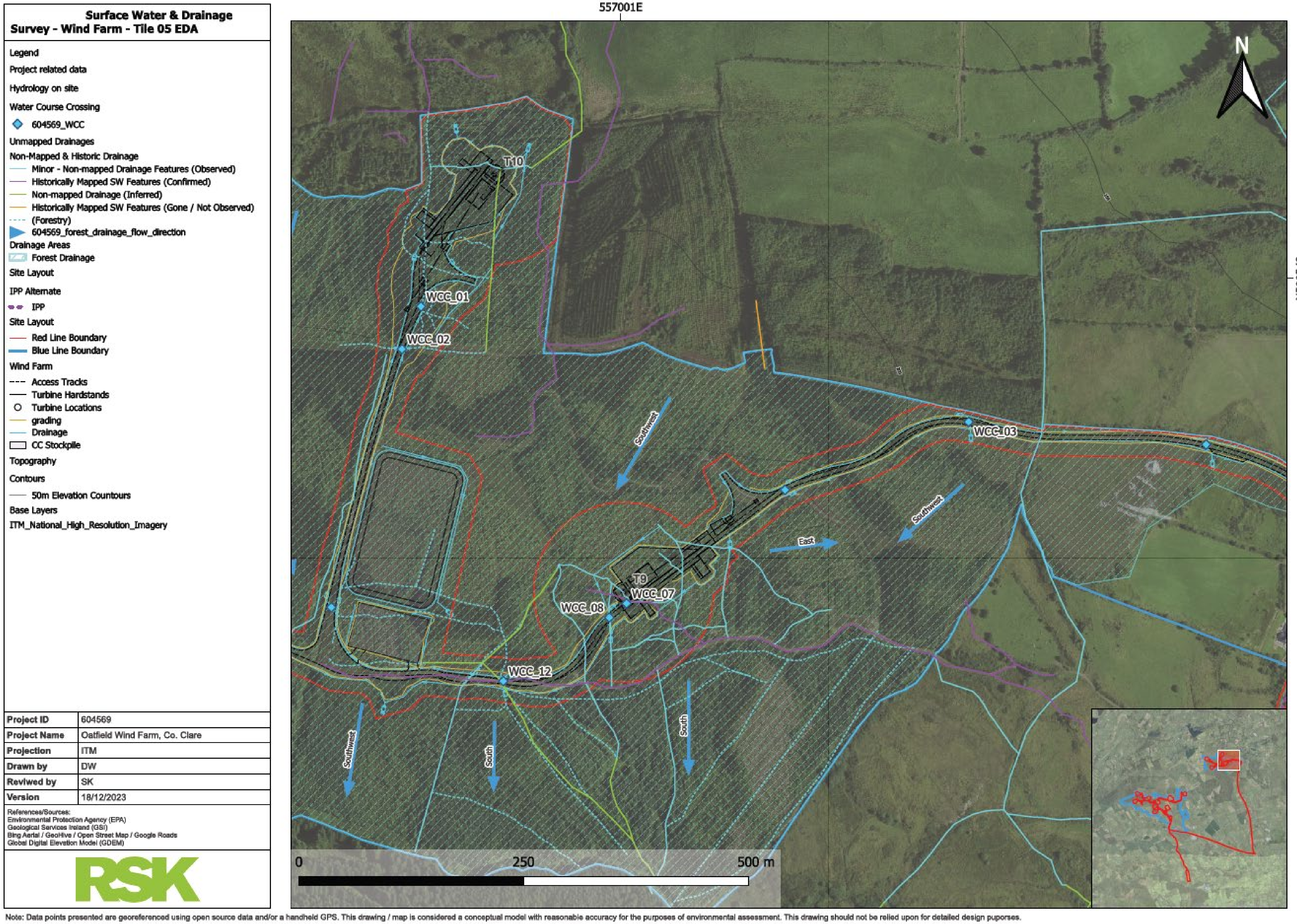


Figure 5.10: Mapped drainage of the eastern DA tile 5

5.2.5 Materials required for Proposed Development

The materials required for construction which will be imported to site are listed in **Table 5.4** along with estimated quantities and the anticipated sources.

Table 5.4: Import of materials required to construct the Proposed Development

Materials	Quantity	Source of Materials
Concrete	8,650 m^3	Off-site concrete plants
Aggregate (crushed stone)*	26,750 m^3	From excavated materials / Off-site quarries
Surface dressing (public road sections)	3,100 m^3	Off-site plants
Turbine Towers (5 sections per tower)	11 (55 sections in total)	Import from within the EU
Turbine Nacelle	11	Import from within the EU
Turbine Blades	33	Import from within the EU
Reinforcing steel	80 kg/m^3 of concrete	Various Irish suppliers (to be finalised during supplier appointments)
Main Transformers	3 loads	Import from within the EU
Electrical Cabling, Communications Cabling	6 loads	Import from within the EU
Switchgear, Electrical Equipment, Apparatus and Plant	8 loads	Import from within the EU
Pre-cast concrete Joint Bay, Communications and Link Box Chambers and Covers	25 joint bays (10 along the GCR and 15 along the IPP route)	Off-site plants
HDPE Ducting	74 km	Irish supplier (to be finalised during supplier appointments)
Red Cable Protection Strip and Yellow Warning Tape	1 load	Irish supplier (to be finalised during supplier appointments)
Steel protection plate	2 loads (if required)	Ireland - presently Birr, Co Offaly
Marker posts and plates	2 loads	Ireland - presently Dundrum, Co Dublin
General building materials	15 loads	Various Irish suppliers (to be finalised during supplier appointments)
Fencing materials, posts, rails, wire	45 loads	Local Hardware
*the values in the table above are considered indicative and will be confirmed upon detailed design, should planning consent be received.		

5.2.5.1 Management of earth materials

As reported in **Chapter 10 Land, Soils and Geology**, probing surveys undertaken at the site indicate a depth to bedrock between < 1m and 3m at all turbine locations. However, the rock type is weak in nature and excavation will be by tracked excavator using both bucket and rock breaker to achieve the required depth.

Soil and subsoils excavated on site will be reused at turbine locations and in the reinstatement of the temporary construction compound.

All earth material excavated from the Proposed Development site will be reserved on site and used in site re-instatement as far as possible. Should excavations result in surplus material, the material will be managed in accordance with the relevant waste management legislation.

5.2.6 On-site electrical and communications components

5.2.6.1 Substation

A 110kV substation will be located in the Western DA as shown on **Drawing No. 20959-NOD-XX-XX-00-DR-C-4210** and **20959-NOD-XX-XX-DR-C-42**. The electricity from the turbines (both the Eastern DA and Western DA) will be cabled into the substation where it will be transformed, metered, and regulated for export to the national electricity system. The substation will be connected to the proposed loop-in location at Ballycar via underground cable. The final layout and design of the substation will be to ESBN specifications within the parameters assessed in this EIAR.

The proposed substation contains the following:

- IPP control room;
- ESB control room;
- Switch room;
- Storeroom;
- Office;
- A water connection system supplied by rainwater harvesting with storage, to supply the proposed Water Closet (WC) and wash hand basin. Potable water will be supplied by bottled water;
- A WC with connection to a sealed wastewater holding tank fitted with a high-level alarm;
- Diesel tank and generator;
- Transformer bund and associated infrastructure (busbars, circuit breakers, cable supports and cabling);
- Lighting and fencing; and,
- Parking.

5.2.6.2 Site Underground Cabling

All power, communication and control cabling on the wind farm will be installed underground in excavated trenches which will be routed from the wind turbines to the wind farm substation, which is located in the Western DA. Electricity generated by the wind turbines will be fed through internal site power cables to the wind farm substation along the path of site access tracks to where these join the local road network and then along these roads.

The Eastern DA will be connected to the proposed development wind farm substation by an IPP cable ducted in the existing local road network as shown on **Figure 5.11**. The IPP cable will be ducted from the Eastern DA along the unnamed local road shown in **Figure 5.11** to where it joins the R471 Regional Road. It will then be ducted westwards along the R471 to the junction with unnamed local road leading to the Western DA and will be ducted along this road to the substation location itself.

Similarly, the wind turbine internal cabling in the Western DA will be ducted along the local unnamed road southwards to the windfarm substation.

When trench excavation works commence, the surface vegetated topsoil will be removed from the trench path and retained on the ground surface adjacent to the trench.

