

KWF Grid Connection EIA Report 2023

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Volume C2: EIA 2023 Main Report

**Chapter 5: Description of Development -
KWF Grid Connection**



August 2023

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Appendix 5.1	Site Photographs

Appendices referenced in this topic chapter can be found at the end of the chapter.

GLOSSARY OF TERMS

Term	Definition
KWF Grid Connection (the subject development)	Underground cabling, additional plant and apparatus in the existing Woodhouse Substation, the construction a new link road, the widening of an existing forestry road and the use of the existing entrance and windfarm road network at Woodhouse Windfarm.
Authorised Knocknamona Windfarm	Not Constructed - Knocknamona Windfarm authorised in 2016 (ABP-PL 93.244006); Amendments to Knocknamona Windfarm to provide for larger turbines authorised in September 2022 (ABP-309412-21) and Junction & Bend Widening Works to facilitate turbine component access through the windfarm site entrance at Knocknaglogh Lower authorised in December 2022 (ABP-314219-22)
Whole Project	KWF Grid Connection with Authorised Knocknamona Windfarm

5 Description of Development

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KWF Grid Connection is described in this chapter, in the following order:

Section 5.1	A Description of the Purpose, Location and Characteristics, and of the subject development, KWF (Knocknamona Windfarm) Grid Connection.
Section 5.2	The durations and timing, main activities (including the standard methods applicable to the construction stage), personnel and material requirements for both the construction and operation stages and any changes envisaged, such as decommissioning.
Section 5.3	The use of natural resources, emissions, production of wastes and energy demand for each stage.
Section 5.4	The vulnerability of the KWF Grid Connection to major accidents and natural disasters and climate change.
Section 5.5	<p>Cumulative Descriptions:</p> <ul style="list-style-type: none"> • For the purposes of cumulative assessment of the Whole <u>Knocknamona Windfarm</u> Project, a comprehensive description of the characteristics and impacts of the previously authorised Knocknamona Windfarm; Larger Turbines at Knocknamona Windfarm and Junction & Bend Widening Works for Knocknamona Windfarm component deliveries is provided (called the Authorised Knocknamona Windfarm throughout this Application). The Authorised Knocknamona Windfarm itself is not yet constructed, therefore there is more potential for cumulative effects from the interaction at the construction phase with KWF Grid Connection. • For the purposes of a cumulative assessment a description of Woodhouse Substation and Woodhouse Windfarm is provided. Woodhouse Substation and Woodhouse Windfarm (including windfarm roads) are already constructed. • For the purposes of a cumulative assessment with Other Projects or Activities, the results of the scoping exercise to identify these projects is provided.

5.1 Characteristics of the KWF Grid Connection

5.1.1 Overview of KWF Grid Connection

The subject application, KWF (Knocknamona Windfarm) Grid Connection is the grid connection element of the Authorised Knocknamona Windfarm Project which is not yet constructed.

The KWF Grid Connection proposal consists of underground cabling, additional plant and apparatus in an existing substation, the construction a new link road and the widening of an existing forestry road.

The underground cabling (1940m in length) comprises cables, ducts and other apparatus installed in a trench. The cables will be routed through lands comprising; felled forestry, forestry road; scrub; farm track; Woodhouse Windfarm roads; Public Road crossing via directional drill; and grassland and will finish at a cable chair to be located in the existing Woodhouse Substation compound. The underground cabling will join the Authorised Knocknamona Windfarm substation to the existing Woodhouse Substation.

The additional electrical plant and apparatus in Woodhouse Substation comprises a new control building; main 110kV transformer; 110kV transformer bay; two lightening masts; and ancillary electrical equipment. Works will also include a new access track and an internal palisade gateway and fencing within the compound and two new gateways in the existing compound perimeter fence.

The development also includes the use of the existing entrance and windfarm road network at Woodhouse Windfarm to provide access for the delivery of electrical equipment and apparatus to Woodhouse Substation and access for the delivery of turbine components and electrical apparatus, via the proposed new link road and widened forestry road, to Knocknamona Windfarm.

5.1.2 Purpose of KWF Grid Connection

The primary purpose of KWF Grid Connection is to facilitate the export of electricity from the Authorised Knocknamona Windfarm (when constructed) to the national grid at Woodhouse Substation.

5.1.3 Location of KWF Grid Connection

KWF Grid Connection is proposed for lands in Knocknamona and Keereen Upper townlands in the Drum Hills area, 8km west of the coastal town of Dungarvan, County Waterford. The immediate area around KWF Grid Connection is very sparsely populated, the nearest dwelling house being c.330m from the KWF Grid Connection construction works areas. The nearest village is AGLISH, c.3.5km to the west.

The underground cabling element of KWF Grid Connection is proposed for both Keereen Upper and Knocknamona townlands. Works within the existing Woodhouse Substation compound will occur in Keereen Upper townland. The widening of the existing forestry road and the construction of the Link Road will take place in Knocknamona townland.

5.1.4 Duration of KWF Grid Connection

Once constructed and commissioned, the new buildings, plant and apparatus in Woodhouse Substation will be operated as a permanent feature of the Irish national grid infrastructure and as such, decommissioning is not envisaged for that part of the KWF Grid Connection development. Similarly, the new link road and widened sections of the existing forestry road will also remain permanently in place.

Decommissioning is only envisaged for the underground cabling between the Knocknamona Windfarm and the Woodhouse Substation. This cabling will remain in place for the duration of the operation of Knocknamona Windfarm, and at the end of the Knocknamona Windfarm operating life, if permission is not

granted to continue to operate or to repower the windfarm with more up to date technology, then Knocknamona Windfarm will be decommissioned, and the underground cabling linking the Knocknamona Windfarm to the Woodhouse Substation will also be decommissioned.

5.1.5 Characteristics of KWF Grid Connection

KWF Grid Connection comprises of the following parts:

- Underground electrical cabling linking Knocknamona Windfarm Substation (to be constructed) and Woodhouse Substation (operational)
- Works within Woodhouse Substation compound comprising a new control building; main electrical transformer with associated plinth and bund; transformer bay and ancillary electrical equipment; 2 No. lightning masts; gateway and palisade fencing and short new access track inside the compound and 2 No. gateways in the existing perimeter fence
- Construction of a new Link Road 190m in length
- Widening of existing forestry road and
- Use of the existing Woodhouse Windfarm Entrance for electrical apparatus and turbine component traffic.

The proposed underground electrical cabling is 1940m in length, and comprises cables, ducts and other apparatus installed in a trench 1.25m deep and 0.6m wide. The cabling will link Knocknamona Windfarm to Woodhouse Substation and will be routed through lands (from Knocknamona Substation) comprising; felled forestry (footprint of the Authorised Knocknamona Windfarm Substation - 30m), forestry road (1180m); scrub (187m); farm track crossing (3m); Woodhouse Windfarm roads (465m); Public Road L6074 crossing via directional drill (5m); grassland (60m) and will finish at the cable chair located in Woodhouse Substation compound (10m). The cables will be located under the centreline of the forestry and link road and to one side of the Woodhouse Windfarm roads. Each cable will comprise two lengths of cable which will be jointed under the forestry road approximately halfway along the cable route.

The proposed works within Woodhouse Substation compound comprise a new control building 5.3m X 3.8m and 4.6m high; main electrical transformer c.6m in height, with associated plinth and bund; transformer bay; 2 no. lightning masts 17.5m in height and ancillary electrical equipment. Works will also include a new access track 17m long and 4.5m in width; additional palisade gateway 4.9m wide and 2.6m in height with palisade fencing within the compound and 2 No. gateways in the existing perimeter fence. The fencing and gateways will be same height and width as the existing fence and gates.

See [Woodhouse Substation Plan and Elevation drawings in the Drawings Pack that accompanied the Planning Application.](#)

The proposed Link Road is 190m in length and 4.5m in width. The Link Road will cover the cabling where it crosses scrubland between the forestry road network and the Woodhouse Windfarm Road network. This is a requirement of the main landowner (Coillte) so that the cabling location is easily identified and protected from forestry management activities.

See [New Link Road Section in the Drawings Pack that accompanied the Planning Application.](#)

The widening of an existing forestry road relates to 960m of existing forestry road in Knocknamona townland. The forestry road is currently 3.5m wide and needs to be widened by 0.5m each side to a give a final width of 4.5m.

See [Widening of Existing Forestry Road Section in the Drawings Pack that accompanied the Planning Application.](#)

Use of the existing Woodhouse Windfarm Entrance relates to the use of the existing Woodhouse Windfarm Entrance and Woodhouse Windfarm road network to provide access to Woodhouse Substation for electrical apparatus deliveries and to provide access to the new Link Road and widened forestry road for the delivery of turbine components and electrical apparatus to Knocknamona Windfarm.

Relevant Figure (at the end of the chapter)

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Figure 5.2: Layout of the KWF Grid Connection

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Construction Works Area Boundary: All construction works e.g. machinery movement; excavations; excavated materials storage, will take place within the construction works area boundary as delineated on **Figure 5.3**. This construction works area is approximately 12m in width, centred over the underground cable route.

Appendix 5.1: Site Photographs (at the end of the chapter)

5.1.6 Environmental Protection Mitigation Measures

Water Quality Protection - Scheduling

As part of the Standard Construction Methodology the underground cable will be constructed in 50m sections. As a section of the trenching and cabling is completed, this section will be reinstated before the next section is commenced. This measure will be implemented by the Construction Contractor and will reduce the potential for sediment laden runoff through reducing the source of sediment available at any particular point in time due to overburden storage and open trenches along works areas.

The following is a list of the environmental protection mitigation measures will be implemented during the construction of KWF Grid Connection.

Invasive Species

The spread of invasive plant species will be prevented through the steam cleaning of all site machinery before entering the site. All biosecurity measures will be in line with Irish Legislation (Regulation 49 of S.I. 477/2011 European Communities (Birds and Natural Habitats) Regulations 2011). This measure will be implemented by the Construction Contractor ahead of mobilizing to the construction site. This measure will prevent the spread of invasive species, by removing the source (i.e. invasive species) from site machinery, thus preventing introducing invasive species to the grid connection site.

Water Quality Protection – Suspended Solids

Single silt fences will be installed at construction works areas down-gradient of the proposed works. Temporary silt fencing / silt trap arrangements will also be placed along potential runoff drainage routes (i.e.

between forestry mounds/ribbons). The roadside drain at the Knocknamona Windfarm Substation will be temporarily blocked during trenching works upslope of this drain. Silt fences are effective at removing larger particle sized solids, and the erection of silt fences, silt traps and blocking of drains at the KWF Grid Connection site will prevent entry to watercourses of sand and gravel sized sediment released from excavations and entrained in surface water runoff from works areas. This measure is a standard form of best practice sediment control commonly used on windfarm construction sites. Silt-fencing will be installed, by the Construction Contractor, ahead of groundworks. Silt fencing and silt trap arrangements will be regularly inspected and maintained during the construction phase to ensure their continued functioning to stated purpose. They will remain in place throughout the entire construction phase. If required, the silt fencing will be left in place until the ground has re-vegetated.

Temporary spoil heaps will be covered with polyethylene sheets during heavy rainfall events, and the excavation of cable trench, substation works and link road works will not be undertaken during periods of intense or prolonged rainfall. These measures will reduce the volumes of excavated material exposed to heavy rainfall, thereby reducing the risk of entrainment of suspended sediment in surface water runoff.

Water Quality Protection – Fuels and Oils

All fuels required for construction activities will be stored in a designated location, away from main traffic activity, at the Woodhouse Substation Compound. All fuel will be stored in bunded, locked storage containers. Where refuelling is required along the proposed route, fuel will be brought to site by a 4x4 in a double skinned bowser with drip trays. The bowser will be bunded appropriately for the fuel usage volume for the time period of the construction. These measures will be implemented by the Construction Contractor, and will prevent the escape of fuels from storage containers, in line within best practice.

The plant and machinery used on-site will be regularly inspected for leaks and fitness for purpose, in order to minimise the risk of oil leakages from vehicles. Spill kits and absorbent material will be readily available on site, with a kit available in the bowser/4x4 and in all plant and machinery used on site. Both machinery operators and delivery personnel will be fully trained to deal with any accidental spills. This measure will ensure that any leaks are contained quickly and effectively and that the risk to downslope water bodies is minimised.

Water Quality Protection – Cements

No batching of wet cement will take place on-site. Concrete requirements for the KWF Grid Connection are limited to c.4 loads of ready-mix concrete to construct the control building foundation, and the plinths and bunds in the Woodhouse Substation Compound. Therefore large volumes of cement will not be present on-site at any time.

Where concrete is delivered on site (at Woodhouse Substation compound only), only the chute will be cleaned, using the smallest volume of water practicable. No discharge of concrete washout waters to any artificial drain or watercourse will be allowed. Concrete washout bags will be placed under the chute to catch any washout wastewater. These measures will be implemented by the Construction Contractor during concrete pours, to prevent the concrete washout from entering drainage networks/watercourses, thus effectively removing the pathway for impacts to downstream waterbodies.

Weather forecasting will be used to plan pouring concrete for dry days; and, the pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event. This measure will minimize the exposure of wet concrete to rainwater runoff.

5.1.6.1 Environmental Management Plan

The construction of the KWF Grid Connection will be carried out in accordance with the Environmental Management Plan (found at Volume D), and the implementation of the mitigation measures during construction works will be monitored by an Environmental Clerk of Works. Weekly auditing of the construction works for compliance with the Mitigation Measures will be carried out by the Environmental Clerk of Works, who will also monitor construction works in order to identify any unforeseen adverse effects to the environment. The Environmental Clerk of Works will be appointed by the Project Promoter, be independent of the Construction Contractor, and will report directly to the Promoters Project Manager.

Once the KWF Grid Connection is constructed, the environmental management of the project will be carried out by the Knocknamona Windfarm site manager, who will be responsible for the implementation of mitigation measures during any KWF Grid Connection operational maintenance and decommissioning works.

5.1.6.2 Mitigation Measures relating to the Operational and Decommissioning Phases

The underground cable may (though unlikely), require replacement during the operational stage. Also should Knocknamona Windfarm be decommissioned, then the underground cables will be removed from the ducting. These cable replacement/removal works involve the re-opening and reinstatement of the jointing location along the forestry road. The following mitigation measures will be implemented:

- To minimise the risk of erosion of excavations by rainfall, works will not be undertaken during periods of intense or prolonged rainfall.
- To remove any suspended sediments in runoff from the works area, temporary silt fencing will be placed downslope of the jointing location before works commence.
- In order to minimise the risk of fuel/oil leaks, any machinery used will be inspected for leaks and fitness for purpose before being transported to the site, and spill kits will be readily available to deal with accidental spillage at all times.
- In order to prevent invasive species being transported onto the KWF Grid Connection site, any machinery which will be used for cable replacement/removal works will be steam cleaned before entering the site.

5.1.7 Monitoring Arrangements

The Project Promoter of KWF Grid Connection (the 'Promoter') will employ a suitably qualified Environmental Clerk of Works (minimum NEBOSH Certificate in environmental management) who will be independent of the Main Contractor. The Environmental Clerk of Works will be employed for the duration of the pre-construction, construction and early operational stages, and will have a full time presence during the construction stage. The Environmental Clerk of Works will be adequately resourced to ensure strict compliance with the EMP and all relevant planning conditions.

The Environmental Clerk of Works will monitor the compliance of the construction works with the EMP, and will engage specialist environmental consultants, such as ecologists, hydrologists and archaeologists, as required.

5.1.7.1 Schedule of Monitoring

During the construction of KWF Grid Connection, the **Environmental Clerk of Works** will carry out the prescribed monitoring through the implementation of the Environmental Management Plan, which includes:

- Monitor the implementation of environmental protection mitigation measures during construction works;
- Oversee the implementation of the environmental protection mitigation measures which form part of standard construction methodologies;
- Monitor the level of environmental effects caused by the development of the project and audit the effects of the development to the evaluations made in the EIA Report;
- Identify any unforeseen adverse effects to the environment in order to be able to undertake appropriate remedial action;
- Monitor the construction of the development in compliance with relevant planning conditions, including additional environmental monitoring conditions attached to planning conditions, conditions of licences or following third party feedback.

See [Volume D: Environmental Management Plan](#)

5.1.7.2 Responsibilities & Management

It will be the overall responsibility of the Project Promoter to ensure that the KWF Grid Connection is developed as consented. The Project Promoter will engage a suitably qualified Environmental Clerk of Works, who will be independent of the construction Contractor for the duration of the construction stage. The Project Promoter will also contractually oblige Construction Contractors to carry out the works according to the Environmental Management Plan for KWF Grid Connection.

5.1.7.3 Resourcing of Monitoring Arrangements

The Project Promoter will be responsible for the costs of monitoring and will provide sufficient resources to the Environmental Clerk of Works to monitor, auditing and report on the compliance of construction works in accordance with the Environmental Management Plan. The Environmental Clerk of Works will also be sufficiently resourced to employ environmental specialists where needed.

5.1.7.4 Role of the Environmental Clerk of Works

5.1.7.4.1 Monitoring of Construction Works

On-going audits will be carried out by the Environmental Clerk of Works, during the construction of KWF Grid Connection. The audits will record the:

- compliance with the EMP;
- environmental effects of the project against the evaluations made in the EIA;
- effectiveness of the environmental management of the project; and
- adequacy of the Promoters and Contractors response to any Corrective Action Requests.

The Environmental Clerk of Works will have a 'stop-works' authority to temporarily stop works at the site to avoid or react to an unforeseen adverse environmental event. Works will not be allowed to re-commence until the issue is resolved.

5.1.7.4.2 Reporting

An EMP Compliance Report will be prepared weekly during the construction stage, issued to the Project Manager for distribution and will be presented at all project Environment Health and Safety (EHS) meetings to ensure that 'live' issues are dealt with in a time efficient manner. The EMP Compliance Report will detail the findings and recommendations of the preceding monitoring and auditing activities and will include a detailed response from the Contractor to any of the recommendations contained in the previous report.

Template reporting and record sheets are included in Section 8 of [Volume D: Environmental Management Plan](#)

5.1.7.4.3 Corrective Actions

Where non-compliance is detected, a system of follow up and corrective action will be implemented. Corrective Action Requests (CARs) will be issued to the Contractor to ensure that prompt action is agreed and committed to, with a view to the effective resolution of any deviations from the EMP requirements. All Corrective Action Requests will be numbered and logged. CARs can be raised as a result of:

- A compliance audit; or
- A suggestion for improvement by a Statutory Body; or
- An incident or potential incident; or
- An internal or external communication.

Related Document

This Chapter 16: Mitigation & Monitoring should be read in conjunction with [Volume D: Environmental Management Plan](#)

5.2 Life Cycle Stages of the KWF Grid Connection

5.2.1 Construction Stage - KWF Grid Connection

Based on the Project being granted permission in 2024, the construction of the Project will be completed within the 10-year planning duration timeframe.

5.2.1.1 Duration & Timing

Underground Cabling, Link Road and forestry road widening.

Construction works for the underground cabling, link Road and the widening of existing forestry road will be completed within a period of approximately 2 months.

Installation of additional plant and apparatus and associated works in the existing Woodhouse Substation

The installation works and commissioning of the electrical plant and apparatus, including the additional control building, in Woodhouse Substation will take approximately 4 months (dependant on technical completion).

Delivery of turbine component loads through the existing Woodhouse Windfarm entrance.

Deliveries of turbine components for Knocknamona Windfarm (comprising upto 72 loads) will be carried out over a 3-month period in consultation with Waterford County Council/An Garda Síochána.

The duration of works provided are approximate and may be slightly shorter or longer, depending on weather conditions and progress on electrical plant deliveries and commissioning. In any case, the construction period will not be longer than 1 year.

5.2.1.1.1 Construction Hours of Work

Normal construction times will be daylight hours between 07.00 and 19.00hrs Monday to Friday and between 08.00 – 16.30hrs on Saturdays.

5.2.1.2 Construction Personnel

Underground Cabling, Link Road and forestry road widening.

Installation of the underground cabling, link road and widened forestry road will be carried out by two works crews, each made up of 3 – 4 personnel.

Additional works and installation of additional Electrical Plant in Woodhouse Substation

The construction of a new control building, fencing and access track and the installation of the additional electrical plant and apparatus in Woodhouse Substation will be carried out by one work crew, made up of 8-10 personnel and one electrical commissioning team of 4-5 personnel.

5.2.1.2.1 Welfare Facilities

Self-contained temporary welfare facilities will be provided adjacent to the Woodhouse Substation compound.

5.2.1.3 Construction Methodologies for KWF Grid Connection

The development will be constructed using the following Construction Methodologies:

Underground Cabling

- Construction areas will be set-out using GPS and other surveying equipment. 'Goal posts' will be erected under any adjacent overhead electricity lines. Silt fencing will be installed at construction works areas, ahead of groundworks, to prevent and minimise the potential for sediment laden runoff.
- The cable trench will be excavated to a distance of c.50m ahead of the ducting works. Work will be completed on this 50m section of trench before excavations begin on the next section. The work will progress thus in a linear fashion.
- Once excavated, the trench floor will be graded, smoothed and trimmed when the required 1250mm depth and 600mm width have been obtained.
- Ducts for the electrical cables will be installed by hand in trefoil formation at the bottom of the trench. When installed, the ducts will be surrounded and covered with backfill from the excavated material which will be compacted in layers. The findings of the 8 No. Trial Pits indicate that the subsoil of the composition found can be used as backfill in the reinstated trench.
- Ducts for communication cables will be installed and covered with backfill from the excavated material which will be compacted in layers.
- Two layers of red warning tape will be placed on the compacted backfill layers directly over the electric and communication cable ducts.
- A layer of backfill will then be laid to within 300mm of the ground surface and compacted.
- Yellow warning tape will be placed over the compacted backfill.
- A final layer of stone will then be placed in the trench to ground level.