Along the access tracks, a cable trench 0.6m wide by 1.2m in depth will be excavated along the length of the cable route. An easement of 4 metres will be provided for construction and maintenance along the cable route. The topsoil layer will be stripped and stored separately adjacent to the works with excavated subsoil stored separately also parallel to the cable trench. The cable trench will be bedded with locally obtained fill material and with Cement Bound Granular Material (CBGM). Cable ducting will be laid in the trench and embedded in a further layer of CBMG. The trench will then be backfilled with excavated material and the topsoil reinstated and reseeded. The easement will be temporarily fenced to allow surface regeneration to occur.

Any excess subsoil excavated material will be reused on the Proposed Development site. There will be two field drain crossings which will be implemented by temporary damming and over pumping to allow cable trenching to pass through. Minor permanent hedgerow loss 10m in total where the cable route passes through the hedgerows will occur.

Along the existing local roads, cable ducting will be installed within the road structure itself. Cable ducting trenches will be 600mm in width and 1,200mm deep except for the short section of local road leading from the wind farm substation to the R471. This section of road will also accommodate the double circuit 110kV export cable from the wind farm to the proposed loop-in masts in Ballycar North. The cable ducting trench along this section will be 1,500mm in width and 1,200mm deep to avoid electrical conflicts in accordance with EirGrid Technical Specification requirements. The cable ducting will be placed into the prepared trench, inspected, and then the trench will be backfilled and the surface of the road reinstated.

The total length of the IPP cable route from the Eastern DA to the Western DA is 10.6 km. Cable ducting will be installed along this length in a trench 1,200mm deep by 600mm in width. Excavations of surface material and subsoil will be required. Where suitable this will be required to backfill around the cable ducting with excess material removed from the construction areas and disposed of by a licensed waste contractor and taken to a licenced waste facility.

The IPP cable ducting will cross watercourses and road junctions, as set out in **Table 5.5**. In terms of crossing methodologies, standard trenching refers to normal cable ducting construction whereby the cable trench is excavated, ducting installed and then backfilled. HDD refers to Horizontal Directional Drilling whereby a launch and retrieval pit are temporarily constructed either side of the watercourse and cable conduits are drilled beneath the watercourse from the launch pit to the retrieval pit.

During the construction period, traffic management measures will be put in place as set out in the CTMP (**Appendix 3.2 to this chapter**) for the Proposed Development.

Table 5.5: IPP Cable Crossing points

Feature ID	Type of Crossing	ITM_X	ITM_Y	Grid cable method crossing
Crossing No. 10A (IPP Grid Route)	Watercourse	555079.198	667189.743	HDD in public road R471 corridor in Oatfield (Crossing culverted bridge)
Crossing No. 12A (IPP Grid Route)	Road Junction	555372.204	667112.324	Standard Trenching in junction between R471 and unnamed local road
Crossing No. 15A (IPP Grid Route)	Road Junction	555905.51	666942.26	Standard Trenching in junction between R471 and unnamed local road
Crossing No. 19A (IPP Grid Route)	Watercourse	556655.911	666677.463	HDD in public road R471 corridor (Crossing watercourse CL-R471-011.00 culverted bridge)
Crossing No. 21A (IPP Grid Route)	Road Junction	556916.853	666571.088	Standard Trenching in junction between R471 with unnamed local road going to Cloontra
Crossing No. 26A (IPP Grid Route)	Watercourse	557544.827	666339.268	HDD in public road R471 corridor (Crossing watercourse CL-R471-012.00 culverted bridge)
Crossing No. 30A (IPP Grid Route)	Road Junction	557723.355	666285.503	Standard Trenching in junction between R471 with unnamed local road going to Cloontra East
Crossing No. 32A (IPP Grid Route)	Watercourse	557914.646	666227.867	HDD in public road R471 corridor (Crossing watercourse culverted bridge River Blackwater)
Crossing No. 35A (IPP Grid Route)	Road Junction	558152.576	666162.647	Standard Trenching in junction between R471 with unnamed local road going to Mountrice
Crossing No. 36A (IPP Grid Route)	Watercourse	558182.081	666158.042	HDD in public road R471 corridor (Crossing watercourse CL-R471-014.00 culverted bridge)

Feature ID	Type of Crossing	ITM_X	ITM_Y	Grid cable method crossing
Crossing No. 38A (IPP Grid Route)	Road Junction	558507.083	666123.295	Standard Trenching in junction from R471 to local road at the East side of Site
Crossing No. 43A (IPP Grid Route)	Watercourse	558311.876	667258.462	HDD in public road corridor along the local road at the East side of Site (Crossing culverted bridge)
Crossing No. 47A (IPP Grid Route)	Watercourse	558234.814	667912.28	Standard Trenching in public road corridor along the local road at the East side of Site (Crossing culverted bridge)
Crossing No. 48A (IPP Grid Route)	Watercourse	558154.7	668222.558	Standard Trenching in public road corridor along the local road at the East side of Site (Crossing culverted road)
Crossing No. 64A (IPP Grid Route)	Road Junction	557676.305	670299.628	Standard Trenching in junction between the local road at the East side of Site with unnamed local road
Crossing No. 65A (IPP Grid Route)	Road Junction	557681.294	670340.183	Standard Trenching in junction between the local road at the East side of Site with unnamed local road
Crossing No. 66A (IPP Grid Route)	Road Junction	557786.862	670613.857	Standard Trenching in junction from local road at the East side of Site to East Site Entrance

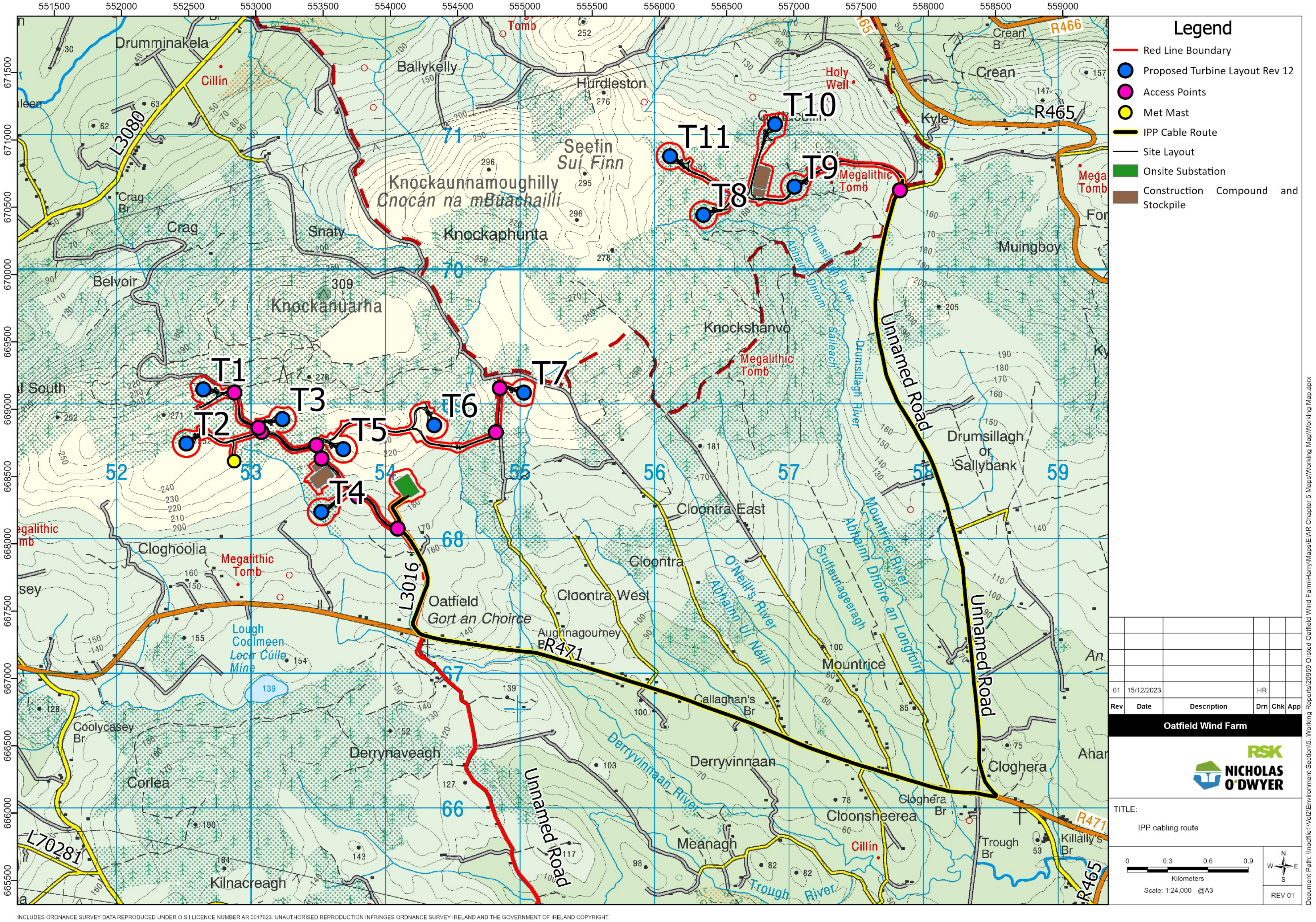


Figure 5.11: IPP cabling route

5.2.7 Permanent meteorological mast

For wind farms with an MEC exceeding 10MW it is a grid operator requirement (per EirGrid Grid Code PPM1.7.1.2 and ESB Networks Distribution Code DCC11.5.1.6) to have continuous on-site meteorological monitoring during operation. These signals are essential in providing high-quality forecasting now and into the future to maintain system security.

A 100m meteorological mast (met mast) is proposed at the Proposed Development site (in the Western DA) to supply continuous, real-time wind speed, wind direction, air temperature and air pressure data. The height of the proposed met mast will be agreed with ESBN / EirGrid during detailed design.

The proposed mast will be a free-standing lattice type structure as shown in **Drawing No. 20959-NOD-XX-XX-DR-C-08106**. It will be accessed via a short section of track from the internal access track. A turning head will be constructed adjacent to the mast site. The met mast access track will be 3.5m in width and will include associated drainage.

The met mast foundation will be 8m x 8m and the mast will be affixed to a concrete plinth with a depth of 1.5m. The plinth will be designed and constructed similarly to the turbine foundations. It will encompass a cast-in insert or bolts to connect to the bottom of the met mast and reinforced bar structural elements. The area around and above the foundation will be backfilled with compacted crushed rock. The met mast will be linked to the closest turbine via buried internal cabling for power and communication.

5.2.8 Temporary works

5.2.8.1 Construction compounds

General temporary construction compounds in the Eastern DA and Western DA

One temporary construction compound is proposed for the Eastern DA, which will be constructed in the vicinity of T5. A second temporary construction compound is proposed for the Western DA will be constructed to the south of T10 (see **Figure 5.3**).

The compounds will each contain temporary facilities for use during the construction phase including site offices and meeting rooms, a drying room, canteen area, storage areas, skips, a bunded refuelling area (with a Class 1 full retention oil interceptor), and a generator for compound electrics. The compounds will include pedestrian barriers for safety. The overall compound areas will measure 1,650m^2 each. Staff and visitor parking will be provided in the compound areas and will include parking for ca. 15 vehicles. The compounds will be constructed on a base of geotextile matting laid at ground level with hardcore material on top.

The construction phase sanitation will consist of a temporary welfare unit(s) that are self-contained and will be serviced regularly. All wastewaters will be collected in an enclosed holding tank and removed from site on a regular basis for final wastewater treatment by a licensed contractor. The source of a water supply will be non-potable water for the site office and service area which will be delivered and stored on site for use in the welfare facilities. Potable water will be supplied by bottled water.

On completion of the construction phase, temporary facilities will be removed and the ground within the temporary construction compounds will be reinstated with topsoil.

Temporary substation construction compound area

A third construction compound area will also be located to the rear of the substation during its construction and will comprise of:

- Storage areas for equipment/materials;
- Drying room;
- Meeting room and offices for site staff;
- Toilet block;
- Canteen;
- Fuel tank and diesel generator;
- Parking for 12 vehicles.

The compound will be constructed by removing the topsoil layer and laying a base of geotextile matting with hardcore material on top. On completion of the construction phase, temporary facilities will be removed and the ground within the contractor's compound will be reinstated with landscaped topsoil.

Temporary GCR construction compound area (in townland of Ballycar North)

A fourth construction compound area will also be located in the GCR loop in area during its construction and will comprise of:

- Storage areas for equipment/materials;
- Drying room;
- Meeting room and offices for site staff;
- Toilet block;
- Canteen;
- Fuel tank and diesel generator;
- Parking for 12 vehicles.

The compound will be constructed by removing the topsoil layer and laying a base of geotextile matting with hardcore material on top. On completion of the construction phase, temporary facilities will be removed and the ground within the contractor's compound will be reinstated with landscaped topsoil.

5.2.8.2 Borrow pits

No borrow pits are being proposed as part of this development. Fill material, concrete and concrete products will be sourced from existing licenced quarries. Steel will be sourced from specialist manufacturers. Similarly, electrical substation components will be imported from specialist suppliers.

5.2.8.3 Storage areas for excavated materials

The handling, management and re-use of excavated materials are of importance during the construction phase of the Proposed Development. It is envisaged that material excavated to construct all infrastructure elements of the wind farm (foundations, tracks, hardstands, etc.) will be used as backfill and for site reinstatement.

Two temporary storage areas will be provided with a stockpile height of a maximum of 2.5m. Storage area A will be located in the vicinity of T5 in the Western DA and a second Storage Area B will be located in the Eastern DA along the access track to T8. **Table 5.6** provides a summary of estimates of the amount of earth material to be excavated for the Proposed Development.

Any earthen (sod) banks to be excavated will be carefully removed and stored separately for use in site reinstatement. Every effort will be made to ensure materials excavated for construction of the wind farm infrastructure will be re-used on site. Should excavations result in surplus material, this will be transported to a licenced facility.

Table 5.6: Summary of estimated excavation for construction

Balance of materials following reuse on site	Generated (m^3)	Generated (with bulking factor (m^3))	Reused on site (m^3)	Imported to site (m^3)	Balance of material (m^3)
Topsoil	76,258	100,744	100,635	N/A	109
Subsoil	60,641	72,769	83,706	10,937	N/A
Aggregate/rock on site	9,602	15,363	15,810	448	N/A
Aggregate imported	N/A	N/A	N/A	26,703	N/A
Concrete	N/A	N/A	N/A	8,638	N/A
Sand	N/A	N/A	N/A	2,914	N/A

The material excavated for the construction and upgrade of site access tracks will be placed in berms alongside the wind farm access tracks and/or stockpiled in the designated temporary storage areas (at a height not exceeding 2.5m). Roadside berms will be a trapezoidal configuration with a tapered trapezoidal berm to blend with existing field levels of maximum height 1m. Refer to **Drawing No. 20959-NOD-XX-XX-DR-C-08301_S4_P01** for details on the proposed drainage ditch and roadside berms.

5.2.8.4 Turbine blade delivery route land take and temporary works

As the turbine components will be imported via sea, the most suitable port identified for shipping in the turbine components is Foynes Port in County Limerick. This Port was selected as it is the closest port to the development site that can land, and store turbine equipment and it has direct access to the N69 National Road and the M18 and M8 Motorways.

The options initially considered for the turbine delivery route from Foynes Port to the Proposed Development site were assessed as part of an abnormal loads assessment. This is detailed in the Turbine Delivery Route Report which is provided in **Appendix 16.5** of **EIAR Chapter 16 Traffic and Transport** (see also **Chapter 4 Project Need and Alternatives Considered**). A preferred route was selected for further assessment within the EIAR (see **Figure 5.12**).

The RSK project team have assessed the selected preferred route for pinch points where temporary accommodating works may be required (e.g., cutting back vegetation, installing temporary road surfaces, removing fencing, signs, and street furniture, etc.) for the delivery of turbine components.

The selected route (see **Figure 5.12**) crosses the Shannon River at Killaloe - Ballina and will utilise the new Killaloe Bypass (see **Figure 5.13**), which includes a new bridge crossing of the River Shannon and an upgrade of the existing R494 regional road from Ballina to the N7 at Birdhill. The bypass is currently under construction and is scheduled for completion in 2025. This route optimises the balance between using appropriate road infrastructure i.e., national roads, motorways, regional roads, and some local roads.

Along the route, tree and hedgerow trimming will also be required and these will only be carried out at the appropriate time of the year and in accordance with any licencing requirements.