- Land within the construction works area will be reinstated and reseeded with grasses and flower species common to the surrounding vegetation. Local provenance native wildflower seed of flowering plants (e.g. Clovers, Vetches and Knapweed) will be sown.
- For public road crossing, the crossing will be carried out by directional drilling beneath the road structure. There will be no damage to the road surface or obstruction to traffic. Preconstruction confirmatory underground services surveys and consultation with service providers (i.e. 'Dial before you Dig' protocol), in line with standard construction practice will be carried out.
- Excavation works will be supervised by a qualified engineer and banksman, and 'goal posts' to identify the height of existing overhead lines will be erected.
- Construction works include the removal of a section of earthen bank field boundary, which will be reinstated along its original alignment and any exposed soil reseeded as for the lands above.
- Following the completion of ducting works the cabling will be pulled through the ducts using a cable pulling machine. A cable joint will be required at one location along the route (under the forestry road). The trench will be reopened at this location for 1 - 2 days. Cable pulling equipment will be set up at either end of the route and the cabling will be pulled through the ducts. The cables will then be jointed and the jointing location will be reinstated to surface level.
- The cables will then be joined to substation infrastructure at both ends and commissioned.
- Cable markers will be installed at intervals along the route of the Underground Cabling.

Figure 5.8: Cross Section of Typical Cables Trench

Additional Works and Electrical Plant in Woodhouse Substation

- 2 no. new pairs of palisade gates will be installed in the existing perimeter fence.
- A new access track will be laid within the existing compound.
- The control building foundations and the plinths and bunds will be constructed using profiles and ready-mix concrete.
- The new control building will be constructed.
- The main electrical transformer, transformer bay and electrical apparatus will be delivered, installed, tested and commissioned.
- Internal fencing and an internal gate will be installed within the existing compound.

Figure 5.4: Plan of the additional plant and apparatus in the existing Woodhouse Substation

Figure 5.5: Elevation of the additional plant and apparatus in the existing Woodhouse Substation

Widening of the Existing Forestry Road

- Construction areas will be set-out using GPS and other surveying equipment.
- The stretch of forestry road that requires widening will be marked out by the site engineer.
- All organic material and soft subsoil will be removed to formation level within the area to be widened. Excess material will be graded along the verge of the road to match the existing road level.
- Geotextile matting will be used to tie in the widened road sections into the existing road.
- Apart from a roadside drain at the junction where Knocknamona Windfarm substation is located, there is no other roadside drainage or under road drainage (i.e. culverts) present along this existing forestry track. Runoff is "over the edge" and onto the adjacent vegetated ground. The existing drainage regime will be maintained.
- A stone sub-base will be laid if required. Then a surface layer will be laid over the widened section of road, which will consist of 150mm compacted granular fill, suitable to accommodate HGV traffic.

- The stone will be compacted using a compaction plate and the surface will be finished with a 1% gradient to allow water run-off.
- Following the completion of widening works, all reinstated areas or graded material along the verge will be reseeded with grasses and flower species common to the surrounding vegetation. Local provenance native wildflower seed of flowering plants like Clovers, Vetches and Knapweed will be sown.

Figure 5.9: Cross Section of New Link Road & Widening of Existing Forestry Road

Link Road

- Construction areas will be set-out using GPS and other surveying equipment and the route of the new Link Road will be marked out by the site engineer.
- The Link Road will be constructed over the location of the Underground Cabling.
- An excavator will excavate the width of the new Link Road which will include roadside drainage channels. All organic material and soft subsoil will be removed to formation level. The excavated subsoil and topsoil will be placed beyond the drainage channels.
- Geotextile matting will be laid along the excavated road area to provide extra bearing support to the new roadway if required.
- A minimum sub-base will be laid which will consist of 300mm of 50mm stone. This sub-base will be compacted in layers.
- A surface layer of hardwearing granular fill will then be laid and compacted.
- The surface of the new road will be finished with a 1% gradient to allow water run-off.
- The excess excavated topsoil will be graded and reseeded with grasses and flower species already present within the surrounding vegetation. Local provenance native wildflower seed of flowering plants like Clovers, Vetches and Knapweed will be sown.

Figure 5.9: Cross Section of New Link Road & Widening of Existing Forestry Road

Directional Drill

- Construction areas will be set out using GPS and other surveying equipment. 'Goal posts' will be erected under any adjacent overhead electricity lines. Silt fencing will be installed at construction works areas, ahead of groundworks, to prevent and minimise the potential for sediment laden runoff.
- The drilling rig and fluid handling units will be set up on either side of the road, the fluid handling units will be stored on double bunded PVC bunds which will contain any fluid spills or rain water run-off.
- A launch pit and a reception pit (5m wide x 2m long x 1.5m deep) will be excavated within the construction works areas, the excavated material will be removed and stored temporarily in an adjacent berm at a suitable location.
- The driller will push the drill string into the ground and will steer a bore path beneath the public road. When the pilot bore reaches the reception pit at the other side of the road, the drill head will be removed and a reamer will be fitted. The reamer will be drilled back enlarging the borehole to the desired size. The ducting is then attached through the borehole ready to receive the electrical cabling.
- The pits will be backfilled and reinstated with all previously excavated material.
- The excess excavated topsoil will be graded and reseeded with grasses and flower species common to the surrounding vegetation.

5.2.1.4 Use of Machinery and Equipment

Underground Cabling, Link Road and forestry road widening.

The main machinery to be used will be 2 tracked excavators, 2 dumpers, 1 tractor and cable roll trailer, 2 compaction plates, vibrating roller, cable pulling machine and 4X4 crew vehicles.

Additional civil and electrical works and installation of additional apparatus and plant in Woodhouse Substation

The main machinery to be used for construction work within Woodhouse Substation includes a plant erection crane, crane hoist and 1 No. excavator, compaction plates and 4X4 crew vehicles.

5.2.1.5 Use of Hydrocarbons

Hydrocarbons will be used on-site during construction activities and will be limited to the diesel or petrol fuel and mechanical oils used by the site machinery and equipment. All fuels required for construction machinery and equipment will be stored in a designated location, away from main traffic activity, at the Woodhouse Substation Compound. All fuel will be stored in bunded, locked storage containers. Diesel or petrol fuel and mechanical oils will also be used by site vehicles and delivery vehicles.

5.2.1.6 Imported Construction Materials

The construction materials, which will be brought onto the KWF Grid Connection site, are listed in the Table below along with details of the quantity and source of the materials.

Table 5-1: Quantities, type and source of construction materials

Materials	Quantity (truck loads)	Likely Source of Materials
Aggregate (crushed stone)	39 No. loads	Keereen/Aglish quarry
Concrete (Woodhouse Substation)	4 No. loads	Roadstone Cappagh quarry
Electrical and communication cabling	5 No. loads	EU
Electrical plant, including main transformer	2 No. loads	EU
General building materials for Substation Control Building	5 No. load	Various Irish Suppliers
General building materials (Yellow and Red warning tape, marker posts)	1 No. load	Various Irish Suppliers
Palisade fencing and gates	1 No. load	Cork
HDPE Ducting	5 No. loads	Cork
HDPE Comms Ducting	3 No. loads	Cork

5.2.1.7 Construction Stage Access & Traffic Management

Advance warning signage will be erected on both approaches to each access point. The placement of this signage has been designed based on the posted speed limit.

Delivery of electrical apparatus for Woodhouse Substation and turbine components for the Authorised Knocknamona Windfarm will be through the existing Woodhouse Windfarm main entrance (Site Entrance No. 2) and along the existing Woodhouse Windfarm roads to a) Woodhouse Substation via a short stretch of the L6074 to the Substation entrance for the additional electrical apparatus for the Substation or b) by continuing along the proposed new Link Road and proposed widened forestry roads to the Knocknamona Windfarm turbine locations for the turbine components. Trailers laden with wind turbine components are necessarily extra-long and wide loads (classified as abnormal loads), irrespective of which turbine model is ultimately permitted on site. The design and manoeuvrability of special extendable flatbed semi-trailers used for the delivery of wind turbine components by HGV articulated trucks, has developed in tandem with the steady increase in wind turbine size which have become available for on-shore windfarms, in recent years. These trailers are designed with two or three hydraulically steered axles and either single or double extendible load floors, which can be adjusted for a range of wind turbine component lengths. The hydraulic turntable steering, which can be operated independently for each axle, can create a very large steering angle which makes these trailers highly manoeuvrable on public roads. The trailer floors can be fully retracted for the return, unladen journey from the windfarm site.

Using such specialist trailers, no additional public road works will be required to transport turbine components to Knocknamona Windfarm. In addition, the public road route has already been prepared and utilised by Woodhouse Windfarm for delivery of the main components for Woodhouse Windfarm.

Relevant Figure (at the end of the chapter)

Figure 5.7.1: Site Entrance No. 1 at Woodhouse Substation

Figure 5.7.2: Site Entrance No. 2 at Woodhouse Windfarm Main Entrance

5.2.1.8 Environmental Management Plan

The evaluation of the effects of KWF Grid Connection on the environment was carried out by a team of competent experts, who found that KWF Grid Connection (based on the proposed construction methods) will have very low level effects on the environment, and that there is no potential or likelihood of significant adverse effects occurring.

Nonetheless, an Environmental Management Plan (EMP) for KWF Grid Connection is included with Volume D of the planning application. The purpose of the Environmental Management Plan for KWF Grid Connection is to identify the roles and responsibilities of the construction team, including reporting requirements, so effects to the environment can be minimised.

Relevant Volume D:

Volume D: Environmental Management Plan

5.2.2 Operational Stage

The underground cabling and the additional plant and apparatus and control building in Woodhouse Substation will be operated/maintained by Knocknamona Windfarm.

The additional plant in the Eirgrid section of Woodhouse Substation will be operated/maintained by Eirgrid/ESB Networks.

5.2.2.1 Duration and Timing

Additional control building, apparatus and equipment to be located within the already operational Woodhouse Substation will be operated as a permanent feature of the Irish national grid infrastructure by the transmission system operator (TSO currently EirGrid).

The cabling outside of the Woodhouse Substation compound utility only relates to Knocknamona Windfarm's connection to the grid. It will operate as long as Knocknamona Windfarm operates.

5.2.2.2 Operational Personnel

It is expected that scheduled inspection and maintenance activities will be carried out by a 2 person crew over a total of 4 days per year.

5.2.2.3 Operational Activities

The KWF Grid Connection development will require minimal maintenance, generally involving;

- Annual walk-over inspection of the cables route
- Maintenance - As the cables will be factory tested to a high standard, sourced from ESNB approved suppliers and constructed in accordance with best practice construction methodologies, it is not expected that they will require repair or replacement. However, if a cable need replacing, change out can take place by pulling cabling through the ducts. The cable will be uncoupled at the jointing location and then the relevant cable can be pulled from either end at the substations and new cable installed. This will require the jointing location to be reopened and reinstated over a single day.
- Regular visual inspection of site access roads and cable route by the Knocknamona Windfarm asset manager.
- The additional plant and apparatus in Woodhouse Substation will require approximately 4 days of maintenance per annum. Maintenance will involve testing of equipment, apparatus and systems, and may also involve the replacement of electrical parts within the substation compound or control building.

5.2.2.4 Use of Machinery and Equipment

Electrical Plant in Woodhouse Substation

The main machinery and equipment that will be used during operation include mobile lifts; replacement electrical or communication apparatus, and any necessary hand tools and testing equipment.

Underground Cabling, Link Road and forestry road widening

In the unlikely event that a cable should need to be replaced, a cable pulling winch will be required otherwise use of machinery and equipment for inspections will comprise 4X4 vehicles, hand tools and testing equipment.

5.2.2.5 Use of Hydrocarbons

A very small volume of hydrocarbons will be used on the KWF Grid Connection site during operational activities and is limited to the diesel or petrol fuel used by the site vehicles and any machinery. Small volumes of oil and grease will be used during maintenance of electrical equipment in the substation compound.

5.2.2.6 Operational Stage Access

Access to Woodhouse Substation will be through the existing Woodhouse Substation entrance from the L6074, in Keeren Upper. Operational access for the underground cabling will be through Knocknamona Windfarm entrance and roads.

5.2.3 Decommissioning

At the end of the Knocknamona Windfarm operating life and if permission is not granted to continue to operate or to repower the windfarm with more up to date technology, then Knocknamona Windfarm will be

decommissioned. In that eventuality, the KWF Grid Connection cabling will be decommissioned and removed from the ducting and can be reused or recycled as part of the circular economy. The cable ducts will be left in place underground. The cable will be uncoupled at the jointing location and then the cables can be pulled from either end at the substations. This will require the jointing location to be reopened and reinstated over a single day. The new link road and widened sections of the existing forestry road will be left in place for use by the landowners. The additional control building and the electrical equipment to be located within the already operational Woodhouse Substation will be operated as a permanent feature of the Irish national grid infrastructure and as such, will not be decommissioned.

5.3 Use of Natural Resources, Emissions & Wastes

The use of Natural Resources is limited to the underground cabling, new link road and existing road widening components of the KWF Grid Connection development.

5.3.1 Use of Natural Resources: Land

Construction Land Requirement: In total construction works areas will be located on 3.6 hectares of land, as follows; Knocknamona Substation compound (0.47ha), forestry road (1.09ha), scrub (0.30ha), farm track (0.01ha), existing Woodhouse Windfarm Road (0.60ha), under Public Road L6074 (0.01ha), grassland (0.07ha) and existing Woodhouse Substation compound (1.05ha). The construction stage land requirements is the Construction Works Area boundary as delineated in RED on Figure 5.3.

Operational Land Requirement: Following the completion of construction works, the new Link Road will remain hardcore area, and as a result 0.3ha of scrub and 0.07ha of grassland will change use to access road for the operational lifetime of the windfarm project. The remaining lands will return to use by the landowners - i.e. return to use as access roads/compounds.

Relevant Figure (at the end of the chapter)

Figure 5.3: KWF Grid Connection Construction Works Area Boundary

5.3.2 Use of Resources: Biodiversity

5.3.2.1 Change in Landcover

KWF Grid Connection is located on modified lands, which for the most part consist of stone forestry access roads and hard-core substation compound. A small area of 2nd rotation forestry which has reverted to scrub will change cover to stone access road, for the full length of the new link road (190m).

Relevant Figure (at the end of the chapter)

Figure 5.2: Layout of the KWF Grid Connection

5.3.2.2 Forestry

Approximately half of the footprint of the KWF Grid Connection project is located within the Knocknamona forest area, however no forestry felling will be required to develop the KWF Grid Connection project.

5.3.2.3 Watercourses

There are also no watercourses located within the construction works area boundary for the project, the closest watercourse is the Mountodell Stream, which flows c.280m to the northeast of the underground cabling and of the forestry road widening in Knocknamona townland.

5.3.2.4 Field Boundaries

One 15m section of earthen bank field boundary will be temporarily removed on one side of the farm track crossing, to facilitate the installation of underground cabling and the new Link Road. The boundary will be reinstated along its original alignment following the delivery of turbine components to Knocknamona Windfarm. Any exposed soils on the reinstated boundary will be seeded with grasses and flower species common to the surrounding vegetation such as local provenance native wildflower seed of flowering plants like clovers, vetches and knapweed.

5.3.2.5 Invasive Species

The spread of invasive plant species will be prevented through the steam cleaning of all site machinery before entering the site. All biosecurity measures will be in line with Irish Legislation (Regulation 49 of S.I. 477/2011 European Communities (Birds and Natural Habitats) Regulations 2011).

5.3.3 Use of Resources: Water

No water is required for construction or operation.

5.3.4 Use of Resources: Soils

5.3.4.1.1 Excavated Soils

Up to 1860m³ of soils, subsoils and rock will be excavated from the cable trench footprint of the new Link Road and along the existing forestry road widening. This excavated material will be temporarily stored beside the works area and will be used to backfill the cable trench and reinstate the works.

5.3.4.1.2 Imported Rock

Up to 470m³ of graded crushed stone will be imported from Keereen Aglish and Cappagh Quarry.

5.3.4.1.3 Operational Stage - Soil

No excavations of soils will be required during the routine operation of the underground cable.

5.3.5 Emissions

5.3.5.1 Construction Stage

Very small volumes of exhaust fumes, dust and noise will be emitted by the construction machinery and delivery vehicles for a duration of approx. 2 months along the Underground Cabling, new Link Road and widened forestry road, over a 4-month period at Woodhouse Substation and by vehicles delivering abnormal loads over a 3 month period. No blasting, piling or rock breaking will occur at the KWF Grid Connection construction works areas. The nearest house is 330m from the construction works area. The short duration and separation distance to the nearest residents precludes the potential for significant effects to local residents.

5.3.5.2 Operation Stage

During the Operation Stage there will be negligible exhaust fumes, dust and noise emitted by maintenance vehicles during occasional maintenance works. The noise emissions from the additional plant at Woodhouse Substation will not be discernible at the nearest dwelling 330m distant.

As with all electrical equipment, the operating electrical cable and plant will be a source of electromagnetic fields (EMF). These emissions will be less than one-tenth of the relevant International Commission on Non-Ionizing Radiation Protection (ICNIRP) exposure limit, when measured directly above the operating cable, and less than one-hundredth when measured at Woodhouse Substation fence.

5.3.6 Waste

5.3.6.1 Construction Stage

General waste will arise from excess construction and building materials. Very small quantities of chemical waste will be generated, this waste is limited to solid waste oil, such as oily rags. All waste will be sorted by the works crews and removed to a licenced waste facility.

Self-contained temporary welfare facilities will be provided adjacent to the Woodhouse Substation compound. All wastewater from the facilities will be removed by a licenced waste contractor to a licenced waste water treatment facility.

5.3.6.2 Operation Stage

Waste during the operation stage will be minimal and will be limited to the maintenance activities at Woodhouse Substation. Such waste will be managed as part of the overall KWF Grid Connection Waste Management Plan.

5.4 Vulnerability of KWF Grid Connection to Major Accidents; Natural Disasters and Climate Change

Major accidents, natural disasters and climate change which have the potential to affect the KWF Grid Connection are described hereunder.

5.4.1 Vulnerability to Major Accidents

It is clear from the EIA Directive that 'major accident' mainly applies to notified Seveso establishments which operate under the Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015, where Dangerous Substances are identified in Schedule 1.

The KWF Grid Connection **is not vulnerable to Major Accidents**, due to the negligible volumes of the Dangerous Substances which will be used, limited to small volumes of diesel fuel and grease to be used during the construction and operation of the KWF Grid Connection. Furthermore there are no Seveso sites in proximity to the KWF Grid Connection site, the closest being c.50km away in Ferrybank, County Waterford.

5.4.2 Vulnerability to Natural Disasters

Natural disasters which could potentially affect KWF Grid Connection include flooding and land slippage.

The vulnerability (exposure and resilience) of the KWF Grid Connection to disasters and the risk or likelihood of these disasters occurring at the KWF Grid Connection site is classified according to the Guide to Risk Assessment in Major Emergency Management (DoEHLG, 2010).

5.1.1.1 Flooding

In recent years, high rainfall events and subsequent flooding have become more frequent in Ireland.

Where complete, the Catchment Flood Risk Assessment and Management (CFRAM)¹ OPW Flood Risk Assessment Maps are now the primary reference for flood risk planning in Ireland and supersede the Preliminary Flood Risk Assessment Maps (PFRA) maps. CFRAM mapping is not currently available for the area of the KWF Grid Connection and therefore the PFRA maps have been consulted. None of the KWF Grid Connection site is in a fluvial or pluvial flood zone and is wholly located in mapped Flood Zone C – where the probability of flooding is low (less than 0.1% or 1 in 1,000). No flood events have been recorded within or in the vicinity of the site.

Flood Hazard was examined by Hydro Environmental Services (HES) during the preparation of the Water Chapter 9, in the EIA Report. A walkover survey of the KWF Grid Connection route was completed to map local drainage routes and potential watercourse crossings. Due to the elevated nature of the KWF Grid Connection route on the side of a hill there are no surface water bodies and no watercourse crossings (streams or drains) along the route. There are no manmade drains of any significance either along the proposed route of the Underground Cabling as there is very limited forestry and agricultural drainage in this area.

Due to the lack of water on site and the PFRA Mapping categorisation, HES conclude that flood risk is not an issue at the KWF Grid Connection site.

Due to the fact that the KWF Grid Connection is not vulnerable to flooding, it is considered that the likelihood of flooding disaster occurring is **Extremely Unlikely**.

5.4.2.1 Land-slippage

Ground stability was also examined by Hydro Environmental Services (HES) during the preparation of the Land & Soil Chapter 8. All parts of the site were examined during the course of the site investigation works. This did not reveal any stress indicators in the form of erosion and there is no evidence of slope failures in the area. No peat deposits were encountered in the site during the site visits or in the 8 No. Trial Pits which were excavated in the course of the ground investigations.

In the Trial Pits, rock was encountered relatively close to the surface along much of the grid connection route, between 1.4m and 1.6m below ground in 5 No. of the Trial Pits with weathered rock encountered closer to the surface in the remaining 3 No. Trial Pits. The project hydrogeologists (HES) therefore conclude that the potential for trench excavations to cause slope instability will be very low because there is weathered rock and bedrock relatively close to the surface; it is proposed to temporarily store overburden from excavations

¹ CFRAM is Catchment Flood Risk Assessment and Management. The national CFRAM programme commenced in Ireland in 2011, and is managed by the OPW. The CFRAM Programme is central to the medium to long-term strategy for the reduction and management of flood risk in Ireland.

in shallow mounds or layers; there is no peat on site and the trench will be excavated, prepared with ducting and reinstated 50m at a time, with work progressing in a linear manner.

It is considered that the KWF Grid Connection is not vulnerable to natural disasters such as land slippage, due to the absence of peat and inherent stability of the subsoils on the site. Therefore it is considered that the likelihood of land slippage disaster occurring is **Extremely Unlikely**.

5.4.2.2 Consequences of Natural Disasters Occurring

The consequence of the impact if the event occurs is described here.