One land take requirement along this route has been identified at the turn from R463 to the R471 in County Clare (for which planning permission is being applied for), see **Figure 5.14**. This will involve the temporary loss of agricultural lands and some hedgerow.

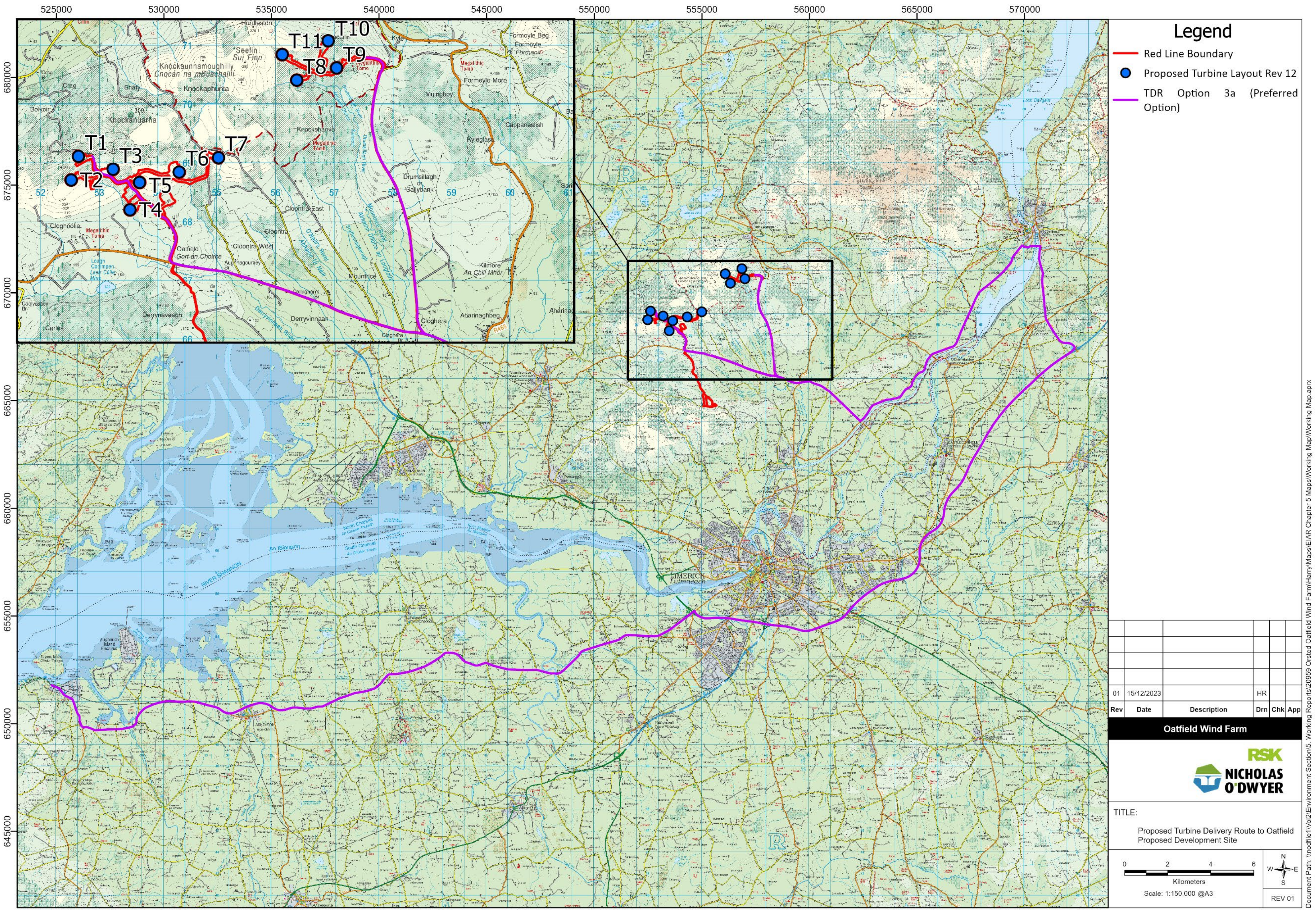


Figure 5.12: Proposed Turbine Delivery Route to Proposed Development Site

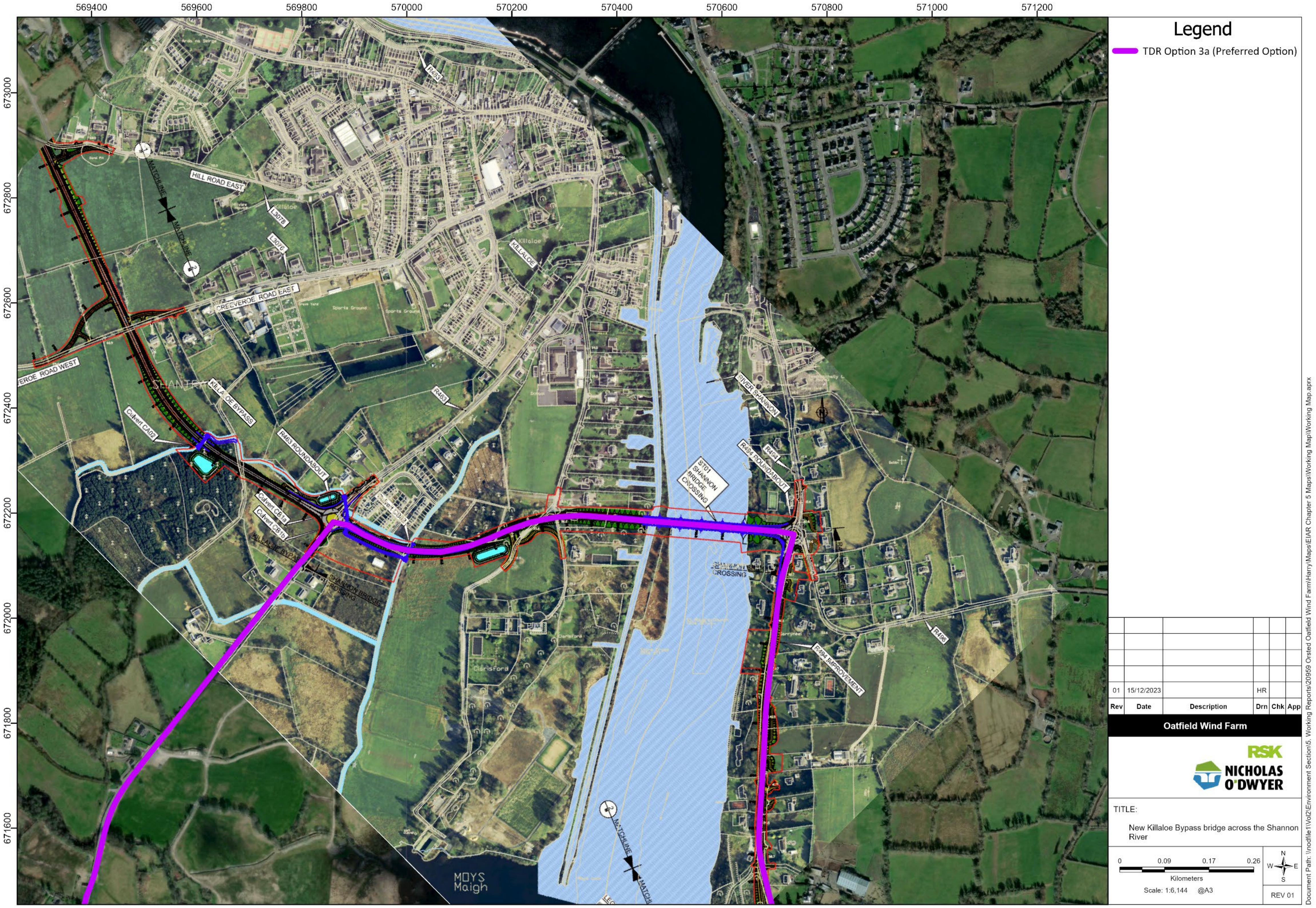


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Figure 5.13: New Killaloe Bypass bridge across the Shannon River

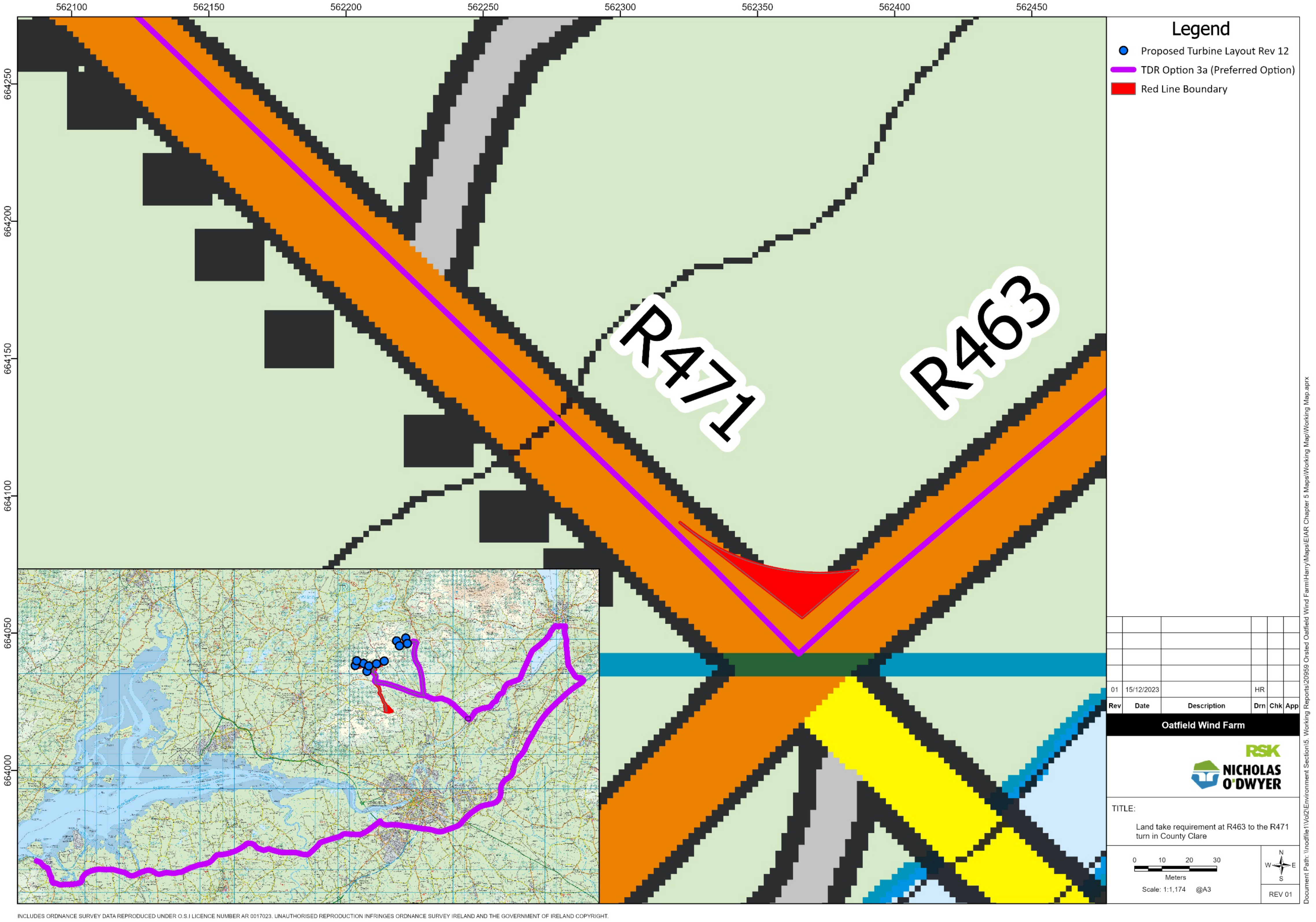

Figure 5.14: Land take requirement at R463 to the R471 turn in County Clare

5.2.8.5 Construction materials delivery route

Haulage to the site will consist of transporting other turbine components (e.g., turbine towers, nacelles, hubs) as well as general construction materials such as steel reinforcement, stone and concrete, cables, and other construction materials and electrical components. These will be brought into the site using the local roads in the region.

Construction haul routes have been assessed with respect to safety of all road users. Road safety improvement measures during construction stage may include tree trimming, signage and the construction of temporary passing bays in consultation with Clare County Roads Authority. The traffic management measures proposed for the Proposed Development are outlined in a Construction Traffic Management Plan (CTMP) provided in **Appendix 5.2 of this chapter.**

5.2.9 Grid connection

An engineering assessment was undertaken on proposed grid connection route options**,** whereafter the preferred option for this planning application was selected (see also **EIAR Chapter 4 Alternatives**).

The Proposed Development will be connected into either the existing Ardnacrusha to Ennis 110kV OHL (Option A) or the existing Ardnacrusha to Drumline 110kV OHL, Option B), via an underground 110kV double circuit underground cable to loop-in masts at the townland of Ballycar North. Both options are included for planning purposes and have been assessed in the EIAR.

The Underground Cable (UGC) works will require a double circuit which entails that two trenches in parallel are required for the entire length of the cable route with a minimum separation distance of 2,000mm required between each circuit.

The proposed design for the 110kV loop-in to the existing OHL will require two new 16m steel lattice end mast structures which will be constructed under the existing 110kV OHL. The existing conductor will be removed between the steel lattice end mast structures with the new connection looped through to the new Proposed Development on site 110kV substation.

The new steel lattice end mast structures locations were selected based on ground surveys, ground profiles, allowable angles and ruling span checks. The expected duration of works is expected to be approx. 4 weeks. Construction of foundation ca. 7 days each, erection of the steel lattice end mast structures ca. 5 days, weather dependant.

The cable route for Option A (see **Figure 5.1**) follows the existing trackway (which will be upgraded) and road infrastructure from the Proposed Development 110kV substation, (located in the Western DA) to the proposed loop-in location to the existing Ardnacrusha – Ennis 110kV OHL at Ballycar North. A short section of the cable route will be ducted from the existing road network through third party lands at Ballycar North to the loop-in masts location. An access track will be constructed on these third-party lands to facilitate construction of the cable ducts and maintenance of the cables. This Option is ca. 3.83 km in length.

Cable ducting trenches will be 2,000mm in width and 1,200mm deep. The section of road leading from the Western DA to the junction with the R471 will also accommodate the

IPP cable from the Eastern DA to the proposed 110kV substation. Each cable trench will accommodate 3 cable ducts (three phases of electricity and two communication ducts).

A total of ten cable joint bays will be constructed along the cable route to the loop-in masts in Ballycar North, five on each circuit. The cable joint bays will be staggered within the existing roadway at the cable joint bay locations. Each joint bay will comprise a concrete bay 4.5m in length 2.3m in width and 2.4m in depth.

Two communication chambers will also be constructed at each cable joint bay associated with each 110kV underground cable. These chambers will be 1.25m in length, 1.1m in width and 1.25m in depth.

The cable ducting will be placed into the prepared trench, inspected, and then the trench will be backfilled and the surface of the road reinstated.

110kV cables will be pulled from truck or trailer mounted cable reels through the ductwork from the Proposed Development 110kV substation to the loop in location on the Ardnacrusha to Ennis 110kV OHL Sections of cable will be jointed along the cable route at the cable joint bay locations.

The existing 110kV OHL conductor will be terminated at these two new structures in order to transition from an OHL to an underground cable arrangement to facilitate the loop in via cable chairs. The existing conductor will be removed between the Interface Mast structures with the new connection looped through to the new Proposed Development 110kV Substation.

The cable route for Option B (Ardnacrusha to Drumline) follows the exact same cable route as Option A with the only difference being that the 110kV double circuit continues further south for a distance of 300m on third party lands to the interface location with the existing Ardnacrusha to Drumline 110kV OHL. Again, the interface will occur via two new interface masts beneath the line. The existing 110kV OHL conductor will be terminated at these two new structures in order to transition from an OHL to an underground cable arrangement to facilitate the loop in via cable chairs. The existing conductor will be removed between the Interface Mast structures with the new connection looped through to the new Proposed Development 110kV Substation. The total length of this option is 4.16km.

Table 5.7 provides a summary of the grid connection crossing points and proposed solutions for each. Standard trenching involves normal cable ducting construction whereby the cable trench is excavated, ducting installed and then backfilled. Horizontal Directional Drilling (HDD) involves temporary construction of a launch and retrieval pit either side of the watercourse and cable conduits are drilled beneath the watercourse from the launch pit to the retrieval pit.