Due to the low number of personnel working on-site at any one location and the very low number of people living or working locally, the consequence of a flooding or land slippage disaster, if they did occur, is considered to be **Limited**.

Due to the absence of streams or rivers within the site boundary and the avoidance of forestry drains, the consequences to water quality due to a land slippage or flooding disaster, is considered to be **Limited**.

5.4.2.3 Overall Risk

When the likelihood and the consequence of a potential land slippage or flooding disaster occurring is applied to the risk matrix from the DoEHLG 2010 guidelines Guide to Risk Assessment in Major Emergency Management a broad indication of the critical nature of each risk can be determined.

In relation to on-site personnel and other people in the locality and to downstream water-catchments, a land slippage or flooding disaster would be classed a 'normal emergency' - based on a likelihood rating of Extremely Unlikely and a consequence rating of Limited.

5.4.3 Vulnerability to Climate Change

High rainfall events and subsequent flooding are now considered to be a consequence of climate change. Flooding and landslip is discussed in the previous section and a flooding or landslip disaster is considered Extremely Unlikely at this site.

Extreme weather such as that experienced in Ireland in recent years, both high temperatures and high winds, will not affect the cable which will be underground. The additional apparatus in Woodhouse Substation will not be vulnerable to these extremes because the plant is designed to withstand temperature variability and exposure in the open countryside.

The Global Facility for Disaster Reduction and Recovery (GFDRR), 'Think Hazard' high-level online tool indicates the potential for weather that could support wildfire spread in a county geographical area. The hazard level for County Waterford is classified as Medium. The Department of Agriculture, Food & the Marine classify all forests in Ireland as of Moderate Fire risk during the main wildfire risk period from March to September. The development is within and adjacent to a forest area. When risk to KWF Grid Connection from forest wildfire is considered, it is found that the development is not vulnerable to wildfires because of the location of the development itself and of the associated windfarm. The grid connection cabling is to be placed underground and therefore not susceptible to fire. The electrical apparatus, to be located within Woodhouse Substation is not at risk from fire because Woodhouse Substation is a hard cored area surrounded by grassland and adjacent to other hardcore areas (public road and Woodhouse Windfarm roads) which effectively act as a fire break and therefore there is minimal fuel to support the spread of wildfire to the substation compound. Similarly for any wildfire on the windfarm – the forestry roads and windfarm roads

and hard core areas around the turbines effectively act as fire breaks within the windfarm – thus checking the spread of any wildfire within the windfarm. Therefore the development is not vulnerable to wildfire risk.

5.4.4 Requirement for Mitigation Measures

Due to the KWF Grid Connection not being vulnerable to Major Accidents, along with the inherent stability of the site; the absence of peat; the absence of watercourses; the absence of vulnerability to climate change, the nature of the KWF Grid Connection project, mainly comprising underground cabling at shallow depths and additional plant and apparatus in an existing substation compound, and the Extremely Unlikely likelihood of a land slippage or flooding disasters occurring, no particular mitigation measures for Major Accidents; Natural Disasters and Climate Change are required.

Furthermore, it is considered that the presence of the project will not increase the likelihood of a disaster occurring.

5.5 Cumulative Descriptions

KWF Grid Connection interacts locationally with the Authorised Knocknamona Windfarm (not constructed), and with the Operational Woodhouse Substation and Operational Woodhouse Windfarm. The Authorised Knocknamona Windfarm is owned by the Applicant. Woodhouse Substation and Woodhouse Windfarm are owned and operated by a separate entity not linked to Ecopower Developments Limited (the Applicant).

These Projects are included in the Cumulative Evaluations in this EIAR.

Figure 1.2: Location of KWF Grid Connection in relation to Authorised Knocknamona Windfarm, existing Woodhouse Windfarm and existing Woodhouse Substation (at the end of Chapter 1)

Figure 5.2: Layout of KWF Grid Connection (at the end of this Chapter 5)

5.5.1 Authorised Knocknamona Windfarm

The **Authorised Knocknamona Windfarm is not yet constructed and comprises;**

- 8 No. wind turbines, overall height of up to 126 metres, 1 No. meteorological mast up to 80 metres in height with wind measuring equipment attached, access roads, electrical substation compound, equipment and control building and ancillary site works. Authorised in December 2016. (An Bord Pleanála Reference PL93.244006: LA File Ref. 14/600109).
- Amendments to the height of the previously authorised wind turbines from 126m tip height to 155m tip height and the met mast from 80m to 99m. Authorised in September 2022 (An Bord Pleanála Ref. 309412-21; LA Ref. 20/845)
- Minor Junction & Bend Widening at 3 No. locations on the public road between Pulla Crossroads on the N25 outside Dungarvan and Knocknamona Windfarm Entrance at Knocknaglogh Lower to facilitate turbine component deliveries to Knocknamona Windfarm. Authorised in December 2022 (An Bord Pleanála Ref. 314219-22; LA Ref. 22/407)

The windfarm is authorised for a location adjacent to and within the proposed KWF Grid Connection site and because these 2 No. elements may be constructed at the same time, a very detailed description of the Authorised Knocknamona Windfarm is provided in this EIAR. This will enable a comprehensive cumulative

evaluation of the Whole Project (i.e. Proposed KWF Grid Connection and Authorised Knocknamona Windfarm) to be carried out. The full EIA Reports for the 3 No. elements can be found in Volume F: Reference Documents.

Relevant Volume F: Reference Documents

Reference Document 1 of 7 to 4 of 7: Knocknamona Windfarm R.EIS 2015

Reference Document 6 of 7 & 7 of 7: Amendment to Knocknamona Windfarm (Larger Turbines & Met Mast) R.EIAR 2021

Reference Document 5 of 7: Junction & Bend Widening Works Screening for EIA 2022.

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5.5.1.1 Knocknamona Windfarm

5.5.1.1.1 Introduction

Knocknamona Windfarm will comprise 8 No. wind turbines, overall height upto 126m, crane hardstanding areas, windfarm site roads and drainage system, meteorological mast up to 80m in height, an electrical substation compound, equipment and control building and ancillary site works. Knocknamona Windfarm is not yet constructed. It was authorised in December 2016, under An Bord Pleanála Reference PL93.244006 (Waterford County Council Planning Ref. 14/600109).

The data and descriptions in this section will inform the environmental factor evaluations in this 2023 EIA, in relation to the evaluation of cumulative effects of the proposed development together with Knocknamona Windfarm as authorised.

This detailed description of Knocknamona Windfarm has been compiled from the Revised EIS 2015; from the Board's Inspector's Reports dated 10/04/2015 and 20/09/2016 and from the Board Direction and Planning Conditions attaching to the final Grant of Permission dated 14/12/16, in order to present a description of the development, in the final form, as has been granted permission. This compilation chapter has been prepared in the same format as this Description of the Development Chapter 5.

Relevant Volume F: Reference Documents

Reference Document 1 of 7 to 4 of 7: Knocknamona Windfarm R.EIS 2015

The Inspectors Reports, Board Order and Direction for Knocknamona Windfarm (ABP Ref. PL93.244006) can be found on the Board's Website at <https://www.pleanala.ie/en-ie/case/244006>

5.5.1.1.2 Location and overview description of Knocknamona Windfarm

The Knocknamona Windfarm site is located in an area of forested uplands to the west of Kilnafarna Hill and to the south of Knocknamona peak and is part of the uphill known as the Drum Hills, 3km to the east of AGLISH village and c.8km southwest of Dungarvan Town, County Waterford. The windfarm footprint is in the townlands of Knocknaglogh Lower, Barranastook Upper, Knocknamona, Woodhouse or Tinakilly, Monageela and Killatoor townlands. The substation is proposed for an area in Knocknamona townland, which is located close to the centre of the site. The cables connecting the wind turbines to the windfarm substation will be undergrounded. The site roads will mainly consist of existing forestry roads which will be upgraded.

The area surrounding the windfarm site is rural with a dispersed and low population. It is a moderate, undulating, upland region supporting commercial forestry and agricultural grassland. The majority of the development site consists of commercial forestry plantation stands or blocks with an extensive network of roads used for ongoing harvesting and maintenance of the plantation. The conifer stands are of a variety of age profiles. The proposal is located both within an area of dense tree cover and clearfell areas.

Construction and operation phase site access will be gained from the Local Road at Knocknaglogh Lower in the southeast of the site.

See end of Chapter 1

Figure 1.2 Location of KWF Grid Connection in relation to Authorised Knocknamona Windfarm, existing Woodhouse Windfarm and existing Woodhouse Substation

5.5.1.1.3 Characteristics of Knocknamona Windfarm

Knocknamona Wind Turbines: 8 No. wind turbines of the three-bladed, tubular tower model, light grey in colour not exceeding an overall height of 126.6 metres. The turbines will be constructed on concrete bases, 380m² in plan, with an adjacent concrete hardstand of 1891m² in plan area. There is no requirement for fencing of turbine areas. The turbines will be connected by underground cables to Knocknamona Substation.

Knocknamona Substation: Electrical substation at the windfarm, comprising an 110kV substation compound 1224m² in plan area, which includes a control building 114m² in plan area, transformer with plinth and bund 48m² in plan area, and other electrical equipment. The compound is secured by a perimeter palisade fence.

Windfarm Roads: Existing forestry roads requiring widening and upgrading. There will be short sections of new spur roads constructed to gain access to the turbines from the existing forestry roads. Works will involve widening and upgrading of 6.7km of existing forestry roads (average 2m widening) and construction of 0.90km of minimum 4.5m wide new roads.

Ancillary Works: The main items of ancillary works will include 1 No. meteorological mast up to 80m in height; 1 No. site entrance at Knocknaglogh townland; Surface Water Drainage System; 1 No. temporary construction site compound at the site entrance; 2 No. borrow pits from which most of the aggregate required will be won; 28.2 ha forestry felling; excavation, storage and reinstatement of soils.

Haul Route for Knocknamona Windfarm

The haul route for turbine components (likely from Belview Port) includes;

- a) the temporary removal of signage and handrails on 7 No. roundabouts ((R1 – R7) on the N25 outside Dungarvan and removal of signage at Pulla Crossroads (HR1) on the N25 outside Dungarvan. These are activities only and do not involve interventions in the natural surroundings and landscape.
- b) junction/bend widening works at 3 No. roadside locations (HR2, HR3 and HR4) between Pulla Crossroads and Knocknamona Windfarm Entrance at Knocknaglogh Lower.

Borrow Pits

Stone from the 2 No. borrow pits will be used for roads and hardstands. Smaller amounts of higher grade imported stone from local quarries will be required for road capping and surface finishing. Borrow Pit No. 1 is proposed for the east of the site at Barranastook Upper and Borrow Pit No. 2 for the north of the site in Knocknamona.

Temporary Construction Site Compound

The temporary windfarm site compound located near the site entrance at Knocknaglogh, which will be securely fenced and bunded, will be used by the contractor undertaking the works. Fuels will be stored within a bunded area in the site compound, along with tools, toilets, materials etc. All plant will be refuelled in this compound.

5.5.1.1.4 Sediment and Erosion Control Plan

The design of the Sediment and Erosion / Storm Water Control Plan for the Knocknamona Windfarm comprises Appendix 15.1 of the Revised EIS submitted in response to request for additional information from An Bord Pleanála. The Plan is based on the principle of minimising the volume of water that can become

contaminated with silt due to the works and also of avoiding unnecessary contamination of the clean water in existing drains. This has been achieved by creating a separate drainage system to collect and treat all runoff from the works areas. The existing drains conveying clean water will be isolated from the works areas so that they cannot become contaminated. Existing forestry drains will be widened or extended where necessary. Settlement ponds have been designed to effectively remove the sediment load from the contaminated runoff and an attenuation system has been incorporated into the design to prevent overloading of the settlement ponds and to prevent any increase in flood risk outside the site. The Plan also makes recommendations on the various measures that may be required to maintain good water quality throughout the construction phase and early operation phase of the development.

5.5.1.1.5 Construction and Environmental Management Plan (CEMP)

Prior to the commencement of the construction works, a Construction and Environmental Management Plan (CEMP) will be prepared and agreed with Waterford County Council in compliance with Condition 14 of the Planning Conditions, attached to the Grant of planning permission for Knocknamona Windfarm. The CEMP will be an all-inclusive suite of documentation prepared to manage the proposed mitigation measures and planning conditions and detailing the controls and responsibilities for the construction works to ensure the project is carried out with the minimum impact on the surrounding environment.

5.5.1.1.6 Knocknamona Windfarm Mitigation Measures

The mitigation measures which were presented in the planning documentation, are listed below by environmental topic – Population, Human Health, Material Assets (public roads, telecommunication network), Cultural Heritage, Landscape, Air, Climate, Land, Soils, Water, Flora and Fauna.

Population & Human Health Mitigation Measures (Residential amenity, road users, health & safety, tourism amenities, landuse, socio-economics)
Mitigation by Design: compliance with the Wind Energy Development Guidelines (2006); windfarm located in a 'Strategic Area' for windfarm development; windfarm avoids visibility from major tourist receptors and towns such as Dungarvan, Cappoquin, Lismore, Youghal, Mahon Falls or to the East of the Comeragh Mountains; separation distance between local residences and turbines (nearest turbine greater than 687m from nearest residence; reduction in number of turbines from 12 to 8.
Turbine Design and Quality Control- Turbine Design certification; Rigorous safety checks during manufacturing; quality control of concrete turbine foundations; matt non-reflective finishes will be used on turbines, no counter rotation of the blades; Installation of shadow flicker modules, ice detection and lightning protection systems.
Mitigation by Design: – stone won on site to reduce requirement for import of aggregate; use of existing forestry roads and siting of turbines close to existing road network to reduce the extent of new access road construction; reduction in turbine numbers;
Mitigation by Design – underground windfarm cabling and grid connection cabling.
Knocknamona Windfarm will be constructed, operated and decommissioned in accordance with the Safety, Health & Welfare at Work Regulations (2006 & 2013) and the IWEA Health & Safety Guidelines for the Onshore Wind Industry on the Island of Ireland (2011) ; Development and implementation of Safety Statement; Restricted site access to the public during construction phase with access plan to facilitate walkers and vehicles during the Construction Phase; management of works to facilitate forestry management; restoration of access following construction works and the provision of parking facilities and windfarm walk;

Population & Human Health Mitigation Measures (Residential amenity, road users, health & safety, tourism amenities, landuse, socio-economics)
House calls to residents, point of contact, continuous liaison with residents and local community
Traffic Management Plan: Traffic coordinator; Road Safety & Courtesy Protocol; point of contact and liaison with local community; designated haul routes and strict adherence to same; provision of wheel wash at site entrance, road sweeper and watering of roads when necessary; road signage scheme; no parking of any vehicles on the public road near the wind farm site access; Road widening at particular points along haul routes, provision of passing bays, use of flagmen; road cleaning and use of wheel wash at site entrance; replacement of some existing culverts along haul route; phasing of windfarm construction and implementation of traffic/walker diversions through the windfarm site to facilitate public access through the forestry; timing of deliveries: stone aggregates and concrete will not be delivered on the same day; delivery programme will avoid peak traffic and local school start and finish times, local school bus/car drop off/pick up times, and evening and overnight deliveries of construction material; deliveries of abnormal loads (turbine components) will occur at appropriate delivery times as agreed with An Garda Síochána; arrival or departure of construction workers to/from site will occur outside peak traffic hours; monitoring of road condition during the construction phase; any damage caused by construction traffic repaired Roads will be repaired to DMRB specifications by Waterford City and County Council or with the approval of Waterford City and County Council.
Construction Environmental Management Plan (see Soils, Water, Ecology section below)
Dust Minimisation Plan (see Air & Climate section below).
Regular maintenance of the operating turbines, and of the windfarm roads and drainage.

Material Assets Mitigation Measures (Public roads, telecommunications)
Mitigation by design – stone won on site to reduce requirement for import of aggregate; use of existing forestry roads and siting of turbines close to existing road network to reduce the extent of new access road construction; reduction in turbine numbers;
Road widening and culvert replacement works carried out in accordance with NRA Design Manual for Roads and Bridges (DMRB); Any damage created by construction vehicles during the construction phase, will be repaired with the approval of Waterford City and County Council; these works will be carried out by an approved road repair contractor Programme and specification of resurfacing works along the haul route local roads agreed with the Area Roads Engineer; Programme of preconstruction and post construction monitoring agreed with Area Roads Engineer; Garda Síochána will be notified and deliveries will occur at appropriate delivery times (abnormal loads) as agreed with An Garda Síochána.
Use of the Windfarm Met Mast as a microwave radio link relay site; TV Antenna re-alignment and increase height; Antenna Re-tuning; Subscription-Free Satellite TV service (SaorSat)

Cultural Heritage Mitigation Measures
Mitigation by design: use of existing forestry road network and siting of turbines close to forestry road network to reduce the requirement for excavations, reduction in number of turbines initially proposed.

Cultural Heritage Mitigation Measures
Groundworks will be archaeologically monitored under licence to the Minister for the Arts, Heritage and the Gaeltacht, with preservation in Situ/by record or as required by the National Monuments Service.

Landscape Mitigation Measures
Mitigation by design: Site within “Strategic Area’ (<i>Preferred Area</i> in 2023) for wind energy development; The design of the proposed wind farm is in accordance with the Wind Energy Development Guidelines (2006) siting and design principles; layout of windfarm reduces instances of visual stacking; site selection in an area with existing wind turbines and in an area where there is a diverse agricultural activity, forestry, rural housing, transmission power lines, reduction in number of turbines; number and extent of new access roads has been kept to a minimum with c.90% of windfarm roads will be along existing forestry roads.
Mitigation by design: colour harmony and adequate screening of the substation using tree species typical of the surrounding area; matt non-reflective finishes will be used on all turbine components; counter rotation of blade sets will be avoided; paint finishes will be similar colour to existing turbines.
The verges of the windfarm roads will be landscaped following construction works, monitored and maintained during the operational phase, kept in good working order and free of wheel ruts.
Mitigation by design: internal windfarm cabling and grid connection cabling will be undergrounded; special care will be taken to preserve any features, which contribute to the landscape character of the study area.

Air & Climate Mitigation Measures
Mitigation by Design: – stone won on site to reduce requirement for import of aggregate; use of existing forestry roads and siting of turbines close to existing road network to reduce the extent of new access road construction; reduction in turbine numbers; use of >5mm aggregate to reduce dust particles.
Concrete poured directly on arrival on site to reduce emissions; site machinery will not be left running unnecessarily.
Dust Minimisation Plan: includes the inspection, cleaning and watering (where necessary) of site roads and public roads in the vicinity of the site; wheel wash with rumble grids at site entrance; a road sweeping vehicle to remove any mud deposited on the Local Roads.

Land & Soils, Water, Flora & Fauna Mitigation Measures (Soils, subsoils, bedrock, surface water, groundwater, designated sites, flora, habitats, birds, mammals and other fauna)
Mitigation by design: implementation of drainage regime ahead of groundworks; use of existing forestry roads and siting of turbines close to existing road network to reduce the extent of new access road construction and minimise excavations; capping of all site roads in hard wearing aggregate such as limestone to reduce breakdown of road surface and resultant sediment creation; reduction in turbine numbers; reuse of all excavated material to reinstate and landscape the site, reinstate the borrow pits and create bunds for the drainage system; siting of infrastructure in low risk (ground stability) areas; use of HDPE or precast concrete pipes for all culverts.

<p>Land & Soils, Water, Flora & Fauna Mitigation Measures (Soils, subsoils, bedrock, surface water, groundwater, designated sites, flora, habitats, birds, mammals and other fauna)</p>
<p>Mitigation by design: turbines sited on least ecologically sensitive areas; hydrological buffer of 100m from watercourse; no watercourse crossing works or instream works required at windfarm site; Keyhole clearfelling will be designed to create buffers of a distance greater than 60m between the turbine blade tip and forest edges and other linear features for bats.; avoidance of felling of wet will-ow/ash woodland habitat with reduction in turbine numbers; no white lights on the tops of the turbines; reinstatement of the windfarm site following construction works.</p>
<p>Construction Environmental Management Plan; Environmental Manager for the duration of the construction stage; on-going monitoring programme for the implementation of mitigation measures, machinery inspection, materials storage, transfer areas, drainage system and reinstatement of the site; design of methodologies suitable for environment which incorporate the recommendations of Inland Fisheries Ireland; Supervision of excavations by suitably qualified engineer; Implementation of Sediment & Erosion/Storm Water Control Plan; Water quality monitoring.</p>
<p>Ecological Management Plan: Project Ecologist; preconstruction monitoring of mammals, birds and water quality; Construction phase and operational phase monitoring of habitats, mammals, birds and water quality; construction of windfarm to avoid bird breeding season, if possible, if not possible then construction to start ahead of the breeding season; replanting and reinstatement of the windfarm site following construction works; blocking of selected drains to enhance aquatic habitats</p>
<p>Sediment & Erosion/Storm Water Management Plan: area of exposed ground will be kept to a minimum; exposed areas which are slow to revegetate naturally or from seed will be replanted with suitable vegetation; capping of site access roads with hard wearing aggregate; clean water drains and dirty water drains around footprint of the windfarm; drainage specialist involved in design of drainage system; attenuation designed into layout; clean water drainage system designed with sufficient cross drains and outflows to maintain existing flow paths; excavation of soil only carried out immediately preceding works in any particular area and drainage system installed ahead of works silt traps, check dams and settlement ponds installed in drainage system; new culverts sized to cope with a minimum 1 in 200 year flood event and submerged approximately $\frac{1}{4}$ of the diameter of the pipe; restriction of vehicles to footprint of windfarm; any temporary stockpiles of soil will be stored away from watercourse with siltation measures such as silt fencing in place; provision of a wheel wash at the windfarm site entrance; turbine foundation and hardstanding excavations backfilled as quickly as possible; weather monitoring; control of works near drains or watercourse during or after prolonged/intense rainfall; cessation of works if evidence of pollution occurring; inspection/maintenance of drainage system after prolonged/intense rainfall events; monitoring of drainage system during construction and until vegetation re-established following construction; water quality monitoring before, during and after construction phase.</p>
<p>Any water pumped from excavated areas will be diverted to a settlement pond for treatment prior to discharge.</p>
<p>Control of Concrete: Use of ready-mix concrete and no batching of concrete on-site; dedicated chute wash down facility; washing of concrete trucks off site at supplier depot; settlement pond at concrete chute washout; pumping of large volumes of concrete water into a skip to settle out, with settled solids transported off-site; use of Siltbuster RCW unit will be used if required to further treat chute wash water prior to discharge to settlement pond; monitoring of weather for pour day suitability; supervision of concrete pours; use of trained operators during concrete pours; precast concrete or HDPE pipes used for cross drains and culverts.</p>

Land & Soils, Water, Flora & Fauna Mitigation Measures (Soils, subsoils, bedrock, surface water, groundwater, designated sites, flora, habitats, birds, mammals and other fauna)
Management of Fuels & Oils: Designated oil/fuel storage area at the site compound; mobile bowsers, tanks and drums stored within secondary containment system in a secure, impermeable designated storage area away from drains/open water; fuel containers and any ancillary equipment (e.g pipes) will be stored within a secondary containment system such as a bund or drip tray; regular inspection of stored fuels and oils, designated trained personnel only authorised to re-fuel; designated re-fuelling/lubrication area for machinery/vehicles; provision of spill kits; emergency response plan; machinery suitability inspection; bunded substation transformer fitted with storm water drainage system and hydrocarbon interceptor; overnight parking at distances greater than 100m from a watercourse.
Tree felling under felling license , and using good working practices as outlined in Forest Service guidelines; installation of buffered drainage outfalls in existing forestry drains, installation of drains and silt traps following felling, monitoring of silt traps and drainage outfalls, removal of excess brush off-site; communication with local NPWS ranger; felling undertaken outside bird breeding season; storage of felled trees at least 15m back from watercourses; water quality monitoring; replanting of felled area with grasses.
Waste Management: waste management plan; designated waste storage areas; removal of all excess introduced construction material off site to licenced waste facility; collection and removal off site, by appropriately licensed operator, of all wastewaters and any accidental spillages of solid state introduced materials.
Operational stage measures: the drainage and attenuation system will remain in place throughout the operational stage of the windfarm; settlement ponds filled in with stone; regular checking of drainage network; integrated wastewater holding tank at site offices.