Table 5.7: Proposed grid connection crossing points and proposed solutions

Crossing location	Type of crossing	ITM-X	ITM-Y	Methodology
Crossing No. 1 (Option 1 Grid Route, IPP Grid Route)	Road Junction	554211.161	667330.636	Proposed Trenching in junction between Local Road leading to West side of Wind Farm with R471
Crossing No. 2 (Option 1 Grid Route)	Watercourse	554211.288	667227.818	HDD in public road corridor (Crossing culverted bridge)
Crossing No. 11 (Option 1 Grid Route)	Watercourse	555101.173	665328.742	HDD in public road corridor (Crossing culverted bridge)

As part of the detailed engineering design, confirmatory site investigation works will be undertaken to confirm ground conditions, the extent of any underground features (i.e., bridge foundations) and depth of cover to inform detailed design of the grid connection. Further consultations with utility providers such as Uisce Éireann, Gas Networks Ireland, and the Clare County Roads Authority will be undertaken as part of detailed design to confirm methods of construction for the grid connection.

The grid connection cabling will be installed in trenches (1.25m deep and 0.60m wide), which will be laid with five cable ducts of which the three will be electrical cables, and the other two being communications cables, and copper cables, respectively. The ducts will be laid on bedding sand. These will then be surrounded by concrete, red cable protection strips, yellow warning tape and steel protective plates, if required. Thereafter, the top of the trench will be backfilled and reinstated.

In areas where a watercourse must be crossed, HDD crossing will be utilised with a launch and reception pit on either side of the crossing. The HDD crossing will be used in two locations.

Temporary land take will be required to facilitate the HDD at these locations which will result in excavation in adjacent farmland and temporary loss of hedgerow which will be reinstated post construction.

In terms of the HDD process, small-scale quantities of greases known as ‘drilling fluids’ are also commonly used during the drilling process to keep components of the drill rig cool and lubricated. These drilling fluids are commonly composed of a mixture of bentonite clay, which can be harmful to the environment. Drilling fluids such as Clearbore, which is an environmentally friendly, high-performance water-based mud suitable for tunnelling and drilling operations, or fluids with similar environmental properties, will be used in drilling operations. Where the proposed grid connection cable route encounters minor culverts, the ducts will be installed above or below the culvert depending on its depth in accordance with construction methodologies outlined in the Construction Environmental Management Plan (CEMP) described in **Section 5.3.1.1**. The cable ducting will be installed so as not to impact the existing culvert.

The cables will be pulled through the ducts and joined together at joint bays located along the route. The joint bay will comprise three underground pre-cast concrete chambers – a joint bay chamber (6m long, 2.5m wide and 2m deep), along with two smaller communication link box chambers, see **Drawing No. 20959-NOD-XX-XX-DR-C-08245**. Cable pulling, jointing, and testing will be carried out at the start and end point and at each joint bay. Once the cables have been jointed and commissioned, the entry and exit points and joint bay chamber will be filled with sand and a concrete cover fitted on top.

A manhole type cover will be fitted over the start and end points of the grid connection cable route and over the link bay chambers. Over-ground identification marker posts and marker plates will be installed along the route. The manhole covers and marker plates/posts will be the only surface expression of the cabling when works are completed.

Joint bays will be 700m apart and their locations are provided in **Table 5.8** and in **Figure 5.15.**

Table 5.8: Joint bays coordinates

Joint Bay	ITM-X	ITM-Y
Joint Bay 1	667881.71	554223.14
Joint Bay 2	667868.07	554233.19
Joint Bay 3	667187.27	554209.96
Joint Bay 4	667177.08	554223.63
Joint Bay 5	666608.79	554614.51
Joint Bay 6	666592.80	554620.05
Joint Bay 7	665952.74	554789.62
Joint Bay 8	665938.48	554798.89
Joint Bay 9	665292.11	555096.25
Joint Bay 10	665275.35	555100.07

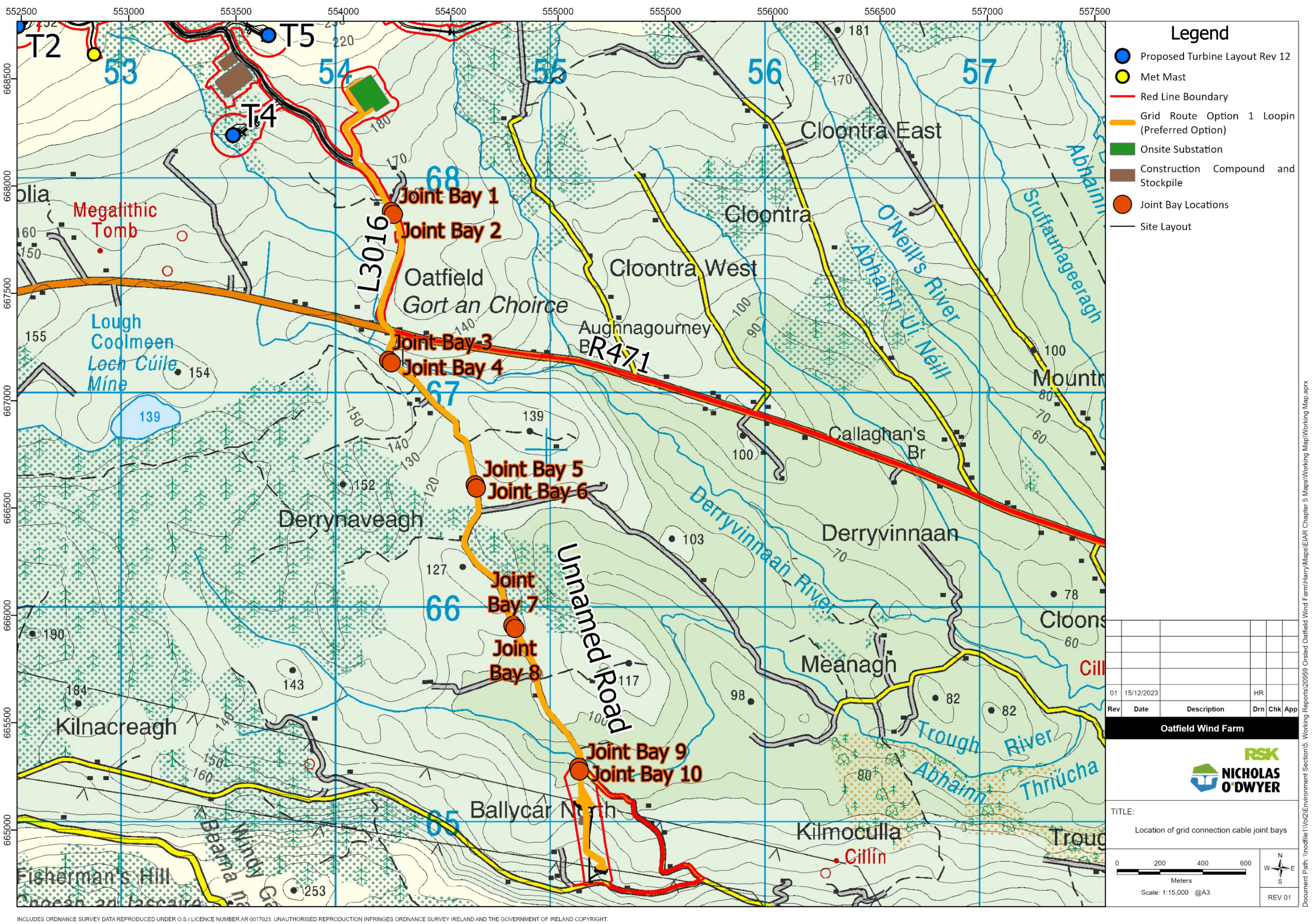

Figure 5.15: Locations of grid connection cable joint bays

5.2.10 Proposed biodiversity enhancements

A Species and Habitat Management Plan (SHMP) is being submitted with this planning application. The (SHMP) provided in EIAR **Chapter 7 Biodiversity, Appendix 7.1** provides details of required mitigation, enhancement and monitoring to avoid significant adverse effects on species and habitats related to the Proposed Development. The SHMP focuses on two key biodiversity features, which are Hen Harrier (*Circus cyaneus*) and Red Grouse (*Lagopus lagopus*).