The above listed mitigation and management measures will be implemented through the Management Plans for the windfarm.

5.5.1.1.7 Management Plans

The Management Plans will include:

- Sediment and Erosion / Storm Water Control Plan
- Fuel Management Plan
- Waste Management Plan
- Traffic Management Plan
- Dust Minimisation Plan
- Construction Phase – Ecological Management Plan
- Invasive Species Management Plan
- Surface Water Management Plan
- Operational Phase – Ecological Management Plan

5.5.1.1.8 Knocknamona Windfarm Monitoring Arrangements

Construction Monitoring arrangements include:

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- Pre-construction monitoring for terrestrial mammals, particularly badger and red squirrel and bats and for birds
 - Weather monitoring
 - Construction-stage noise, dust and vibration monitoring (Condition 14 (f))
 - Construction works monitoring by an ecologist/environmental scientist (Condition 14)
 - Water Quality monitoring (Condition 14 (j))
 - Archaeological Monitoring of site development works (Condition 12)
 - Monitoring of silt traps and drainage outfalls during tree felling (Condition 13)
 - On-going monitoring of road condition (Condition 10)
- Operational Monitoring arrangements include:
- Post-construction birds and bats monitoring for three years
 - Post-construction Water Quality monitoring for two years
 - Operational noise monitoring by agreement with Waterford County Council (Condition 7)
 - Operational shadow flicker monitoring by agreement with Waterford County Council (Condition 8)
 - Operational radio/TV interference monitoring by agreement with Waterford County Council (Condition 9)
 - Post-construction re-vegetation monitoring by ecologist for 5 years
 - Ongoing post-construction monitoring of site drainage system

5.5.1.1.9 Life Cycle Stages of Knocknamona Windfarm

5.5.1.1.9.1 Construction Stage of Knocknamona Windfarm

The construction timetable is detailed in the Table below;

Table 5.2: Duration and timing of the construction of the Knocknamona Windfarm

Activities	Duration	Timing of Activities
<ul style="list-style-type: none"> • Civil works • Delivery and erection of wind turbines • Electrical Works • Turbine and substation commissioning 	9- 12 months	Projected Start Date: (now) 2025

Construction Hours of Work

Normal construction times will be 07.00 to 19.00hrs Monday to Friday and 08.00 – 16.30hrs on Saturdays.

Construction Personnel

Approx. 75 people will be employed at the height of construction including construction workers, engineers, and specialist crews erecting and commissioning the wind turbines, ecologists, archaeologist, supervisors, plant operators and security staff. The electricity infrastructure will be constructed by a specialist electrical engineering company, several of whom are based in the region.

Construction Personnel Welfare Facilities

Welfare facilities will be available at the temporary construction site compound (adjacent to the Site Entrance).

Construction Stage Activities

The scope of works for the construction of Knocknamona windfarm will comprise;

- Set up temporary site compound inside the site entrance. This compound will be securely fenced and bunded to contain any hydrocarbon spills from parked vehicles and storage of fuel/oil.
- Fencing/gate erected.
- Clear fell of approximately 28.19ha area of conifer plantation.
- Commence construction of a surface water drainage system along the road edges, around substation compound, turbine hardstanding areas, temporary soil deposition areas, temporary site compound and borrow pits.
- Establish Borrow Pit No. 1 and No. 2. The excavated area at each of the borrow pits will be 55m x 85m with an area of 4675m² each. Excavation of materials in order to facilitate the construction of the turbines bases, hardstanding areas, windfarm substation compound, new access roads and the upgrading of roads sub totals will equal;
- 8524m³ Topsoil
- 18859m³ Subsoil
- 2038m³ Rock
- Site won crushed stone from the 2 borrow pits will total 25,075m³ will be used for roads and hardstands etc.
- Upgrade construction materials haul road and windfarm haul road
- Import additional stone from local quarries.
- Widen and upgrade 6.7km of existing forestry roads (average 2m widening). Construct 0.90 km of 5m wide new roads.

Existing forestry roads comprise almost 90% of the site roads required. These existing roads will require remedial works in places to include widening, strengthening, and resurfacing. Construction of the small amount of new roads will involve removal of trees (if any), removal of topsoil and subsoil. The trees will be taken offsite and timber sold. The excavated soil will be stored adjacent to the road for later reinstatement of the verges and bunds. Crushed rock will be laid on the excavated hard ground and compacted in layers of 200mm. The edges of the roads will be graded and re-vegetated.

- Construction of 8 hardstands at the turbine locations with dimensions of 30m wide by 60m long
- Excavation for 8 turbine foundation bases with minimum depth of c.2.8m and a c.224m² plan area.
- Fixing the reinforcing steel and pouring the concrete foundations.

The foundations will each consist of approximately 50 loads of concrete and 14 tonnes of reinforcement steel. There will be no surface expression of the turbine foundations and they will be covered with stone and soil.

- Construction of the windfarm substation compound 53m long by 24m wide, with excavation depth of approximately 0.60m and 1272m² plan area.

- Construction of an electrical substation and installation of associated equipment.
- Construction of substation control building, which will contain a store room, switchgear room, ESB control room and windfarm control room. The substation control building is within the substation compound.
- Construction of grid connection works.
- Erection of 8 turbines with a maximum tip height of 126m.
- Laying electrical cable between turbines and the substation compound.
- Installation of an 80m high meteorological mast with wind measuring equipment attached.
- Commissioning of the wind turbines and electrical equipment and connection to the National Grid.
- Grading of roadside verges.
- Reinstatement/grading of 2 No. borrow pits.
- Temporary compound dismantled refurbished/ reinstated gates and fences
- Construction equipment and vehicles demobilised
- Site tidied and landscaped.

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Use of Machinery and Equipment

The machinery, equipment and tools to be used during construction are listed on the Table below.

Table 5.3: Construction Machinery, equipment and tools

Construction Machinery	Equipment and Tools
30-50T Excavators; Mobile cranes for construction; Cranes (1 main, 1 assist) Erection 120t to 800t; Dump trucks; Tractors and trailers; 12t Rollers; Crushers; Screener;	Rebar/shuttering/ precast units/concrete pipe/box culverts Double contained fuel bowsers; Diesel powered generators; and Water bowsers Hand tools Silt traps, silt fences Spill Kits Fencing Materials – post and wire

Use of Hydrocarbons

The plant and equipment that will be used during the construction stage will be run on hydrocarbons. Mobile equipment will require regular refuelling from a fuelling station which will be located in a designated impermeable bunded area, drained through an oil interceptor at the temporary construction site compound.

Imported Construction Materials

The materials identified in the Table below will be imported onto Knocknamona Windfarm site.

Table 5.4: Quantities, type and source of construction materials

Materials	Quantity	Likely Source of Materials
Aggregate (crushed stone)	352 No. loads.	Roadstone Cappagh and Keereen/Aglish quarries

Materials	Quantity	Likely Source of Materials
Reinforcing Steel (rebar)	48 No. loads	Various Irish Suppliers
Concrete	400 No. loads	Roadstone Cappagh and Keereen/Agligh quarries
Electrical plant and Switchgear	14 No. loads	EU Various Suppliers
Turbine towers	24 No. loads	Via Belview Port
Turbine Nacelles	16 No. loads	Via Belview Port
Turbine Blades	24 No. loads	Via Belview Port
Generators, gearboxes and transformers	8 No. HGV loads	Via Belview Port

Construction Stage: Traffic Management

A Traffic Management Plan would be prepared following consultation with the Planning Office, including the Roads Department, of Waterford City and County Council. Construction Stage: Material and Delivery Traffic Management

Construction Materials Haul Route

The delivery of construction materials such as concrete and crushed stone, will most likely be made from two suppliers Keereen Agligh Quarry and Roadstone Cappagh Quarry, both north west of the site, off the N72 (Cappoquin Road). The vehicles will travel first east on the N72 back to the Spring roundabout on the N25 (Youghal Road) around Dungarvan Town. From this point, delivery vehicles will turn right onto the N25 travelling 4530m as far as Pulla Junction. Then turning right onto the L2024 and travelling for 1300m and turning right onto the L2022 and left onto the L6077, travelling as far as Knocknamona Windfarm Site Entrance at Knocknaglogh Lower. The timing of the construction materials deliveries will not coincide with the turbine components deliveries. The Local Road haul roads to the south of the site will require road widening (Junction & Bend Widening Works).

See end of Chapter 12

Figure 12.4: Public Roads – Whole Project Haul Routes

5.5.1.1.9.2 Operational Stage of Knocknamona Windfarm

Duration and Timing of Operational Stage

The duration and timing of the operational stage of the Knocknamona Windfarm, as per Condition 4 of the Grant of Permission is set out in the Table below;

Table 5-5: Duration of Operation Stage

Description	Duration & Timing
Operating Knocknamona Windfarm	25 years from the date of commissioning of the wind turbines (Condition 4)

Operational Personnel

There will be 4 permanent jobs created in operation and maintenance activities, legal, electricity sales and asset management relating to Knocknamona Windfarm. 2/3 maintenance personnel will be employed at the windfarm site approx. 2 to 3 days a week to service, maintain and monitor the turbines for operational safety and performance.

Operational Activities

Knocknamona Windfarm will be maintained in good working order throughout the operational stage. The operational stage will involve:

- Daily remote monitoring of wind turbine and grid activity,
- Visits by maintenance crews to carry out scheduled and unscheduled maintenance and repairs on wind turbines and electrical equipment,
- Occasional replacement of major components,
- High Voltage Switching of wind turbines and substation equipment when required by the System Operator (Eirgrid),
- Inspection and maintenance of site roads and drainage system,
- Maintenance of Windfarm Safety Measures.

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Use of Machinery and Equipment

The machinery and equipment listed in the Table below will be used during the operational stage.

Table 5-6: Use of Machinery and equipment during the Operation Phase

Machinery	Equipment	Materials
<ul style="list-style-type: none"> • Light 4-wheel drive vehicle • Cranes and hoists for major component replacement and repairs 	<ul style="list-style-type: none"> • Specialist electrical and mechanical tools • Testing equipment 	<ul style="list-style-type: none"> • Replacement turbine parts • Replacement electrical or communication parts

Use of Hydrocarbons

A small volume of hydrocarbons will be used on the windfarm during operational activities and is limited to the diesel or petrol fuel used by the site vehicles and machinery and any mobile generators used. Mechanical oils and grease will be used during maintenance of the turbine and electrical equipment. These will be brought on-site and receptacles removed by the O&M personnel.

5.5.1.1.9.3 Changes to the Knocknamona Windfarm

In the Grant of Permission, Condition 4 outlines the duration of operation of the windfarm, and potential for decommissioning at the end of the operational period, and Condition 22 outlines the requirements for decommissioning of the Knocknamona Windfarm:

Condition – 4: The permission shall be for a period of 25 years from the date of the commissioning of any wind turbines. The wind turbines and related ancillary structures shall then be decommissioned and removed unless, prior to the end of the period, planning permission shall have been granted for their continuance for a further period.

Condition – 11: Prior to commencement of development, a detailed reinstatement programme providing for the removal of all turbines and ancillary structures (but not turbine bases, access roads/tracks, cabling or the sub-station) shall be submitted to, and agreed in writing with, the planning authority. On full or partial decommissioning of the windfarm, or if the windfarm ceases operation for a period of more than one year, the masts and turbines concerned shall be dismantled and removed from the site. The site shall be reinstated in accordance with the agreed programme and all decommissioned structures shall be removed within three months of decommissioning.

5.5.1.1.9.4 Decommissioning Activities (if required)

Decommissioning will involve the removal of all the turbines and ancillary structures and reinstatement of the turbine and ancillary structure sites.

The turbines will be dismantled by crane. This involves removal of the blade sets, the removal of the nacelle and hub, which contains the gearbox and generator, followed by the removal of the tower sections. The turbine foundations can be left in situ. The foundations are below ground level and have a steel cylindrical ring or bolt basket protruding from the foundations up to ground level onto which the turbine tower is bolted. This ring can be cut away. The foundations and hardstands can then be covered with soil and re-vegetated. The forestry road system would be left in place as before. Reinstatement of the site will be done under the supervision of a suitably qualified environmental engineer. Re-vegetation of the site will be done under the supervision of a specialist ecologist. All demolition waste will be removed from the site.

All appropriate mitigation measures deployed during the Construction Phases will be used during the Decommissioning Phase also.

5.5.1.1.10 Use of Natural Resources Emissions and Waste

Use of Natural Resources

The resources which will be imported onto the Knocknamona Windfarm site or which will be obtained from within the site during the development of the Knocknamona Windfarm are described below.

- **Land:** The overall development site area covers 398 hectares of land.
- **Biodiversity:** In total 28.2 hectares of coniferous forestry will be felled, under a felling license from the Forest Service.
- **Water:** Bottled drinking water will be imported and stored in the canteen at the temporary construction site compound. Non-potable water for hand washing or toilet flushing will be imported to the temporary construction site compound from a local municipal supply and stored in water holding tanks for the toilet and wash facilities. There are no operational stage water requirements.
- **Excavated Soils:** Construction of Knocknamona Windfarm access roads, crane hard standings, substation compound and turbine bases will involve excavation of approximately c. 28,765m³ of soils from the works areas. It is estimated that up to 25,075m³ of rock will be excavated from the on-site borrow pits.
- **Reuse of Excavated Soils:** Excavated earth materials will be reused in an environmentally appropriate and safe manner. This material will be used to reinstate the borrow pits, build the bunds which are part of the drainage system and used for landscaping around the site. Any remaining material will be removed from the development site at the end of the construction phase.
- **Imported Rock:** Approximately 9,063m³ of higher-grade rock for capping etc. rock will be imported from Roadstone Cappagh and Keereen/Aglish quarries.
- **Operational/Decommissioning Stage:** No excavations of soils will be required during the routine operation of the Knocknamona Windfarm or during the decommissioning stage. The foundations will be left in situ to avoid disturbance of the lands.

5.5.1.1.10.1 Knocknamona Windfarm: Emissions

Dust, construction machinery exhaust, noise, vibration will be emitted during the construction stage. There is no house within 200m of the construction works, the nearest house is 687m distant.

During the **Operational Stage** there will be negligible dust, vehicle exhaust and vibration.

The turbines will emit noise and have potential to create shadow flicker during operation. Permitted noise and shadow flicker emissions are prescribed by Planning Condition 7 and 8 respectively.

The operational electrical plant will be a source of very low frequency (50Hz) electromagnetic fields but these will not be at levels to cause significant effects at the turbine locations, and no effects will occur at local residences.

5.5.1.1.10.2 Knocknamona Windfarm: Waste

During construction, wastewater from welfare facilities will be contained in self-contained units in the construction site compound. General and chemical waste will also arise from construction activities and processes. All waste will be stored in a designated and secure areas in the construction site compound, for collection by an appropriately licenced operator.

The contractor will prepare a Waste Management Plan as part of the Construction and Environmental Management Plan.

5.5.1.1.11 The Vulnerability of Knocknamona Windfarm to Major Accidents; Natural Disasters and Climate Change

Major accidents or natural disasters which have the potential to affect the Knocknamona Windfarm are described hereunder. The vulnerability (exposure and resilience) of Knocknamona Windfarm to major accidents and disasters and the risk of these accidents or disasters is classified according to the *Guide to Risk Assessment in Major Emergency Management* (DoEHLG, 2010).

5.5.1.1.11.1 Vulnerability to Major Accidents

It is clear from the EIA Directive that 'major accident' mainly applies to notified Seveso establishments which operate under the Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015, where Dangerous Substances are identified in Schedule 1.

Knocknamona Windfarm is **not vulnerable to Major Accidents**, due to the minimal volumes of the Dangerous Substances which will be used, limited to small volumes of diesel fuel used by vehicles during the construction and operation of the windfarm, and small volumes of oils and grease used during turbine maintenance. Furthermore there are no Seveso sites in proximity to the Knocknamona Windfarm, the closest being in Ferrybank, County Waterford.

5.5.1.1.11.2 Vulnerability to Natural Disasters (High Winds, Land slippage, Flooding)

Natural disasters which could potentially affect the Knocknamona Windfarm include land slippage and flooding. The likelihood of these natural disasters occurring is discussed below, with likelihood of the natural disaster occurring rated according to the DoEHLG 2010 Guidelines.

- High Winds: In recent years, high wind events including hurricane force winds, have become more frequent in Ireland, and have resulted in major damage and loss of life. However, it is considered that the Knocknamona Windfarm is not vulnerable to high wind events, as the wind turbines which will be installed at the Knocknamona Windfarm will all be high specification turbines, and will easily tolerate hurricane force winds. Due to the design of the windfarm, it is considered that windfarm the likelihood of an accident occurring due to high winds is Extremely Unlikely.
- Land Slippage: Ground stability was examined by Hydro Environmental Services, a specialist hydrological and hydrogeological consultancy, during the preparation of the Land & Soil Chapter 8, in the EIA Report. All parts of the site were examined during the course of the site investigation works. This did not reveal any stress indicators in the form of erosion and there is no evidence of slope

failures in the area. No peat deposits were encountered in the site during the site visits or in the course of the ground investigations. HES concludes that there is a negligible risk of slippage or landslides in the Knocknamona Windfarm site because of the stable sub-surface ground conditions as determined in the site investigations and the absence of peat coverage. It is considered that the Knocknamona Windfarm is not vulnerable to natural disasters such as land slippage, due to the absence of peat and inherent stability of the subsoils on the site. Therefore it is considered that the likelihood of land slippage disaster occurring is **Very Unlikely**.

- Flooding: In recent years, high rainfall events and subsequent flooding have become more frequent in Ireland. Where complete the Catchment Flood Risk Assessment and Management (CFRAM)² OPW Flood Risk Assessment Maps are now the primary reference for flood risk planning in Ireland and supersede the Preliminary Flood Risk Assessment Maps (PFRA) maps. CFRAM mapping is not currently available for the area of Knocknamona Windfarm and therefore the PFRA maps have been consulted.

Flood Hazard was examined by Hydro Environmental Services during the preparation of the Water Chapter 9, in the EIA Report, who concluded that there is a low risk of impact on Knocknamona Windfarm as a result of potential flooding because, based on the PFRA mapping, none of the site is in a fluvial or pluvial flood zone and is wholly located in mapped Flood Zone C – where the probability of flooding is low (less than 0.1% or 1 in 1,000). No flood events have been recorded within or in the vicinity of the site.

Due to the fact that the Knocknamona Windfarm is not vulnerable to flooding, it is considered that the likelihood of flooding disaster occurring is **Unlikely**.

5.5.1.1.11.3 Consequences of Natural Disasters Occurring

The consequence of the impact if the event occurs is described here.

Due to the low number of personnel working on-site at any one location, the consequence of any high wind, flooding or land slippage events, if they did occur, is considered to be **Limited**.

Due to the low number of people living or working locally, the consequence of any high wind, flooding or land slippage events, if they did occur, is also considered to be **Limited**.

The consequences to water quality due to land slippage or flooding could be **Serious** due to the widespread effects and extended duration of sedimentation effects in downstream watercourses.

5.5.1.1.11.4 Overall Risk

When the likelihood and the consequence of a potential high wind, land slippage or flooding event occurring is applied to the risk matrix from the DoEHLG 2010 guidelines, a broad indication of the critical nature of each risk can be determined.

²CFRAM is Catchment Flood Risk Assessment and Management. The national CFRAM programme commenced in Ireland in 2011, and is managed by the OPW. The CFRAM Programme is central to the medium to long-term strategy for the reduction and management of flood risk in Ireland.

In relation to on-site personnel and other people in the locality, a high wind, land slippage or flooding event would be classed a 'normal emergency' - based on a likelihood rating of Extremely Unlikely and a consequence rating of Limited.

In relation to downstream water quality, due to the higher level of effect (Serious) on water quality a land slippage or flooding event could be a major emergency. According to the DoEHLG 2010 guidelines, both flooding and landslip events would be at the lowest extreme of 'major emergency'.

5.5.1.1.11.5 Vulnerability to Climate Change

High rainfall events and subsequent flooding and high temperatures are now considered to be a consequence of climate change. Flooding and high temperatures are discussed in the previous section and are considered Unlikely at this site.

When risk to Knocknamona Windfarm from forest wildfire is considered, it is found that the development is not vulnerable to wildfires because the forestry roads and windfarm roads and the hard core areas around the turbines effectively act as fire breaks within the windfarm – thus checking the spread of any wildfire within the windfarm.

5.5.1.1.11.6 Mitigation Measures

The Likelihood of land-slippage is **Very Unlikely**; the likelihood and of Flooding is **Unlikely** and the project is not vulnerable to climate change and therefore no particular mitigation for Major Accidents; Natural Disasters and Climate Change is required.

The installation of high specification turbines at the Knocknamona Windfarm site will ensure that high wind events do not cause turbine failure at the site.

No measures are required for land slippage risk. In relation to flooding, no instream works are required for the windfarm. Flood attenuation measures are built into the project through the surface water drainage system design, these measures will prevent any increase in discharge rates and associated flooding risk, downstream of the windfarm.

Should a disaster occur, unconnected to the project but in the locality – the above mitigation measures already designed into the project will ensure that the project will not make the consequences of the event worst. In addition the presence of the project will not increase the likelihood of such an event occurring.

5.5.1.1.12 Interaction of KWF Grid Connection with Knocknamona Windfarm

For the most part, KWF Grid Connection does not overlap the footprint of Knocknamona Windfarm, being mainly located to the north of the Knocknamona Windfarm infrastructure. Part of the KWF Grid Connection cable trench overlaps where a 280m length of cable is routed along an existing forestry road within the footprint of the Knocknamona Windfarm (windfarm access road), between the Knocknamona Windfarm substation and Knocknamona Windfarm meteorological mast.

The alignment of the underground cabling for KWF Grid Connection, in the centre of the existing roads, is such that it will not cross or otherwise interfere with the design of the drainage system associated with the Knocknamona Windfarm roads or substation compound.

Relevant Volume F: Reference Documents

Reference Document 1 of 7 to 4 of 7: Knocknamona Windfarm R.EIS 2015

5.5.1.1.13 ABP Environmental Impact Assessment of Knocknamona Windfarm

Knocknamona Windfarm has already been subject to Environmental Impact Assessment by An Bord Pleanála in 2016, and therein considered, either individually or cumulatively with other projects, that there will be no

significant effects on the environment or human health as a result of the development of the Knocknamona Windfarm.

In the Proper Planning and Sustainable Development section of the Board Direction to Grant permission for Knocknamona Windfarm, the Board considered that subject to compliance with the planning conditions, including the reduction of the windfarm from 12 No. wind turbines to 8 No. wind turbines, the windfarm "would

- accord with national and regional wind energy policies and guidelines,
- would be in accordance with the provisions of the Waterford County Development Plan 2011-2017, including the policies set out therein in relation to wind energy and the protection of landscapes and scenic routes,
- would not be unduly visually dominant and would be acceptable within this landscape,
- would not seriously injure the amenities of the area or of residential property in the vicinity, would not give rise to a risk of pollution,
- would not detract from archaeological features or from architectural heritage,
- would be acceptable in terms of traffic safety and convenience and
- would not be prejudicial to public health.
- The proposed development would, therefore, be in accordance with the proper planning and sustainable development of the area."

The Inspectors Reports, Board Order and Direction for Knocknamona Windfarm (ABP Ref. PL93.244006) can be found on the Board's Website at <https://www.pleanala.ie/en-ie/case/244006>

Note: The passage of time is discussed at the end of this section.

5.5.1.2 Larger Turbines & Met Mast at Knocknamona Windfarm

In 2020 a Planning Application was submitted to Waterford City & County Council to change the maximum tip height of the authorised turbines at Knocknamona Windfarm and to change the height and design of the authorised meteorological mast. (Waterford City & County Council Ref. 20/845). Authorised by An Bord Pleanála in September 2022 ABP Ref. 309412-21.

It is authorised to change the following elements of the previously authorised Knocknamona Windfarm, ABP Ref. PL93.244006) and is described in detail above;

Changes to the authorised turbines:

- Provides for an increase the overall maximum tip height from 126m to 155m,
- Provides for an increase in turbine hub height from 81.6m to a hub height within the range 86-95m,
- Increase turbine rotor diameter from 90m to a rotor diameter within the range 112m to 126.7m.

Changes to the authorised meteorological mast:

- Increase the height of the meteorological mast from 80m to a maximum of 99m, and
- Change the structure from a tube tower to lattice tower structure.

There will be no change to the remaining elements of the Authorised Knocknamona Windfarm, as per:

- No changes to the locations of the authorised turbines or of the authorised meteorological mast;

- No changes to the authorised windfarm site access roads or drainage network, as the site roads and drainage network can accommodate the larger turbines and meteorological mast;
- No changes to the location of the turbine foundations and no change in the number of loads of concrete or steel reinforcement described for the foundations;
- No changes to the size or location of the crane hardstanding areas;
- No changes to internal windfarm cabling or to other ancillary works such as the site entrance, borrow pits or temporary construction compound;
- No additional clear-felling, excavations or imported rock required for the larger wind turbines and meteorological mast. The size and volume of the authorised borrow pits and stone requirements does not need to increase for the larger turbines and meteorological mast;
- No changes to construction materials haul routes;
- No change to the turbine components haul route through Pulla (Option A) as described in Revised EIS 2015;
- No changes to the authorised substation compound and control building at Knocknamona Windfarm,
- No changes to the use of Natural Resources and no material change to emissions (dust, noise, EMF); and
- No changes to levels of site activity, number of personnel or traffic during either construction or operation or decommissioning of the Knocknamona Windfarm project.
- No change to the mitigation measures for protection of biodiversity and water quality, which form part of the authorised wind windfarm.

See end of Chapter 1

Figure 1.2 Location of KWF Grid Connection in relation to Authorised Knocknamona Windfarm, existing Woodhouse Windfarm and existing Woodhouse Substation

5.5.1.2.1 Evaluation of Larger Turbines & Met Mast Application

The direct, indirect and cumulative impacts on the prescribed environmental topics of amending the size of the authorised turbines and the size and design of the met mast was evaluated in the project Revised EIA Report 2021 and accompanying Figures and Appendices. The evaluation includes the impact of the whole Knocknamona Windfarm project.

Relevant Volume F: Reference Documents

Reference Document 6 of 7 & 7 of 7: Amendment to Knocknamona Windfarm (Larger Turbines & Met Mast) R.EIAR 2021

The summary conclusions of the evaluation of the impact on each environmental topic is set out below.

5.5.1.2.2 Land & Soils

Summary Conclusion: There will be **NO CHANGE** to the impacts on **LAND & SOILS** as a result of the Larger Turbines and Meteorological Mast.

The larger turbines and meteorological mast will not cause any impacts to Land or Soils. The amendment will not result in any change in the impact of Knocknamona Windfarm on Land & Soils beyond that already authorised under Planning Ref. 14/600109.

This is because the amendment will not result in any increase in excavated footprint for the wind turbines or meteorological mast, nor to the volumes of soils excavated nor forestry felled. The larger turbines and meteorological mast can be constructed using the same turbine bases, hardstands, access roads, electrical substation and ancillary site works as already authorised for Knocknamona Windfarm. There will be no change to the size or location of the turbine foundations or crane hardstanding. The volumes of concrete and aggregates required for the Larger Turbine's foundations will be in line with that evaluated in Revised Knocknamona Windfarm EIS 2015. There will be no change to the construction materials and turbine component haul routes either through Knocknamona Windfarm site entrance (Option A) as evaluated in the Revised Knocknamona Windfarm EIS 2015.

The larger turbines and meteorological mast will not cause any greater, or lesser, effects to the use of the forestry or agricultural lands in the area. The use of the vast majority of the lands can continue during construction works, albeit with temporary local diversions in place.

With regard to Windtake in the context of renewable energy landuse at the adjacent Woodhouse Windfarm, the minimum separation distances in a Crosswind and Downwind Direction between the Larger Turbines and the nearest Woodhouse turbines can be achieved.

5.5.1.2.3 Water

Summary Conclusion: There will be **NO CHANGE** to the impacts on **WATER** as a result of the Larger Turbines and Meteorological Mast.

The larger turbines and meteorological mast will not cause any impacts to Water. The amendment will not result in any changes in the impact of Knocknamona Windfarm on WATER beyond that already authorised under Planning Ref. 14/600109.

This is because the amendment will not result in any increase in excavated footprint for the wind turbines or meteorological mast, nor to the volumes of soils excavated nor forestry felled. The larger turbines and meteorological mast can be constructed using the same turbine bases, hardstands, access roads, electrical substation and ancillary site works as already authorised for Knocknamona Windfarm.

There will be no change to the size or location of the turbine foundations or crane hardstanding. The volumes of concrete and aggregates required for the Larger Turbine's foundations will be in line with that evaluated in Revised Knocknamona Windfarm EIS 2015. There will be no change to the construction materials and turbine component haul routes either through Knocknamona Windfarm site entrance (Option A) as evaluated in the Revised Knocknamona Windfarm EIS 2015. Similarly the proposal will not result in any changes in location and therefore distance of works from watercourses will remain the same. The larger turbines and mast will not result in any change in levels of activity or use of oils or fuels during the construction, operation or decommissioning of the whole Knocknamona Windfarm Project.

The amendment to the authorised Knocknamona Windfarm will not require any changes to KWF Grid Connection or to the Haul Route Works.

The **whole Knocknamona Windfarm project** (including the amendment) will not cause significant adverse impacts to Water.

5.5.1.2.4 Air including Air Quality. Noise. Shadow Flicker. Electromagnetic Fields

There will be **NO CHANGE** to the impacts on air quality & vibration as a result of the Larger Turbines and Meteorological Mast. The larger turbines and meteorological mast will not cause any air quality, construction noise or vibration impact to Air. The amendment will not result in any change in the impact of Knocknamona Windfarm on Air Quality, Construction Noise or Vibration beyond that already authorised under Planning Ref. 14/600109. This is because the larger turbines and meteorological mast can be constructed using the same

turbine bases, hardstands, access roads, electrical substation and ancillary site works as already authorised for Knocknamona Windfarm. Construction of the larger turbines and meteorological mast will not result in any increase in excavated footprint for the wind turbines, nor to the volumes of soils excavated or forestry felled, nor to the volumes of soils stored on site at the Knocknamona Windfarm. There will be no change in the number of construction materials deliveries to the site or to the level or type of construction activities. There will be no change to the construction materials and turbine component haul routes through Knocknamona Windfarm site entrance as evaluated in the Revised Knocknamona Windfarm EIS 2015.

There will be **NO CHANGE** to the impacts of **ELECTROMAGNETIC FIELDS (EMF)** as a result of the Larger Turbines and Meteorological Mast. While the Larger Turbines will result in a change to the electrical output of the turbines, there will be no notable difference in Electromagnetic Fields (EMF) levels emitted from the electrical equipment in the turbine, including the turbine transformer. Therefore there will be no material change to the levels of EMF at the turbine locations.

There will be **NO CHANGE** to the impacts of **OPERATIONAL NOISE** as a result of the Larger Turbines and Meteorological Mast. Operational noise levels from the Larger Turbines will be controlled to ensure that the amendment, either alone or cumulatively, will remain within the authorised and allowable noise limits.

There will be a **POSITIVE CHANGE** to the impacts of **SHADOW FLICKER** as a result of the Larger Turbines and Meteorological Mast. Operational shadow flicker occurrence resulting from the Larger Turbines will be controlled to ensure that the amendment will not cause any shadow flicker at sensitive receptors- this is a POSITIVE change to the authorised windfarm which allows up to 30 hours/30 mins of shadow flicker to occur.

5.5.1.2.5 Climate

Vehicular emissions or embodied emissions summary conclusion: There will be **NO CHANGE** to the impacts on CLIMATE as a result of the Larger Turbines and Meteorological Mast. The **larger turbines and meteorological mast** will not cause the release of emissions to the atmosphere which would impact Climate. The amendment will not result in any negative changes but will result in positive changes in the impact of Knocknamona Windfarm on Climate beyond that already authorised under Planning Ref. 14/600109.

Vehicular emissions and Embodied Emissions: The larger turbines and meteorological mast, will not result in any change in the levels of vehicular emissions or embodied emissions and associated impacts of Knocknamona Windfarm on Climate beyond that already authorised under Planning Ref. 14/600109. This is because the larger turbines and meteorological mast can be constructed using the same turbine bases, hardstands, access roads, electrical substation and ancillary site works as already authorised for Knocknamona Windfarm. Similarly the larger turbines and meteorological mast will not result in any change to the size of the excavated footprints, nor to the volumes of materials excavated, nor concrete evaluated for the foundations and will not result in any change in levels of activity or use of oils or fuels during the construction, operation or decommissioning of the whole Knocknamona Windfarm Project. The amendment to the authorised Knocknamona Windfarm will not require any changes to KWF Grid Connection or to the Haul Route Works.

Increased production of RE-E summary conclusion: There will be a **SIGNIFICANT POSITIVE** change to the impacts on CLIMATE through the avoidance of emissions from fossil fuel generation in Ireland, as a result of the Larger Turbines. The increased production of RE-E and the consequential avoidance of emissions from fossil fuel generation will have a direct increased positive effect to the Environmental Factor, Climate at both a national and global scale. All action on the reduction of greenhouse gas emissions will contribute towards mitigating atmospheric warming and changes to our climate. **This is the only significant impact on the environmental topics** from installing larger turbines at the previously authorised Knocknamona Windfarm. The larger turbines **will result in a materially significant change to the amount of RE-E at Knocknamona**

Windfarm above that already authorised. The increase in the wind turbine blade length and hub height will enable the installation of more technically advanced up-to-date wind turbines which have a significantly higher electricity generation capacity. **There will be an increase in capacity factor from 29.8% to 38.2%.** The electricity production of the authorised turbines has been modelled by Lloyd’s Register, wind resource analyst. The modelling is based on a Vestas V112 turbine, which is in the size range already authorised i.e. up to 126m to uppermost tip height. When the electricity production of the authorised turbines is compared against the electricity production of the larger turbines, it is predicted that there will be an increase in electricity production from **c.75,000,000 kWh per annum for the authorised turbines to c.96,000,000 kWh per annum for the larger turbines.** This will contribute to the Climate Action Plan 2019 target of 12GW (12,000MW) of installed capacity of RE-E.

The impact on Climate of the increased RE-E production, which offsets fossil fuel generation in Ireland, is set out in the Table below;

Table 5-7 Impacts of increased production and fossil fuel offsets

	<u>Authorised</u> 8 No. wind turbines overall tip height up to 126m	Larger 8 No. wind turbines overall tip height up to 155m
RE-E production per annum ³	75 million kWh	96 million kWh
<u>Avoided</u> emissions of GHGs ⁴	25,125 tonnes of CO ₂ e per annum	36,000 tonnes of CO ₂ e per annum

Overall, the **whole Knocknamona Windfarm project** (including the amendment) will have a positive and significant impact to Climate due to the production, by the wind turbines, of renewable electricity.

5.5.1.2.6 Biodiversity

Environmental Management Plan – Construction Phase

Based on the baseline ecological environment, the extent and characteristics of the Larger Turbines and Meteorological Mast and of the other parts of the whole Knocknamona Windfarm project, the following construction phase potential impacts have been identified for the immediate and surrounding landscape, as a result of the wider works associated with the authorised Knocknamona Windfarm and KWF Grid Connection:

- Alteration of existing vegetation (as a result of removal of selected trees and alteration of grass verges for Haul Route works and forestry road widening for on site works);
- Construction and earthworks;

³ Lloyd’s Register (independent expert) energy yield assessment prediction for eight turbines at Knocknamona Windfarm

⁴ Based on the energy intensity of the Irish electricity generation mix of 375g CO₂e/kWh (Source: Energy-related CO₂ Emissions in Ireland 2005-2018 (SEAI, 2020)

- Lighting during construction and operation; and
- Noise and vibration.
- Sediment and siltation run off
- Surface water run off
- Water quality monitoring

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A full suite of mitigation measures to address and mitigate against these potential impacts have been established to prevent any adverse impacts on the ecological integrity of the habitats or species within or connected to the whole Knocknamona Windfarm Project. These measures are detailed in the full Environmental Management Plan accompanying this application (Knocknamona Windfarm Project Environmental Management Plan).

Summary Conclusion on Ecological Aspects

Summary Conclusion: There will **NO CHANGE** to the impact on **DESIGNATED SITES** as a result of the larger turbines and meteorological mast and no adverse impacts to designated sites as a result of the whole Knocknamona Windfarm project – similar to the authorised Knocknamona turbines, the Larger Turbines and Meteorological Mast are not likely to cause significant adverse impacts to bird species of European Sites, Ramsar sites or pNHA sites. In relation to indirect water quality impacts, when compared to the authorised windfarm, the larger turbines and meteorological mast will not cause increased impacts to Ramsar or pNHA sites, because the larger turbines and meteorological mast will not result in any increase in excavated footprint for the wind turbines or meteorological mast, nor any changes in forestry felling, habitat removal, modification, degradation or fragmentation from the already authorised development. The potential for significant impacts to European Sites (which substantially overlap the Dungarvan harbour and Blackwater Estuary Ramsar and pNHA sites) is examined in the Larger Turbines Appropriate Assessment (AA) Report 2021 (Stage 2) for the project. The AA Report concludes that the whole Knocknamona Windfarm project, including the Larger Turbines and Meteorological Mast, either alone or in-combination, will not give rise to adverse effects on the integrity of a European Site.

There will be **NO CHANGE** to the impacts on **TERRESTRIAL HABITATS, AQUATIC HABITATS OR SPECIES, TERRESTRIAL MAMMALS, AMPHIBIANS, REPTILES, or INVERTEBRATES**. The larger turbines and meteorological mast, will not result in any change in the impact of Knocknamona Windfarm on terrestrial habitats, aquatic habitats or species, terrestrial mammals, amphibians, reptiles or invertebrates beyond those already authorised under planning ref. 14/600109.

This is due to the Larger Turbines and Meteorological Mast not resulting in any increase in excavated footprint for the wind turbines or meteorological mast; nor any changes in forestry felling, habitat removal, modification, degradation or fragmentation from the already authorised development. The larger turbines and meteorological mast can be constructed using the same turbine bases, hardstands, access roads, electrical substation and ancillary site works as already authorised for Knocknamona Windfarm.

There will be no change to the construction materials and turbine component haul route through Knocknamona Windfarm site entrance, as evaluated in the Revised Knocknamona Windfarm EIS 2015. Additionally, there will be no change in the traffic levels within or to the sites during the construction, operation or decommissioning of the project as a result of the larger turbines and meteorological mast whole project.

Therefore, there will be no change to displacement or disturbance effects or increase in risk of invasive species spread, beyond those already authorised/evaluated. Furthermore, there has been negligible changes in habitat and species composition at the authorised windfarm site or in downstream watercourses in the passage of time between the initial 2013 assessments and the 2020 surveys for the Larger turbines amendment. Being highly modified farmland and plantation forestry habitat, the authorised site is generally of low biodiversity value and ecological importance for terrestrial mammals, amphibians, reptiles and invertebrates.

There will be **NO CHANGE** in the impacts to **BATS DUE TO LOSS/FRAGMENTATION OF FORAGING HABITATS, LOSS/DISTURBANCE OF ROOSTS OR DISTURBANCE/DISPLACEMENT DUE TO WINDFARM LIGHTING**. The larger turbines and meteorological mast will not result in any change in the impacts to bats communities or their use of the site as a result of loss or fragmentation of foraging habitats, loss or disturbance of bat roosts, or disturbance/displacement due to lighting of the Knocknamona Windfarm project, beyond those already authorised. This is because the larger turbines and meteorological mast will not result in any increase in excavated footprint for the wind turbines or meteorological mast; nor any changes in forestry felling, habitat removal, modification, degradation or fragmentation from the already authorised development.

The larger turbines and meteorological mast can be constructed using the same turbine bases, hardstands, access roads, electrical substation and ancillary site works as already authorised for Knocknamona Windfarm. There will be no change to the construction materials and turbine component haul route through Knocknamona Windfarm site entrance as evaluated in the Revised Knocknamona Windfarm EIS 2015, or through Woodhouse Windfarm site entrance as evaluated in KWF Grid Connection EIAR 2023. There will be no change in construction work practices including the use of lighting.

There were no suitable bat roosts, or roosts in use, found within 200m of the blade tip length of the authorised Knocknamona Windfarm site during the 2020 surveys.

Summary Conclusion: There will be **NO MATERIAL CHANGE to HABITAT LOSS impacts to BIRD SPECIES**. The larger turbines and meteorological mast will not result in any change in habitat loss impacts of the Knocknamona Windfarm project on bird species, i.e. general birds and passerines, waders or birds of prey, beyond the impact of the already authorised turbines.

This is because the larger turbines and meteorological mast will not result in any increase in excavated footprint for the wind turbines or meteorological mast, nor any changes in forestry felling, habitat removal, modification, degradation or fragmentation associated with the already authorised development. The larger turbines and meteorological mast can be constructed using the same turbine bases, hardstands, access roads, electrical substation and ancillary site works as already authorised for Knocknamona Windfarm. There will be no change to the construction materials and turbine component haul routes through Knocknamona Windfarm site entrance as evaluated in the Revised Knocknamona Windfarm EIS 2015.