The SHMP proposes general habitat management measures that are relevant to all habitats within the study area. Baseline (i.e., pre-construction) habitats within and adjacent to the Proposed Development (together forming the 'study area' that is subject to assessment and management prescriptions within this SHMP (see also **Figure 5.3**). Proposed management measures include:

- Timing of works;
- Supplementary feed of livestock;
- No burning of vegetation or other materials;
- No spraying or broad application of herbicides;
- No use of any poisons or stupefying baits will be permitted;
- No shooting of Red Grouse or any other wildlife will be permitted; and
- Fence marking.

Specific management measures for Hen Harrier and Red Grouse focus primarily on maintaining appropriate grazing regimes; specifically, extensive low-level grazing in bog, heath, and grassland to maintain a vegetation structure that is neither too overgrown nor too heavily grazed, whilst retaining and creating scrub and edge habitats (e.g., bushy hedgerows).

Proposed features and management prescriptions for main habitats within the study area requiring specific management for Hen Harrier comprise:

- Scrub and hedgerows;
- Heath and heath mosaic habitats;
- Forestry;
- Wet grassland;
- Grazing management;
- Rush management
- Nutrient management; and
- Improved agricultural grassland.

The management measures applied will benefit the Hen Harrier in both the short term and long term and will ensure the supply of a substantial area of suitable foraging habitat for the local Hen Harrier population, over and above that lost as a result of the Proposed Development. The overall aim of the management plan is for a net gain of foraging habitat for Hen Harrier following development and operation of the Proposed Development. The management prescriptions proposed will enhance the existing biodiversity of the areas for prey items and wildlife in general which is an extremely important component of successful SHMP application.

Orsted will ensure implementation of all aspects of the SHMP and will ensure that the relevant stakeholders are regularly briefed on the progress of the Plan in relation to achieving its objectives.

The SHMP will promote a mosaic of vegetation types which are optimal foraging habitat, will improve foraging success rates and consequently breeding success rates for the local population of Hen Harrier, which is the ultimate target of this plan.

5.2.11 Community benefit fund

Upon obtaining planning permission and contingent upon a successful Renewable Electricity Support Scheme (RESS) auction, Orsted is mandated to establish a Community Benefit Fund (CBF), as stipulated by the RESS. In the unlikely event that the company fails to secure a RESS agreement, it will commit to an alternative, voluntary community benefit scheme aligned with the Department of the Environment, Climate and Communications Good Practice Principles Handbook for Community Benefit Funds (July 2021)[2].

These guidelines outline that a Community Benefit Fund (CBF) should have a strategic focus, in line with county or local development strategies and the United Nations Sustainable Development Goals (UNSDGs). Based on the total Maximum Export Capacity (MEC) of the Proposed Development. it has the potential to generate a significant Community Benefit Fund over its lifetime. During this period, a number of key community-related activities will continue to be progressed.

The Proposed Development will commit to the implementation of a community benefit fund. It is proposed that the annual community benefit contribution would be €2/MWh in line with the RESS. See **Part 1, Section 8 of the Planning Application** for further details.

5.2.11.1 Administration of the Community Benefit Fund

Throughout all stages of the proposed development, a dedicated community liaison officer (CLO) is contactable by phone and email. The frequency and nature of interactions and communications will be dependent on the stage of the sustainable development project. As the project advances, regular updates relating to the Proposed Development's status and activity will be posted to the project website and, where appropriate, circulated to the local community. A collaborative process for the Community Benefit Fund will be formed between the project developers/funders (Orsted) and members of the local community.

[2] Department of the Environment, Climate and Communications, 2021. Good Practice Principles Handbook for Community Benefit Funds Under the Renewable Electricity Support Scheme. Government of Ireland.

5.3 Construction of the Proposed Development

5.3.1 Environmental management of construction activities

5.3.1.1 Construction Environmental Management Plan (CEMP)

A CEMP has been prepared for the proposed development and is included in **Appendix 5.1 of this chapter**. The CEMP sets out the key environmental management measures associated with the construction, operation, and decommissioning of the proposed development, to ensure that during these phases the environment is protected, and any likely effects are avoided, reduced or offset.

The final CEMP will be updated upon planning approval, to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.

An Ecological Clerk of Works (ECoW) will be appointed for the duration of the construction phase to oversee the implementation of the CEMP. The following sections describe key activities which, if unmitigated against, may have a significant adverse effect on the environment.

5.3.1.2 Refuelling

Wherever possible, vehicles will be refuelled off-site. This will be the case for regular, road-going vehicles. For vehicles that require refuelling onsite, fuel will be stored on site in the temporary construction compound and bunded to at least 110% of the storage capacity of fuels to be stored. On-site refuelling of machinery will be carried out at dedicated refuelling locations a minimum distance of 50m from watercourses using a mobile double skinned fuel bowser. The fuel bowser, a custom-built refuelling trailer, or similar, will be re-filled on site by the local supplier by means of a fuel truck or similar and will be towed to refuelling locations by a 4x4 jeep to where machinery is located. The 4x4 jeep will be equipped with a drip tray, spill kits and fuel absorbent pads in case of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use. Only designated competent operatives will be authorised to refuel plant on site.

5.3.1.3 Concrete management

Ready-mixed concrete will be used as required during the construction phase except for parts of the substation where hollow core concrete will be used and for the drainage culverts, which will be pre-cast. All concrete will be delivered from local batching plants in sealed concrete delivery trucks, as required. When concrete is delivered to site, only the chute of the delivery truck will be cleaned in a dedicated bunded area, using the smallest volume of water necessary, before leaving the site. Concrete trucks will then exit the site and return to the supply plant to wash out the mixer itself. The joint bays to be installed during the grid connection works will be pre-cast and will be delivered to the site and transported from the site to the installation location using lowbed trailer trucks.

The concrete pours at the turbine locations will be planned in advance and proposed mitigation measures are set out in EIAR **Chapter 9 Hydrology and Hydrogeology**.

5.3.1.4 *Dust Management*

In periods of extended dry weather, dust suppression may be required to ensure dust does not have a significant adverse effect. Damping down of site compounds will be undertaken to prevent the generation of dust as necessary.

To reduce mud and debris from getting onto the local road network, a wheel wash facility will be employed at exiting points on-site which will wash mud and debris from vehicles egressing the site. Refer to EIAR **Chapter 17 Air Quality** for further information.

5.3.1.5 *Traffic management*

A prudent approach will be taken to planning the entirety of the works associated with the proposed development to ensure minimal impacts on road users and the general public.

Turbine delivery route

Traffic Management at the Proposed Development site will be coordinated by an appointed Traffic Manager for the duration of the construction phase of the Proposed Development. The proposed delivery route of turbine components from Foynes Port includes temporary works that may be required for pinch points (e.g., cutting back vegetation, installing temporary road surfaces, removing fencing, signs, and street furniture, etc.).

A pre-condition survey will be carried out on all public roads that will be used in connection with the development to record the condition of the public roads in advance of construction commencing. A post construction survey will also be carried out after the works are completed. All roads will be reinstated in a timely manner upon completion of the construction works, in line with an appropriate road opening license.

Letter drops will be carried out to notify members of the public living near the proposed works to advise them of any particular upcoming traffic related matters. Clear signage relating to the development, both temporary and permanent, will be provided for accessing the site. The entrances to the site will be secured when the site is not in use. When necessary, a flagman will be used to assist traffic movements at the site entrance or in other areas as required.

Turbine delivery will require the transportation of abnormal loads. This will be undertaken at off-peak times under agreement with the local authority and An Garda Síochána and in accordance with the conditions of any permit issued for these deliveries.

Grid connection route

For the grid connection construction, cable trenching will be carried out with the aid of lane closures and / or road closures, which will ensure that the trenching works are completed as expeditiously as possible. The cable ducting to be installed within the road corridor will be conducted over a period of approximately 20 weeks. Road closures will be applied for by the appointed contractor and will outline diversions whilst maintaining local access at all times for residents, farms and businesses, and restrictions during school drop off and collection times, where applicable.

Road closures will be subject to the applicable statutory processes as implemented by the Local Roads Authority. Road closures will be facilitated by the existing road network. ‘Rolling road closures’ will be implemented, whereby the works will progress each day along a road, which will have the effect of reducing the impact for local residents.

Traffic management for the cable trenching will be adopted, in consultation with Clare County Council, to provide a safe environment for road users and construction workers.

A CTMP has been prepared for the Proposed Development and is presented in **Appendix 5.2 of this chapter**. In the event that planning permission is granted for the proposed development, the CTMP will be updated to include any relevant planning conditions, including any additional mitigation measures which are conditioned.