It is also noted that there are negligible differences in habitat composition and with the exception of Kestrel and Buzzard which were recorded more frequently, there has been no material change in the species recorded onsite or their usage of the site during the passage of time since the authorised Knocknamona Windfarm site records began in 2010.

The whole Knocknamona Windfarm project (including the amendment) will not cause significant adverse impacts to Biodiversity, nor are significant cumulative impacts with other projects likely to occur.

5.5.1.2.7 Landscape & Visual Amenity

Landscape Character: The number of turbines and single meteorological mast for the current amendment to the authorised Knocknamona Windfarm will remain the same and in addition there will be no change in the

footprint of the windfarm (beyond that already authorised); i.e. the turbine foundations, mast, access tracks, substation compound or other ancillary works. Nor will there be any additional forestry felling as a result of the dimensional changes. Furthermore, there will be no change to the construction materials and turbine component haul routes through Knocknamona Windfarm site entrance. Thus, there will be no increase to the physical effects of the whole Knocknamona Windfarm project to land form, landscape features or land use patterns as a result of the Larger Turbines and Met Mast.

Although the tip height relative to the authorised tip height is equivalent to a 23% increase in scale, the principle of eight commercial scale wind turbines is already established on this site and, from experience, such variation is more difficult to discern than the dimensional differences suggest. Furthermore, this is a broad upland setting where the landform and land use patterns are considered capable of assimilating the larger turbine dimensions as readily as the authorised dimensions.

The whole Knocknamona Windfarm project (including the amendment) will not cause significant adverse impacts to Landscape Character.

Visual Amenity: As can be seen in the discussion and results indicated in the comparative assessment table, there are no instances in which the larger turbines will result in an increase in the category of visual impact previously assessed for the now authorised development. Whilst the larger turbines are discernibly larger than their authorised counterparts, particularly from closer viewpoints, they do not appear over-scaled relative to the broad scale underlying landform of land use patterns. Nor do they appear incongruous next to the smaller Woodhouse turbines. Indeed, a casual observer may not read the difference in height between the larger Knocknamona turbines and the existing Woodhouse turbines as this could easily be perceived as a function of the higher ground level of the taller turbines balanced by their greater relative distance from most receptors.

Even though the larger turbines appear marginally larger than the authorised turbines (reality is 23%), this dimensional increase will not be reflected by a proportional increase in visual impact. From some viewpoints the aesthetics of the development and its relationship with the adjacent Woodhouse development are marginally altered by the height increase. However, such effects are very nuanced and have little bearing on visual amenity overall. The change to the design and height of the met mast will not give rise to a material increase in visual impact

On the basis of the discussion and assessment contained herein, **it is considered that the increase to the turbine dimensions of the authorised Knocknamona Wind Farm turbines WILL NOT RESULT IN ANY MATERIAL CHANGE TO THE LANDSCAPE & VISUAL AMENITY PREVIOUSLY ASSESSED for this development.** Consequently, the amendments to turbines and met mast is not considered to result in a noticeably increased effect on physical landscape elements or the overall character of the landscape in comparison to the authorised turbines. For these reasons, it is considered that there would be **NO MATERIAL CHANGE TO THE LANDSCAPE & VISUAL AMENITY IMPACTS** arising from the Larger Turbines.

5.5.1.2.8 Cultural Heritage

There will be **NO CHANGE** to the impacts on **CULTURAL HERITAGE DURING CONSTRUCTION** as a result of the Larger Turbines and Meteorological Mast. The larger turbines and meteorological mast will not result in any change in the impact of Knocknamona Windfarm during construction, on Cultural Heritage sites (i.e. Recorded Legally Protected Sites, Other Recorded Sites, Previously Unrecorded Sites and Unknown Subsurface Sites) beyond that already authorised. This is because the larger turbines and meteorological mast, will not result in any change to the footprint of the authorised Knocknamona Windfarm the larger turbines and meteorological mast can be constructed using the same turbine bases, hardstands, access roads, electrical substation and ancillary site works as already authorised for Knocknamona Windfarm.

Furthermore, the larger turbines and meteorological mast will not result in any additional requirement for road widening works or any other works along the construction materials and turbine component haul routes. This is because the larger turbines can be delivered through Knocknamona Windfarm entrance as evaluated in the Revised Knocknamona Windfarm EIS 2015 without changes to the routes or requirements for additional work to those previously authorised.

There will be NO MATERIAL CHANGE to the visual impacts on CULTURAL HERITAGE DURING OPERATIONAL STAGE as a result of the Larger Turbines and Meteorological Mast.

The potential for changes in visual impact on the designed views and setting of Cappagh House, Cappoquin House, Tourin House and Headborough House and the historic villages of Villierstown and Aglish was evaluated by the author of The Landscape & Visual Amenity chapter (Richard Barker, MacroWorks), where he evaluated that although the increased size of the larger turbines may be discernible at some locations, that this will not be reflected by a proportional increase in visual impact, and that in the case of these historic houses and villages, there will not be any increase in the category of visual impact relative to the previous assessment (2015). Therefore, it is evaluated by the authors of this chapter that the visual impact on the designed views will not materially change, and remain of Slight-Imperceptible significance. With respect to the meteorological mast, the changes to the authorised mast will not be noticeable from these historic houses and villages.

The whole Knocknamona Windfarm project (including the amendment) will not cause significant adverse impacts to Cultural Heritage.

5.5.1.2.9 Material Assets

There will be **NO CHANGE to the impacts on the PUBLIC ROAD NETWORK** as a result of the Larger Turbines and Meteorological Mast. The larger turbines and meteorological mast, will not result in any change in the impact of Knocknamona Windfarm on Material Assets (Public Road Network) beyond that already evaluated in Revised Knocknamona Windfarm EIS 2015. This is because the construction materials haul route remains the same as that evaluated in the Revised Knocknamona Windfarm EIS 2015. The larger turbine components can be delivered through Knocknamona Windfarm entrance as evaluated in the Revised Knocknamona Windfarm EIS 2015, without changes to the routes or requirements for additional work. Also, because the larger turbines and mast can be constructed using the authorised construction footprint and because the grid connection cabling and equipment remains unchanged, there will be no increase in construction traffic volumes through either the Knocknamona Windfarm entrance or the Woodhouse Windfarm entrance.

Summary Conclusion: There will be **NO CHANGE to the impacts on the ELECTRICITY SYSTEM NETWORKS** as a result of the Larger Turbines and Meteorological Mast beyond that already authorised. This is because the increased production from the higher generation capacity turbines can be accommodated and exported using the equipment and cabling as authorised for Knocknamona Windfarm. Also, the larger turbines and mast can be delivered without any requirement for electricity pole removal/relocations.

The whole Knocknamona Windfarm project (including the amendment) will not cause significant adverse impacts to Public Roads, Local Built Services or to the national Electricity System network.

Telecommunication Signals Summary Conclusion:

There will be **NO CHANGE to the impacts on the TELECOMMUNICATION SIGNALS** as a result of the Larger Turbines and Meteorological Mast. Modelling and analysis of the 3 No. telecommunication links which pass through the windfarm area shows that no impact is likely to occur to any of these links as a result of the Larger Turbines, as there is sufficient separation distance between the link paths and the Larger Turbines.

Cumulative Impact: Given the nature of point to point communication signals, which can only be blocked by the first obstruction – meaning that a second obstruction has no signal to interfere with, cumulative impacts are not modelled for these signal path types.

Television Reception Summary Conclusion: There will be **NO INCREASE IN THE SIGNIFICANCE** of the impacts on **TELEVISION RECEPTION** as a result of the Larger Turbines. Modelling carried out in 2020 for the authorised 8 turbines and the 8 Larger Turbines predicts that, when worst case conditions were modelled, the Larger Turbines cause a 7% increase in the number of residences potentially affected by television interference (n=719), when compared to number of properties which could potentially be affected by the authorised turbines (n=669). The unmitigated impact of the turbines was evaluated as significant in 2015. This unmitigated impact continues to be evaluated as significant in 2020. It is therefore considered the Larger Turbines will not result in a change in the significance of the impact, when compared to the impact of the authorised turbines. However, it is also noted that the mitigation measures (TV Antenna re-alignment and increase in height, Antenna Re-tuning (getting signal from a different RTE TV transmitter, or Subscription-Free Satellite TV service (SaorSat)), which form part of the authorised windfarm will continue to be effective mitigation for the Larger Turbines. Furthermore, the developer, also agrees to sign up to a protocol with 2RN, as part of this application for the Larger Turbines, which will resolve television reception interference issues in the local area. Therefore, with the implementation of this effective mitigation, there will be no residual impact of the Larger Turbines on television reception in the surrounding area.

Cumulative Impact: Cumulative modelling carried out in 2015 identified a number of residences which could be affected by both Knocknamona turbines and Woodhouse turbines. The Woodhouse Windfarm is now operational, with negligible levels of interference, this is mainly due to the topography of the Drumhills, the lower elevations of the Woodhouse turbines, and the separation distance of 3km between the Woodhouse turbines and the RTE Dungarvan Mast transmitter and the remedy of any interference issues by the windfarm operator. It is therefore considered that the Woodhouse Windfarm turbines will not contribute significantly to cumulative impacts with the larger turbines. In any case the mitigation measures which will effectively remedy any interference cause by the larger turbines, will also remedy any cumulative interference issues, should any arise.

5.5.1.2.10 Population & Human Health

There will be **NEUTRAL CHANGE** to the impacts on **LOCAL EMPLOYMENT AND LOCAL SPEND DURING CONSTRUCTION AND OPERATION** as a result of the larger turbines and meteorological mast. This is on the basis that the larger turbines can be constructed on the already authorised footprint of Knocknamona Windfarm, the larger turbines will not result in a change in the numbers of construction personnel or to purchases of stone or concrete from local quarries. Similarly, during the operational phase, the larger turbines require the same level of maintenance as the authorised turbines. Overall, the potential direct changes to socio-economic factors (employment and local spend) during construction and operation would be comparable to that already consented, with no material risk to public health.

There will be **NEUTRAL CHANGE** to the impacts on **HEALTH DUE TO CONSTRUCTION TRAFFIC** as a result of the larger turbines and meteorological mast. Cross-factor health and wellbeing effects (including severance, pedestrian amenity and risk of accident/injury) due to increased traffic on local roads would be Neutral, as the larger turbines would not require changes to haulage routes or an increase in construction traffic, beyond that already assessed for Knocknamona Windfarm. Overall, the potential change in construction traffic is negligible, with no material risk to public health.

There will be **NEUTRAL CHANGE** to the impacts on **HEALTH DUE TO TURBINE NOISE OR SHADOW FLICKER** as a result of the larger turbines and meteorological mast. Cross-factor health and wellbeing effects due to turbine noise or shadow flicker occurrence would be Neutral, as the larger turbines would not increase the

noise levels of the windfarm beyond that already authorised and operation of the more advanced turbine technology can be controlled to ensure that shadow flicker occurrence and noise emissions from the turbines stay below the levels authorised. On the basis that the larger turbines would adhere to the same noise constraints already evaluated, the change is negligible, with no material risk to public health. Shadow Flicker effect will be controlled so as to be negligible.

There will be **NEUTRAL CHANGE** to the impacts on **HEALTH DUE TO TURBINE EMF** as a result of the larger turbines and meteorological mast. Cross-factor health and wellbeing effects due to EMF would be Neutral, because although the Larger Turbines will result in a change to the electrical output of the turbines, there will be no notable difference in Electromagnetic Fields (EMF) levels emitted from the electrical equipment in the turbine, including the turbine transformer. Similarly, the rated capacity of the internal windfarm cabling will remain the same, which is substantially below the threshold values set to be protective of public health by the International Commission on Non-Ionising Radiation Protection.

There will be **NEUTRAL CHANGE to ATTRACTIVENESS OF TOURISM OFFERINGS AND AMENITY** as a result of the larger turbines and meteorological mast. The larger turbines would not cause noticeable cross-factor changes to the authorised impact of the Knocknamona Windfarm to the attractiveness of tourism offerings in the area, including hill walking routes within the Comeragh and Knockmealdown ranges, the nearby St Declan's Way pilgrim walking route and the further afield heritage views (stately houses, gardens and historic villages). According to the evaluations in The Landscape & Visual Amenity chapter, **no material increase in the authorised visual impact along walking routes and heritage views are expected to occur**, and therefore no change to the authorised impact is expected to tourism offerings.

There will be **POSITIVE CHANGE** to the impacts on **LOCAL HEALTH AND ECONOMY DUE TO COMMUNITY BENEFIT PAYMENTS** as a result of the larger turbines and meteorological mast. This is on the basis that the larger turbines would result in a large community benefit payment - increasing, to an estimated €192,000 per annum (based on a predicted production of 96,000,000 kW hours of electricity per annum). The amount of this payment is based on a community benefit fund payment of €2 per MW hour of electricity produced, payable per annum (RESS1 Terms & Conditions). As the community benefit fund will to support a broad range of local projects, it is anticipated that associated benefits would directly support physical, mental and social wellbeing in addition to indirectly supporting physical, mental and social wellbeing through strengthening the local economy.

There will be **POSITIVE CHANGE to WATERFORD CITY & COUNTY COUNCIL BUDGET DUE TO COMMERCIAL RATES PAYMENTS** as a result of the larger turbines and meteorological mast. Commercial rates payments to Waterford City & County Council **will be c.€450,000 per annum for the lifetime of the windfarm**. Commercial Rates, are based on the capacity factor of a windfarm and the electricity generation prediction per annum for the site. The larger turbines will increase the capacity factor and generation potential of Knocknamona Windfarm substantially and therefore there will be significantly increased commercial rates paid to Waterford City & Council Local Authority Area. This commercial rates paid to the Local Authority Area would directly benefit the communities living within the locality by supporting local projects, programmes and infrastructure. As per the community benefit fund, the associated benefits would directly support physical, mental and social wellbeing in addition to indirectly supporting physical, mental and social wellbeing through strengthening the local economy.

There will be **POSITIVE CHANGE to the impacts on HEALTH DUE TO AN INCREASE IN RENEWABLE ENERGY GENERATION, CARBON EMISSION OFFSET AND ENERGY SECURITY** as a result of the larger turbines and meteorological mast. Primary climate change impacts (e.g. increased temperatures, increased CO₂, sea level rise and increased extreme weather events) can affect several environmental functions (e.g. water availability, salinization, crop yields, wildfires and PM concentrations), which in turn have the potential to

alter a range of health outcomes. The amended scheme utilising higher capacity wind turbines, is predicted to produce approximately 96,000,000 kWh which is enough to supply 22,952 houses annually with the average domestic electricity needs⁵. This amount of electricity will offset 36,000 tonnes of CO₂e per annum that would otherwise be emitted if the electricity generated by Knocknamona Windfarm, was instead generated by gas, coal and oil.⁶

On the basis that the project would contribute to renewable energy infrastructure, this would result in a positive change contributing towards national policy and global targets inherently linked to sustainability, health and wellbeing. As climate change is a global and transboundary issue, when considered in an international context the health and wellbeing benefits associated with carbon emission offsetting would be imperceptible. When considered in a national context, the project has a larger benefit as it contributes to achieving national net zero carbon emission targets, however, the benefit to health and wellbeing remains imperceptible.

5.5.1.2.11 Interaction of the Foregoing

Potential cross factor effects were identified and, where relevant, are evaluated by the authors of the receiving environmental factor topic chapter.

The evaluation concludes that where there were cross-factor effects these effects were not significant.

See end of Chapter 1

Figure 1.2 Location of KWF Grid Connection in relation to Authorised Knocknamona Windfarm, existing Woodhouse Windfarm and existing Woodhouse Substation

Relevant Volume F: Reference Documents

Reference Document 6 of 7 & 7 of 7: Amendment to Knocknamona Windfarm (Larger Turbines & Met Mast) R.EIAR 2021

5.5.1.2.12 ABP Environmental Impact Assessment of Larger Turbines & Met Mast

Amendments to Knocknamona Windfarm to provide for larger turbines and met mast has already been subject to Environmental Impact Assessment by An Bord Pleanála in 2022, and therein considered, either individually or cumulatively with other projects, that there will be no significant effects on the environment or human health as a result of amendments to the previously authorised Knocknamona Windfarm.

In the Proper Planning and Sustainable Development section of the Board Direction on the Amendments Application, the Board considered that subject to compliance with the planning conditions *“the amendments would accord with European, national, regional and local planning, renewable energy, other and related policy, it would not have an unacceptable impact on the landscape or ecology, it would not seriously injure*

⁵ Based on Commission for Regulation of Utilities (CRU) Figures of 4,200 kWh average use per household in Ireland (August 2017). *Review of Typical Domestic Consumption Values for Electricity and Gas Customers (CER 17/003)*

⁶ Based on the energy intensity of the Irish electricity generation mix of 375g CO₂/kWh (Source: Energy-related CO₂ Emissions in Ireland 2005-2018 (SEAI, 2020))

the visual or residential amenities of the area or of property in the vicinity, and would be acceptable in terms of traffic safety and convenience. The amendments would, therefore, be in accordance with the proper planning and sustainable development of the area.”

The Inspectors Report, Board Order and Direction for Amendments to Knocknamona Windfarm (ABP Ref. PL93.309412) can be found on the Board’s Website at <https://www.pleanala.ie/en-ie/case/309412>

5.5.1.3 Junction & Bend Widening Works

The haul route for turbine components examined in the Knocknamona Windfarm Revised EIS 2015 included;

- a) the temporary removal of signage and handrails on 7 No. roundabouts and 1 No. roadside location along the N29 and N25 outside Dungarvan and
- b) junction/bend widening works between Pulla Crossroads and Knocknamona Windfarm Entrance at Knocknaglogh Lower.

Item (a) involves activities only and will be carried out by arrangement with the Local Authority. Item (b) involves works and required planning permission. On 13th May, 2022 Knocknamona Windfarm Limited (KWFL) applied to Waterford City & County Council for permission for works at four Junction/Bend locations on the Local Roads between Pulla Crossroads on the N25, to Knocknamona Windfarm site entrance c.7km east at Knocknaglogh Lower on the L6077. (WCCC Ref. 22/407; ABP No. 314219-22). Planning Permission was granted on 7th December 2022.

See end of Chapter 12

Figure 12.4 Public roads – Whole Project Haul Routes

5.5.1.3.1 Evaluation of Junction & Bend Widening Works

A EIA Screening Report was submitted as part of the planning Application. The direct, indirect and cumulative impacts on the prescribed environmental topics of carrying out these minor road works is evaluated in the Screening for EIA 2022 document. The evaluation includes the impact of the whole Knocknamona Windfarm project.

Relevant Volume F: Reference Documents

Reference Document 5 of 7: Junction & Bend Widening Works Screening for EIA 2022.

There follows hereunder a detailed summary of the Screening for EIA 2022 and a summary of the An Bord Pleanála evaluation of the project.

5.5.1.3.2 Description of Junction & Bend Widening Works development

The Junction & Bend Widening Works comprises works at four discreet locations along Local Roads to the east of the authorised Knocknamona Windfarm site, involving works at the junction of the L2024 with the L2022 in Carronahyla (HR2); the junction of the L2022 with the L6077 in Knocknaglogh Upper (HR3); and two bends along the L6077 in Knocknaglogh Upper (HR3 and HR4). Works will occur in the road verges and on 3rd party lands.

Delivery of turbine blades necessarily comprises extra-long HGV. The junction/bend widening will be necessary to facilitate blade deliveries to Knocknamona Windfarm entrance at Knocknaglogh Lower. Otherwise, there are no other road works required along the route from Port (likely Belview), to accommodate blade delivery.

5.5.1.3.3 Junction Widening Works at HR2 and HR3

Junction Widening Works at Carronahyla (HR2)

At HR2, the haul route turns north from the L2024 Local Road onto the L2022 Local Road at an acute angle junction. The lands at this location comprise a previously felled/recently replanted forestry area/road verge area. A temporary road diversion will be made in the form of a load bearing road surface through 3rd party forestry lands to facilitate haulage of the turbine components. A new concealed drain will be installed to prevent water egress onto the public road. The footprint of the works at this location will be 1345m².

Junction Widening Works at Knocknaglogh Upper (HR3)

At HR3 Junction works, the haul route turns west from the L2022 Local Road onto the L6077 Local Road at a 90° angle. The lands at this location comprise a roadside verge, bank and drain, and improved agricultural grassland field. A temporary diversion will be provided in the form of a load bearing road surface through 3rd party agricultural grassland in order to facilitate the haulage of the turbine components. A small number (5) of semi-mature willow trees which are growing in the bank/drain will be removed to accommodate the works and the passage of the components. A concealed drain will be installed in the existing drainage channel. The footprint of the works at this location will be 409m².

At HR2 and HR3 Junction works, the new load bearing surface will remain in place for the operational duration of Knocknamona Windfarm. Following the delivery of the wind turbine components during construction, this surface will be covered with a layer of soil to conceal it from view. A new post and rail fence will be erected along the alignment of the existing road corridor at HR2, while livestock fencing will be erected along the existing alignment at HR3.

5.5.1.3.4 Bend Widening Works at Knocknaglogh Upper (HR3)

A bend on the L6077 Local Road will be widened to facilitate haulage of the turbine components particularly turbine blades, through the provision of a load bearing surface on 3rd party agricultural grasslands. The lands at this location comprises improved agricultural grassland bounded by an electric wire fence. The footprint of the works at this location will be 185m². Following delivery of the components to the construction site, the hardcore areas will be left in place, and a new electric fence will be erected along the alignment of the road corridor.

5.5.1.3.5 Bend Widening Works at Knocknaglogh Upper (HR4)

A bend on the L6077 Local Road will be widened to facilitate haulage of the turbine components particularly turbine blades, through the provision of a load bearing surface on 3rd party agricultural grasslands. The lands at this location comprises improved agricultural grassland bounded by an electric wire fence. The footprint of the works at this location will be 234m². Following delivery of the components to the construction site, the hardcore areas will be left in place, and a new electric fence will be erected along the alignment of the road corridor.

5.5.1.3.6 Construction Phase

Duration: The Junction & Bend Widening Works will be limited in scale, including temporary construction works and will take c.9 days to complete. The Works will remain in place for the operational life of Knocknamona Windfarm (including any decommissioning phase).

Timing: The Junction & Bend Widening Works will be carried out prior to the components being delivered. Reinstatement of a roadside boundary, along its original boundary, at Junction & Bend Widening Works locations and the reinstatement of lands at Junction works locations will be carried out after the component loads pass.

The proposed works are located in the Blackwater (Munster) catchment and Colligan-Mahon Catchment. In order to avoid sequential cumulative impacts to these surface waterbodies from the Junction & Bend Widening Works with works at Knocknamona Windfarm and KWF Grid Connection, the developer commits to carrying out the road works either before or after the main groundworks associated with the Knocknamona Windfarm or with the KWF Grid Connection. In addition, to protect surface water quality, the road works will be carried out during dry weather. Any pruning or removal of trees will be completed outside the bird breeding season.

5.5.1.3.7 Use of Natural Resources

The following natural resources will be required for Junction & Bend Widening Works:

Resources:

- 0.2ha forestry land
- 0.07ha agricultural grassland
- c.652m³ soils will be excavated
- 5 semi-mature willow trees will be removed

5.5.1.3.8 Operational Phase

During the operational lifetime of Knocknamona Windfarm, it may occasionally be necessary to replace turbine components including blades. This will require the reopening of the junction/bend widening sites (HR2, HR3 and HR4), comprising dismantling of the roadside fence at HR2, HR3 and HR4 and at Junctions Works HR2 and HR3, scraping back the topsoil to reveal the hardcore load bearing surface underneath, in order to re-open the short temporary diversion roads in 3rd party lands to facilitate the component deliveries. Reinstatement of the roadside boundary at Junction/Bends Works and of the lands at Junction Works (HR2, HR3) locations will be carried out when transportation is complete, reinstatement will comprise spreading the soil back over the hardcore area and reseeding with native grasses along with re-erection of the boundary fence. These works during the operational phase will be minimal and of very short duration and would happen very occasionally during the lifetime of the windfarm.

5.5.1.3.9 Environmental Protection Measures

Water Quality Protection – all Phases of the Junction & bend Widening Works

- At HR2, HR3, HR4, excavated topsoil will be stockpiled in a temporary bund and protected with silt fencing.
- Works will be carried out during dry weather.
- All individual waste streams will be identified at source and disposed to a licensed landfill / to a licensed recycling facility and excavated soils will be reused for reinstatement.
- Stationary equipment will have a spill tray in place to contain any fuel leaks. As an added measure all plant and equipment will be refuelled at the site compound. Any accidental spillages of fuels, materials or wastes will be controlled by spill kits provided as part of the (Knocknamona Windfarm) waste management plan; any such wastes will be collected and disposed of at an appropriate licensed landfill.
- The temporary windfarm site compound located near the site entrance, which will be securely fenced and bunded, will be used by the contractor undertaking the works. Fuels will be stored within a

bunded area or designated COSHH in the site compound, along with tools, toilets, materials etc. All plant will be refueled in this compound. Machinery will also be parked overnight in the compound.

Biodiversity Protection – construction phase

- The removal of semi-mature Willow trees at HR3 Junction works will be conducted outside of the bird breeding season.
- Implementation of biosecurity measures will be carried out in line with Irish Legislation (Regulation 49 of S.I. 477/2011 European Communities (Birds and Natural Habitats) Regulations 2011).

Public Road Network, Built Services and Road Users – construction phase only

- Use of alternating ‘Stop/ Go’ system along the L2024, L2022 and L6077
- The Traffic Management Plan for Knocknamona Windfarm construction materials and turbine component haulage will be implemented during construction
- Goal posts will be erected under overhead lines.

Cultural Heritage– construction phase only

- All initial groundworks will be archaeologically monitored under licence to the National Monuments Service of the Department of Arts, Heritage and the Gaeltacht.

5.5.1.3.10 Receiving Environment - Water

Surface Water: The Junction & Bend Widening Works are located in the Goish_010 and Brickey_020 river sub catchments. The Goish drains into the River Blackwater whereas the Brickey drains into Dungarvan Harbour. The nearest surface watercourse to the works is the Ballycullane Beg Stream, which is located c.171m from Junction Widening Works at HR3. The Ballycullane Beg Stream flows north for c. 2.4km to meet the River Brickey. The River Brickey flows east into Dungarvan Harbour.

HR2 and HR4 are both located in the Goish catchment. HR4 is located c.572m upslope of the Goish River, while HR2 is located c.641m from the Monagally East Stream – which is a tributary of the Goish River. The Monagally East Stream flows into the Goish River further west. The Goish River joins the River Blackwater c.12km downstream of the works.

Groundwater: The Junction & Bend Widening Works are located in the Glenville GWB and Helvick Head GWB;

Flood Risk: The Junction & Bend Widening Works are not located within any mapped pluvial or fluvial flood zones.

Local Wells/Springs: There are no local surface water or groundwater abstractions from local streams for public supply, and no springs supplying public or private water within the vicinity of Junction & Bend Widening Works at HR2, HR3 and HR4.

5.5.1.3.11 Receiving Environment - Biodiversity

Terrestrial Habitats: The Junction & Bend Widening Works locations are adjacent to road corridors. The roadside boundaries comprised a mix of Hedgerow WL2, Treeline WL1, grass dominated Earth banks BL2 with some sections consisting of fencing. Improved agricultural grassland GA1 extends, without a boundary of any kind to the southern edge of the carriageway along a considerable section of the L6077. Each of these linear habitats is fringed along the roadside edge by margins, often with perennial ryegrass dominant in linear strips. Overall, these roadside habitats are of low ecological value both locally and nationally. These habitats are abundantly available throughout the area in the network of Local Roads and the extensive field boundary system that extends in all directions.

There are no important areas for flora or fauna at the works locations. The nearest wetland is Dungarvan Ramsar Site.

Designated Sites: The Goish_010 sub-basin drains into the River Blackwater while the Brickey_020 sub-basin drains into Dungarvan Harbour, both of which have a number of European Site designations. There is no spatial overlap between the works and any European Site. The Waterford coastline is c.9km to the south and east.

There are no NHAs or pNHAs within the local water catchment areas of the works.

Amphibians, Reptile & Invertebrates: The habitats contained within the works areas are of low local ecological value and are not likely to support large enough populations of these groups for the works to have significant adverse effects.

Terrestrial Mammals: Works relating to HR2 are located in an area of road verge/conifer plantation, which has limited ability to support terrestrial mammals. Similarly, HR3 and HR4 are located in an area of intensively managed, improved agricultural grassland.

Bats: there are some linear habitats such as tree lines, forest edges and field boundaries, present in the vicinity of the works. However, these are small areas: one patch of semi-mature willow and the other a small area of conifer plantation. Thus, due to their position within the surrounding landscape, species and age context, these patches would not have the characteristics to support bat roosts.

Birds: Hedgerows providing potentially suitable nesting habitat for passerines is a minor component in the habitat mix along the road corridor. Equivalent habitats of equal or greater ecological value are abundantly available in the extensive field boundary system adjacent to the subject roads and in the wider geographical area.

5.5.1.3.12 Receiving Environment - Landscape

HR2 is located along a scenic route on the L2024 from "Clashmore along third class route to N25 at Gorteen" (Pulla Crossroads). The area of the proposed Junction & Bend Widening Works is not mountainous, being sited on the south-eastern slopes of the Drum Hills.

5.5.1.3.13 Receiving Environment - Cultural Heritage

No previously recorded heritage sites (RMPs, Protected Structures, NIAH sites) occur within the 100m study zone of the Junction & Bend Widening Works. Nothing of significance is marked on the first edition Ordnance Survey map or aerial photography. No bridges of historic or archaeological significance will be impacted by the works. The nearest archaeological feature is a Holy Well unclassified, 1.4km from HR2.

5.5.1.3.14 Receiving Environment - Material Assets

The Junction & Bend Widening Works are located along the L2024, L2022 and L6077 Local Roads. Telephone lines are located along these local roads, however there are no overhead telephone lines at proposed Works locations HR2, HR3 or HR4.

5.5.1.3.15 Receiving Environment - Population & Human Health

- The Junction & Bend Widening Works at HR2, HR3 and HR4 on the L2024, L2022 and L6077 local roads, are located in the Electoral Divisions of Mountstuart.
- The works are located adjacent to the Public Road corridor. The areas surrounding the proposed works locations comprise farmland (grazing pasture lands) and commercial forestry plantations. The area is sparsely populated with no houses located in close proximity to the works locations.

- The nearest residences are 300m from HR2, 411m from HR3 and 620m from HR4;
- The nearest village is Aglish, 7km west from HR4;
- The nearest waymarked trail, St. Declan's Way Walk crosses the L2024 in a northwest-southeast direction, 5.3km from HR2;
- The L6077 is used locally to gain access to the Knocknamona Forestry area for recreational purposes;
- The Scenic Route No.6 is routed along the L2024;
- The nearest tourism product is Accommodation, 391m from HR2.

RECEIVED: 08/09/2023

5.5.1.3.16 Results of the EIA Screening Exercise

This EIA Screening Report comprised an examination of the nature, size and location of the Junction & Bend Widening Works, a description of the receiving environment, and an examination of the potential for impacts from the works on that environment, in order to facilitate the Planning Authority in the examination of whether the subject proposal is likely to cause significant effects on the environment and, as such, whether or not EIA is required.

An examination of the nature, size and location of the Junction & Bend Widening Works at Carronahyla and Knocknaglogh Upper has been undertaken and the summary conclusion is that:

- The Junction & Bend Widening Works will be located on very limited areas of forestry and agricultural lands (grassland), in addition to lands within the public road corridor – i.e. road verge and road pavements.
- The works are not located in a sensitive location being away from houses and community facilities, and away from sensitive, designated or important sites; the works are not located in, or close to, any natural watercourse. The works locations are not susceptible to major adverse natural events. The works are very limited in scale, of very short duration and require few resources.

Therefore, it is concluded that the Junction & Bend Widening Works are not likely to give rise to significant impacts on the environment or human health.

5.5.1.3.17 Cumulative Evaluation of the Whole Knocknamona Windfarm Project

In relation to cumulative impacts, it is concluded that the Junction & Bend Widening Works do not have the potential for significant cumulative effects with the other elements of the whole Knocknamona Windfarm project due to the very small scale and duration of the road works and the separation distance of the Works from the windfarm site.

Because the Proposed Junction & Bend Widening Works either on their own, or in combination with other projects, is not likely to cause significant effects on the environment or human health, **it is considered that an EIA is not required as part of the Planning Assessment.**

5.5.1.3.18 ABP Assessment of Junction & Bends Application

On 7th December 2022 the Board decided to Grant Permission for the Junction and Bend Widening Works "having regard to:

- the nature and scale of the proposed development, the planning history, including the recently permitted increase in length of turbine blades in the Knocknamona Windfarm, and the pattern of existing and permitted development in the area,

- National and regional policies promoting renewable energy use and generation,
- the policies and objectives of the Waterford County Development Plan 2022-2028, including the landscape designations,
- the separation between the proposed development and dwellings or other sensitive receptors,
- the contents of the Environmental Impact Assessment Screening Report and the Appropriate Assessment Report submitted by the applicant,
- the separation of the sites from any European Sites and the nature of the connections between them,
- the topography and landscape character of the area,
- the submissions made in connection with the planning application and the appeal, and
- the report and recommendation of the Inspector.”

The Board considered that, subject to compliance with the planning conditions, *“the proposed development would be in accordance with European, National, regional and local planning, renewable energy and other related policies, would not have an unacceptable impact on landscape or ecology, would not seriously injure the visual or residential amenities of the area or of property in the vicinity, and would be acceptable in terms of traffic safety and convenience. The proposed development would, therefore, be in accordance with the proper planning and sustainable development of the area”*.

Further the Board completed an environmental impact assessment screening of the proposed development and concluded as follows – *“having regard to:*

- I. the limited nature and scale of the proposed development, which is not of a development class identified in Schedule 5 of the Planning and Development Regulations 2001, as amended, and which would not meet the criteria set out in paragraph 13 of Part 2 of Schedule 5 thereof,
- II. the location of the site at a remove from any sensitive location identified in article 1 09(4)(a) of the Planning and Development Regulations 2001, as amended, and the absence of any likely significant effects thereon,
- III. the guidance set out in the Environmental Impact Assessment Guidelines for Consent Authorities regarding sub-threshold Development published by the Department of the Environment, Heritage and Local Government (2003), and
- IV. the criteria set out in Schedule 7 of the Planning and Development Regulations 2001, as amended,

the Board concluded that *the proposed development would not be likely to have any significant effects on the environment and that the preparation and submission of an environmental impact assessment report would not, therefore, be required”*.

The Inspectors Report, Board Order and Direction for Junction & Bend Widening Works (ABP Ref. PL93.314219) can be found on the Board’s Website at <https://www.pleanala.ie/en-ie/case/314219>

Relevant Volume F: Reference Documents

Reference Document 5 of 7: Junction & Bend Widening Works Screening for EIA 2022.

5.5.2 Passage of Time since the previous Evaluations on the Whole Project

Regarding the passage of time since the Knocknamona Windfarm Revised EIS 2015, the Larger Turbines at Knocknamona Windfarm Revised EIA 2021 and the Junction & Bend Widening Works Screening for EIA 2022

was prepared, there have been no material changes to the receiving environment and therefore the receiving environment remains as it existed and was assessed by the Board in 2016 and again twice in 2022 except for national policy progressions for Climate Action and the adoption of a new Waterford City & County Development Plan.

In the context of the critical environmental topic Climate, there have been dramatic changes in the emission reduction targets since the EIS 2015; EIA 2021 and Screening for EIA 2022 were prepared. Overall, the importance and urgency associated with reducing carbon emissions has increased during the intervening period. Ireland is estimated to have cumulatively exceeded its compliance obligations by 12.2 Mt CO₂ eq over the 2013- 2020 period and will need to use credits and/or purchase surplus annual emission allocations from other member states to achieve compliance.⁷ This provides a challenging context for our national ambitions to deliver on increasingly stringent annual emission reduction targets out to 2030 and the new Climate Action Plan 2021 target of 80% electricity generation from renewable sources by 2030. The whole Knocknamona Windfarm project will contribute to achievement of these ambitious targets.

Also the Waterford City & County Development Plan 2022-2028 is now in force. Appendix 8 – Landscape and Seascape Character Assessment contains the CCDP landscape designations and objectives. The areas of ‘sensitivity’ designated in the CCDP 2022-2028 have been renamed (from CCDP 2011-2017) from ‘Sensitive Area’ to ‘High Sensitive’ and the number of such areas have been reduced in the vicinity of the site. It should be noted also that in Appendix 7 Renewable Energy Strategy 2016-2030 (Wind Energy Strategy Map), the whole Knocknamona Windfarm project area is still in an area of highest acceptability for windfarms in County Waterford.

5.5.3 Woodhouse Substation

Woodhouse Substation at Keereen Upper is an operational electrical substation, forming part of the national electricity system. The Substation was commissioned in 2015.

Woodhouse Substation is an electrical transformer station. The main building; electrical equipment and ancillary works comprise;

- Eirgrid control building 10m X 13.5m and 6.5m in height
- Woodhouse Windfarm control building 19m X 8.8m and 6.5m in height
- Equipment including Busbar, Voltage and Current Metering Equipment, Line Disconnects, Surge Arrestors
- 2 No. overhead line end masts
- 2 No. lightning masts 17.5m high,
- Woodhouse Windfarm electrical transformer 6m in height, with associated plinth and bund, 6.5m X 9.5m and 1m in height
- Perimeter and internal palisade fence

⁷ EPA (June 2021) Ireland’s Greenhouse Gas Emissions Projections 2020-2040

- Hardcore ground surface and drainage system.

Woodhouse Substation was authorised by Waterford County Council under Planning Reference 11/355.

5.5.4 Woodhouse Windfarm

Woodhouse Windfarm is an operational windfarm, located adjacent and connected to Woodhouse Substation, in Woodhouse or Tinnakilly, Keereen Upper, Ballygambon Upper and Knocknamona townlands. It was authorised by Waterford County Council under Planning Reference 10/45. Woodhouse Windfarm comprises 8 No. wind turbines 125m in height – 5 No. turbines with a hub height of 75m and rotor diameter of 100m and 3 No. turbines with a hub height of 80m and rotor diameter of 90m, crane hardstanding areas, windfarm site roads and drainage system, meteorological mast 80m in height and ancillary site works. Woodhouse Windfarm was commissioned in 2015.

The windfarm also includes 3.3km of access roads, 4.5m in width, with associated drainage. The roads are surfaced in gravel and are not hard topped with tarmacadam or concrete. The road verges have fully revegetated since the civil works were completed in 2015.

5.5.5 Other Projects or Activities

5.1.1.2 Scoping for Other Projects

A scoping exercise was carried out to determine which other projects or activities along with the KWF Grid Connection have potential to cause cumulative effects to the environment and in that context are included for evaluation in this EIA Report. This scoping exercise is detailed in Chapter 2: EIA Process including Screening & Scoping and in Appendix 2.1: Scoping of other projects and activities for the Cumulative Evaluations (end of Chapter 2).

In total 44 other projects were identified within c.17km of KWF Grid Connection. These are numbered 1-44 on [Figure 2.1: Location of other projects included in the Scoping for the Cumulative Evaluations](#) at the end of Chapter 2.

These 44 projects were scoped to determine if they were located or occurred within the cumulative geographical and time-frame boundaries. The scoping results were that 35 of the 44 projects were excluded as they do not occur within the geographical and time-frame boundaries, and therefore are not likely to cause cumulative impacts with KWF Grid Connection. 5 No. of the remaining 7 No. projects were within geographical and timeframe boundaries but have been scoped out from further cumulative evaluation in the EIA because any cumulative effects with KWF Grid Connection will be negligible due to the size, nature and location of these Other Projects, in addition to the separation distances to KWF Grid Connection. The 2 No. remaining Other Projects identified relate to proposed windfarms in the area – proposed Lyrenacarriga Windfarm (11km west of KWF Grid Connection) and proposed Scart Mountain Windfarm (11km north northwest of KWF Grid Connection). Both proposed windfarms have been scoped out for cumulative evaluation because cumulative effects with KWF Grid Connection are considered to be negligible during the construction stage due to the separation distance from KWF Grid Connection and the small scale of the KWF Grid Connection works (effects on water). During the operational stage cumulative effects are considered to be negligible also, due to the compact surface expression of additional electrical equipment proposed for an existing substation (effects on Avifauna, Landscape and Cultural Heritage).

In summary, the result of the scoping exercise is that there are no other projects within 17km scoped in for evaluation of cumulative effects in this EIA Report.

5.1.1.3 Existing Windfarms

The existing 2-turbine Ballycurreen Windfarm is considered for in-combination effects. Ballycurreen Windfarm is located c.12km to the southeast of the KWF Grid Connection in the Maolán_Choirnigh sub-catchment. Due to the separation distance from the KWF Grid Connection, the built status of the Ballycurreen Windfarm and its location in a separate subcatchment, it is considered that Ballycurreen Windfarm does not have any potential to cause cumulative effects with KWF Grid Connection.

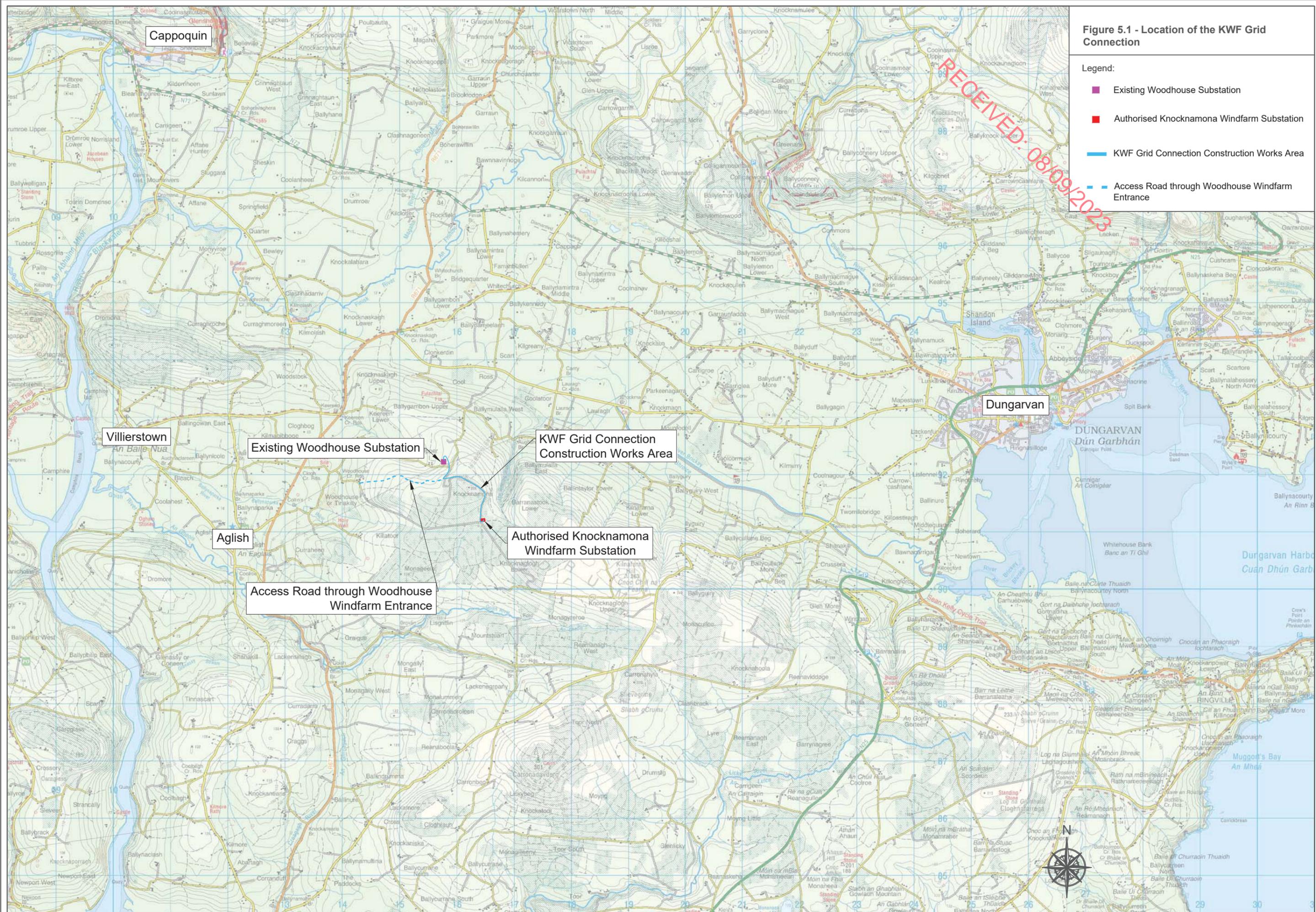
5.5.6 Other activities considered

Forestry is the dominant landuse occurring at the KWF Grid Connection development site, with sections of forestry plantation also occurring throughout the wider area. Commercial forestry plantation is the most dominant habitat within the authorised windfarm site boundary along with sections of recently felled forestry. Intensive agriculture is also one of the main land uses within the wider area. Land reclamation, drainage, reseeding, fertilisation and intensive grazing have all made an impact on the landscape of this area. Forestry and agricultural activities which occur within the landholdings of the KWF Grid Connection were also considered for cumulative evaluations.