5.3.1.6 Spoil management

Any soil excavated for the construction of access roads within the site will be re-used on site in berms and for landscaping purposes and along the margins of the access roads.

Berms will be created from suitable excavated material and are located on the opposite side of infrastructure to any interceptor drains. The berms will therefore not obstruct flow or risk siltation to interceptor drains. Berms will be placed outside the roadside drains which drain the new access tracks. Further details related to management of soil during the construction stage are **EIAR Chapter 10 Land, Soils and Geology** and within the **CEMP** in **Appendix 5.1** of this chapter.

Spoil arising during construction works will be stored at a maximum height of approximately 2.5m and a minimum of 25m from watercourses. In addition to a minimum buffer distance, silt fences will be placed between the spoil storage areas and significant water crossings to prevent silt from entering the drains during construction. These temporary spoil mounds will have side slopes battered back to 1:1 and will be covered when left for extended periods of time.

Following completion of construction, all plant and machinery will be removed from the site. The temporary works/assembly areas needed for the construction period will be reinstated using the original spoil material removed and stockpiled close to the location from where it was excavated as explained in **EIAR Chapter 10: Land, Soils and Geology**.

Soils management measures will keep earthworks and earth movement at the site to a minimum and, if possible, reuse and avoid permanently removing any soils / subsoils and rock from the site. This approach provides for the sustainable use of materials and minimises adverse impacts to habitats, watercourses, and the landscape as a result of the construction of the Proposed Development. This approach also assists in reducing the carbon footprint of the Proposed Development.

Further details on the drainage of the site are contained in **Chapter 9 Hydrology and Hydrogeology** and in the accompanying Planning Drawings (**Part 2 of the Planning Application Documentation**).

5.3.1.7 Waste management

A Waste Management Plan (WMP) has been prepared and is included in the CEMP (**Appendix 5.1 of this Chapter**). The WMP outlines the methods of waste prevention and minimisation by recycling, recovery, and reuse at each stage of construction of the proposed development. Disposal of any waste will be a last resort.

Orsted, in conjunction with appointed contractor, will reduce, reuse, and recover as much of the waste generated on site as practicable and ensure the appropriate transport and disposal of residual waste off site to licensed facilities. This is in line with the relevant National Waste Management Guidelines and the European Waste Management Hierarchy, as enshrined in the Waste Management Act 1996, as amended and circular economy principles.

Prior to the commencement of the Proposed Development, a Construction Waste Manager will be appointed by the Contractor. The Construction Waste Manager will have overall responsibility to instruct all site personnel including sub-contractors to comply with on-site requirements. They will ensure, at an operational level, that each crew foreman is assigned direct responsibility. They will also ensure that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to.

The WMP will provide systems that will enable all arisings, movements, and treatments of construction materials to be recorded. This system will enable the contractor to measure and record the quantity of waste being generated. It will highlight the areas from which most waste occurs and allows the measurement of arisings against performance targets. The WMP can then be adapted with changes that are seen through record keeping.

Wastewater from the staff welfare facilities will be tankered off-site by an authorised waste collector to a wastewater treatment plant.

5.3.2 Proposed construction schedule

It is anticipated that the construction of the Proposed Development will take approximately 18 - 24 months. The expected construction programme is presented in **Figure 5.16**.

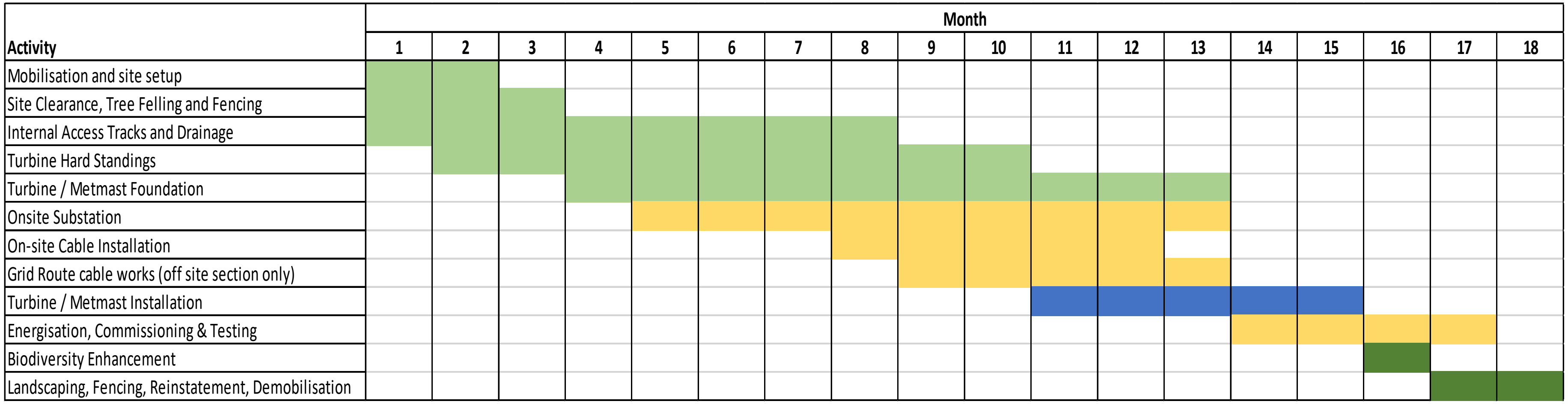

Figure 5.16: Expected construction programme

Working hours for construction will be from 07:00 to 19:00 on weekdays, with reduced working hours from 08:00 to 13:00 on a Saturday. It should be noted that it may be necessary to commence turbine base concrete pours at earlier times in the day due to time constraints incurred by the concrete curing process. Similarly, in the case of turbine assembly to allow works within suitable weather conditions. Turbine component deliveries will be undertaken between night time and early morning hours as part of the specialise turbine delivery operation (while traffic is low). Any changes to usual hours (whether earlier or later in the day) shall be subject to agreement with the local authority.

5.4 Operation of the Proposed Development

During the operation stage, the wind turbines will operate automatically, responding by means of anemometry equipment and control systems to changes in wind speed and direction. The wind turbines will be connected via electrical and communications cables, and data will be relayed from the wind turbines to an off-site control centre which will operate 24 hours per day, 7 days per week. The off-site control centre will monitor turbine output, performance, wind speeds, and will respond to any key alarms.

The Proposed Development is expected to have a lifespan of 35 years. Planning permission is sought for a 35-year operation period commencing from the date of commissioning of the full Proposed Development.

5.4.1 Maintenance

The turbines will be subject to a routine preventative maintenance programme involving a number of checks and changing of consumables, including oil changes. In addition, there will be a requirement for unscheduled maintenance which could include resetting alarms to major component changes requiring a crane. Maintenance traffic will consist of four-wheel drive vehicles or vans. The electricity substation components and site tracks will also require periodic maintenance.

Although the level of activity required for the maintenance of the proposed development is not significant, the impacts associated with traffic volumes for this period are assessed in **Chapter 16 Traffic and Transport**.

5.5 Decommissioning

In the decommissioning phase, cranes will be used to disassemble each turbine section and they will be removed from the site. All the major component parts are bolted together, so this is a relatively straightforward process. The concrete plinth projecting above ground will be removed, and the remainder of the foundations will be covered by soils typical of the surrounding environment and then reseeded or left to re-vegetate.

Leaving the turbine foundations in situ is considered a more environmentally sensible option as to remove the reinforced concrete associated with each turbine would result in adverse environmental effects such as noise and vibration and dust. Underground cables will be cut back at the turbine termination points and will be recycled. It is proposed that site access tracks will remain to allow access through the site. Decommissioning the Proposed Development will take approximately six months to complete.

Site materials will be recycled where practicable or disposed of in accordance with waste legislation and at the time of decommissioning.

As with construction, decommissioning works could result in potential effects on identified sensitive receptors. Decommissioning has been considered and assessed within the EIAR chapters. Details of decommissioning will be agreed with the local authority prior to any decommissioning taking place.

5.5.1 Use of the site following decommissioning

The land on which the turbines will be located is a mixture of agricultural lands and forestry lands. Following decommissioning, the hardstands and crane pads will be covered with soil and reseeded or left to revegetate, and the upgraded and new internal access tracks will be utilised to access forest plantation and farmlands.