Other activities: A search of the EIA Portal and Waterford County Council's online planning system in May 2023 did not list planned major developments in proximity to the proposed KWF Grid Connection, that had potential to contribute to significant cumulative effects.

Figure 5.1 - Location of the KWF Grid Connection

- Legend:
- Existing Woodhouse Substation
 - Authorised Knocknamona Windfarm Substation
 - KWF Grid Connection Construction Works Area
 - Access Road through Woodhouse Windfarm Entrance



Cappoquin

Dungarvan

Villierstown

Existing Woodhouse Substation

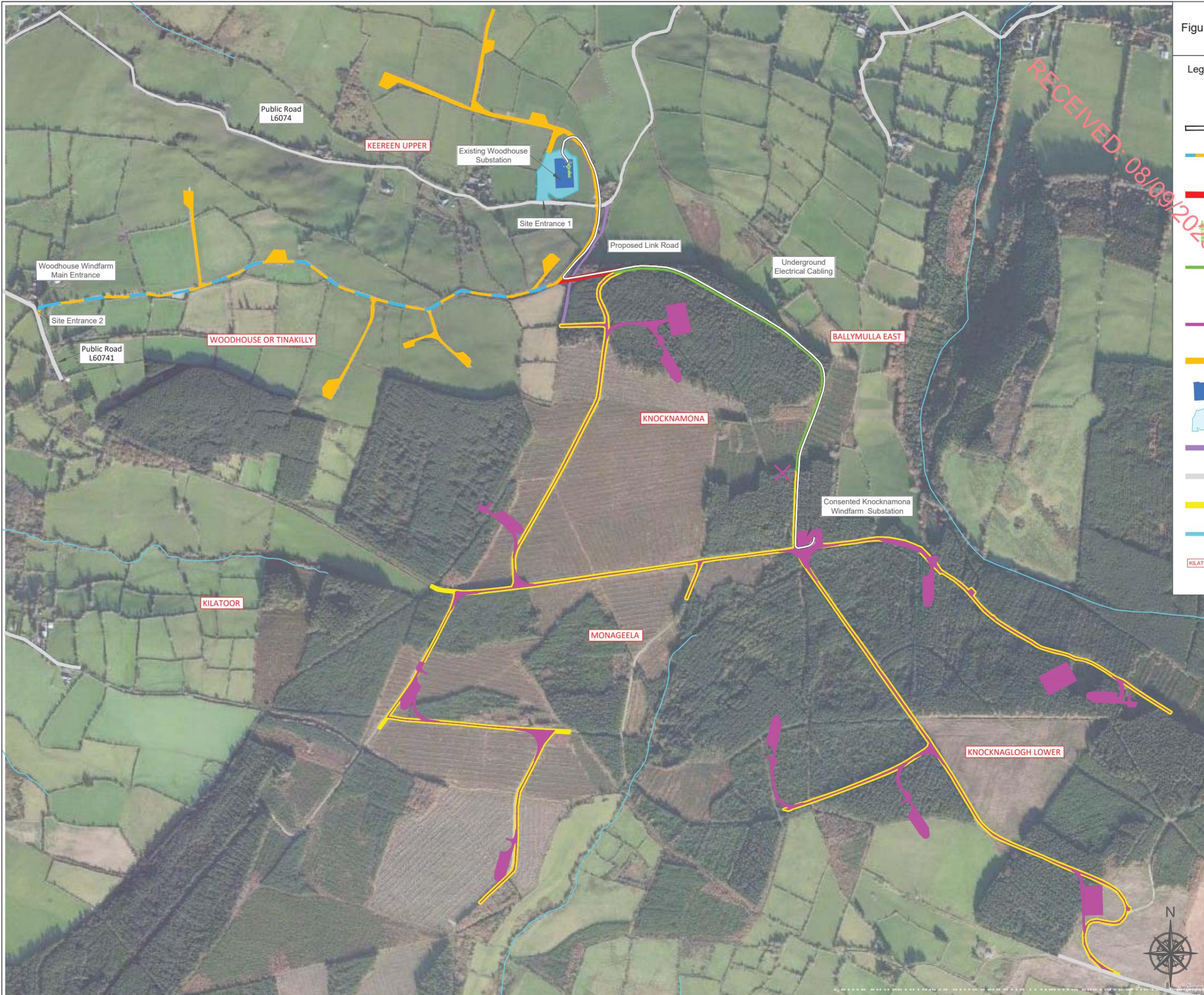
KWF Grid Connection Construction Works Area

Aglish

Authorised Knocknamona Windfarm Substation

Access Road through Woodhouse Windfarm Entrance

Figure 5.2 - Layout of the KWF Grid Connection



Legend:

- PROPOSED**
- Underground Electrical Cabling
- Access Road through Woodhouse Windfarm Entrance
- Proposed Link Road
- Proposed Woodhouse Substation Additional Plant
- Existing Forestry road to be widened
- EXISTING / AUTHORISED**
- Authorised Knocknamona Windfarm and amendments
- Existing Woodhouse Windfarm
- Existing Woodhouse Substation
- Existing hardcore area
- Existing Farm Track
- Public Road
- Existing Forestry Road
- Watercourse
- KILATOOR Townlands



Figure 5.3 - KWF Grid Connection Construction Works Area Boundary

Legend:

 Construction Works Area Boundary

 Townlands

KEEREN UPPER

KNOCKNAMONA

Ballymulalla

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River Enrickey



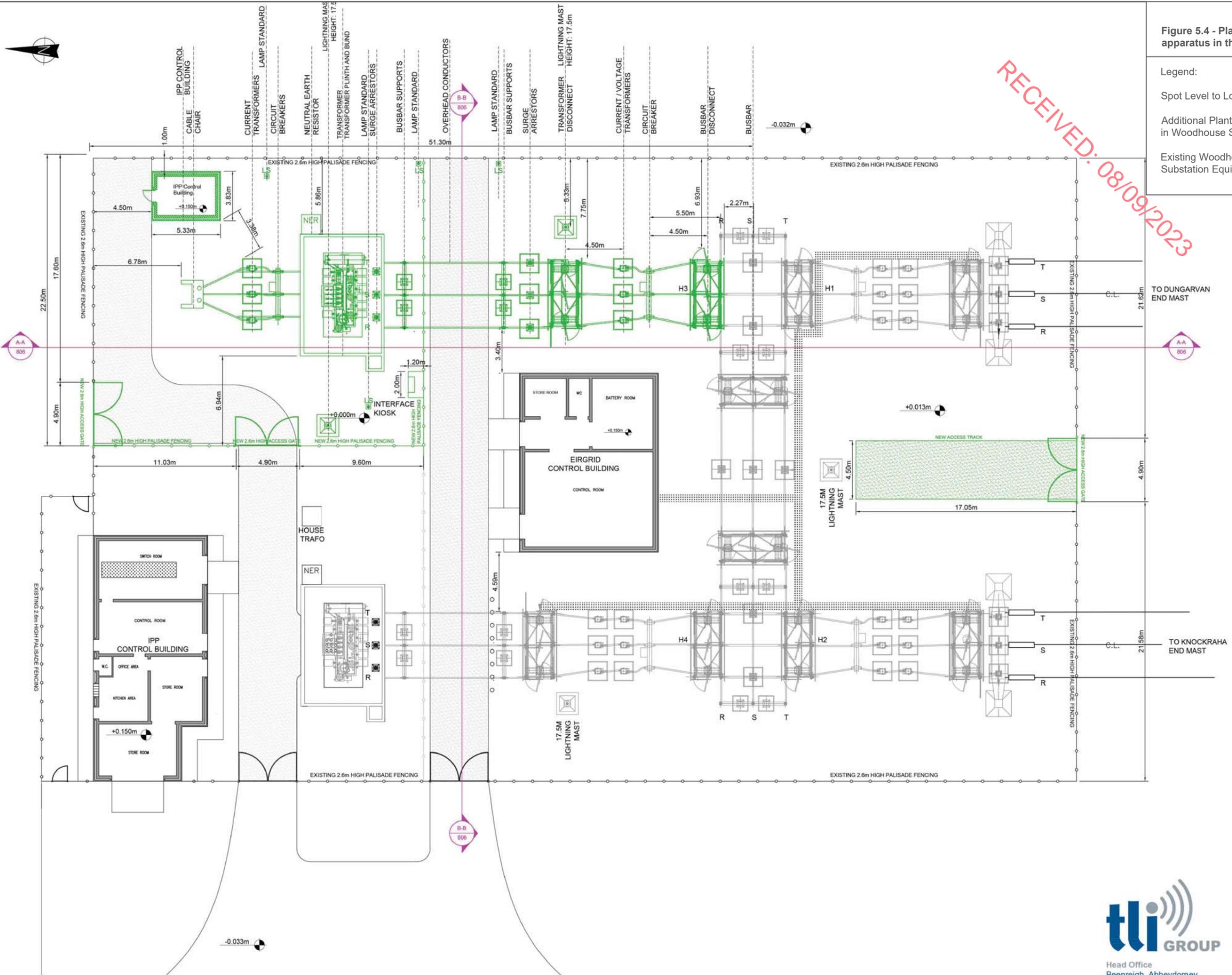


Figure 5.4 - Plan of the additional plant and apparatus in the existing Woodhouse Substation

Legend:

- Spot Level to Local Datum
- Additional Plant to be Installed in Woodhouse Substation
- Existing Woodhouse Substation Equipment

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Substation Layout Plan

Figure 5.5 - Elevation of the additional plant and apparatus in the existing Woodhouse Substation



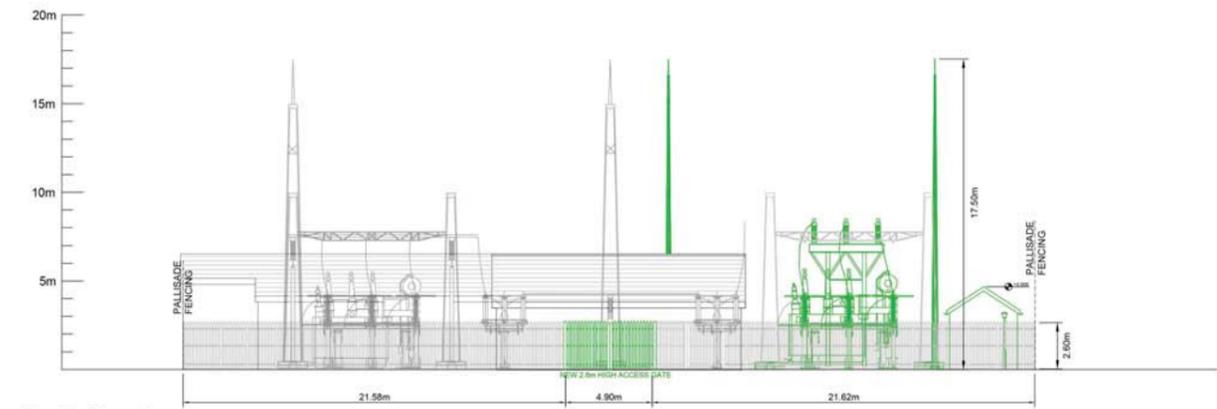
Head Office
 Beenreigh,
 Abbeydorney,
 Tralee, Co. Kerry
 Ireland
 Tel: 00353 66 7135710

Regional Office
 Basepoint Business Centre
 Stroudway Road, Basingstoke,
 Hampshire
 RG24 8UP, UK
 Tel: 00 44 1256 400964

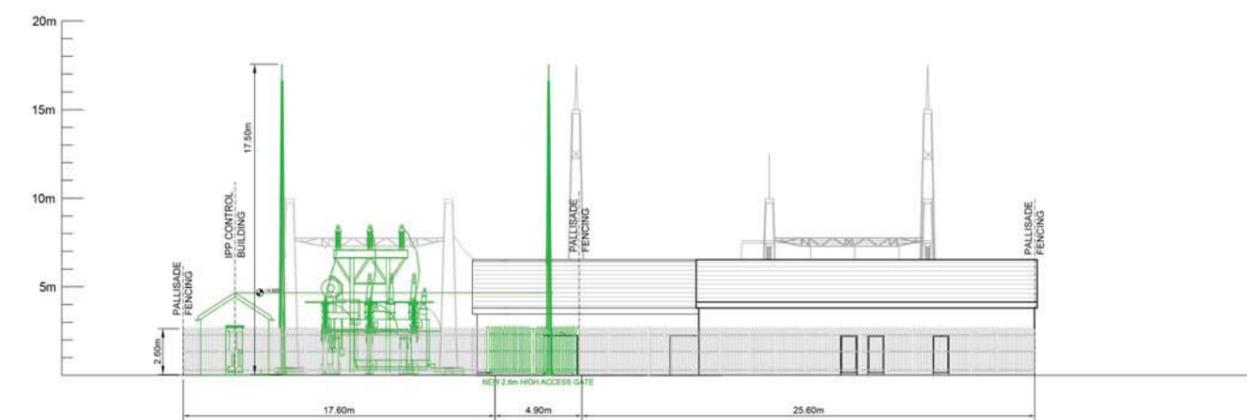
Legend:

Additional Plant to be Installed in Woodhouse Substation	
Existing Woodhouse Substation Equipment	

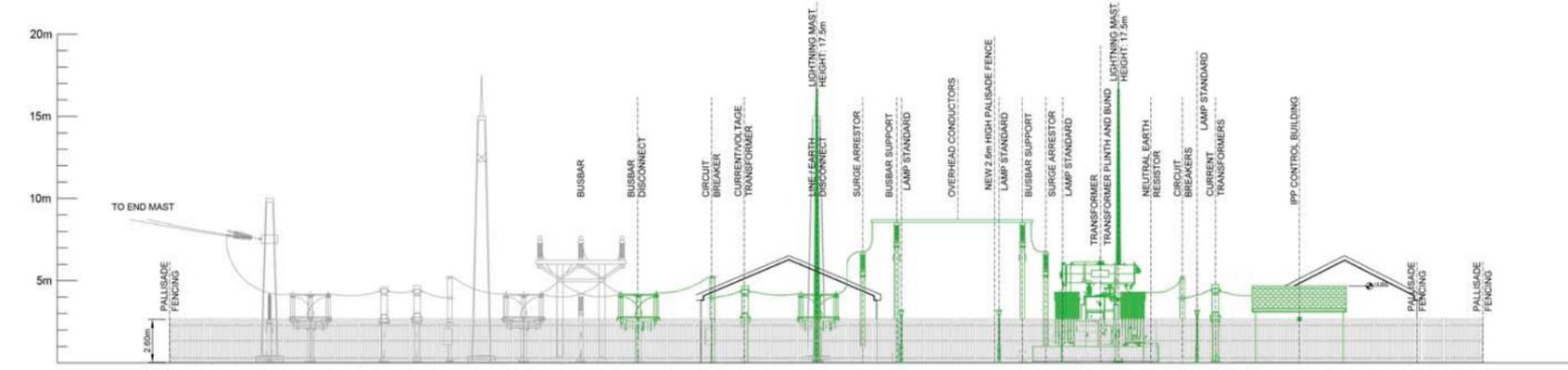
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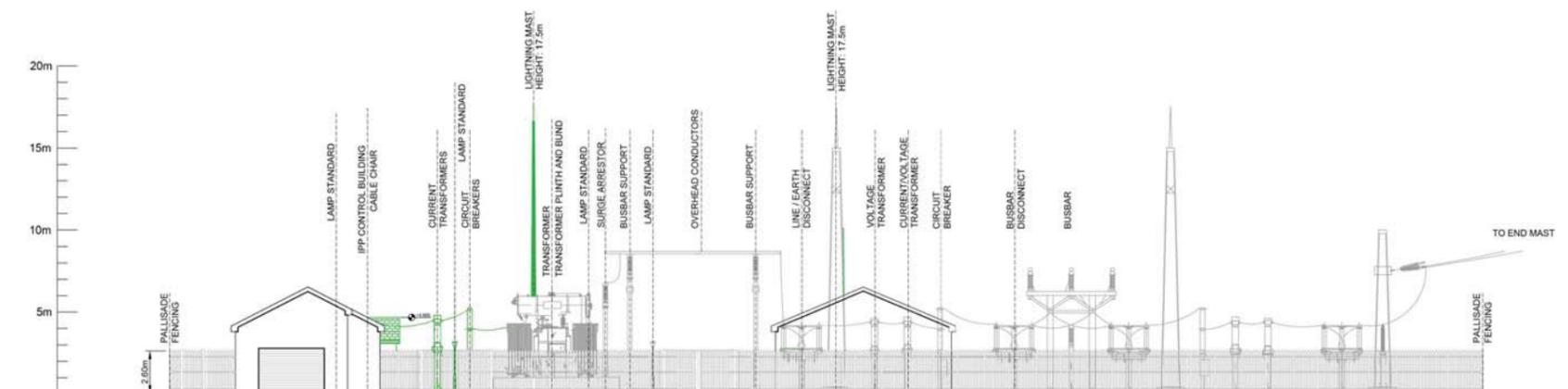
South Elevation



North Elevation



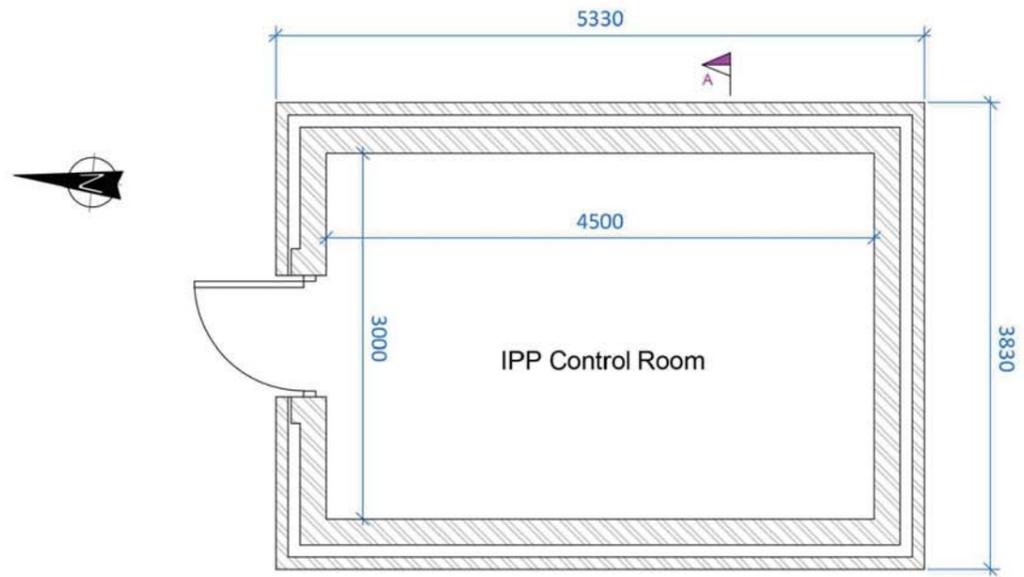
East Elevation



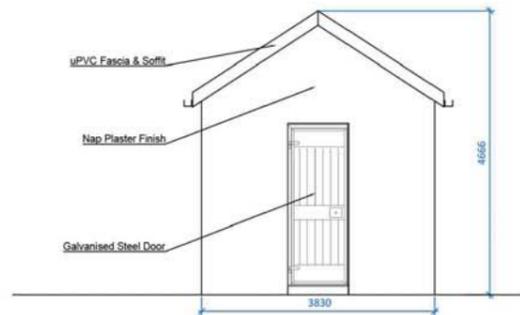
West Elevation

Figure 5.6 - Plans and Elevations of the proposed Control Building in the existing Woodhouse Substation

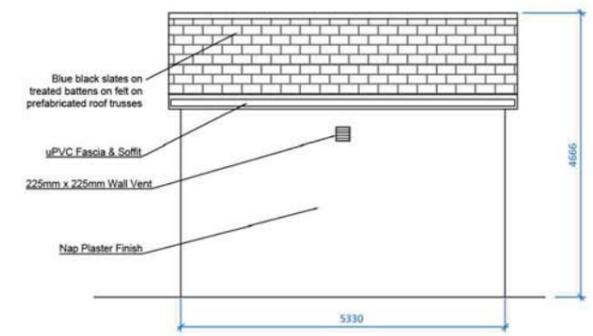
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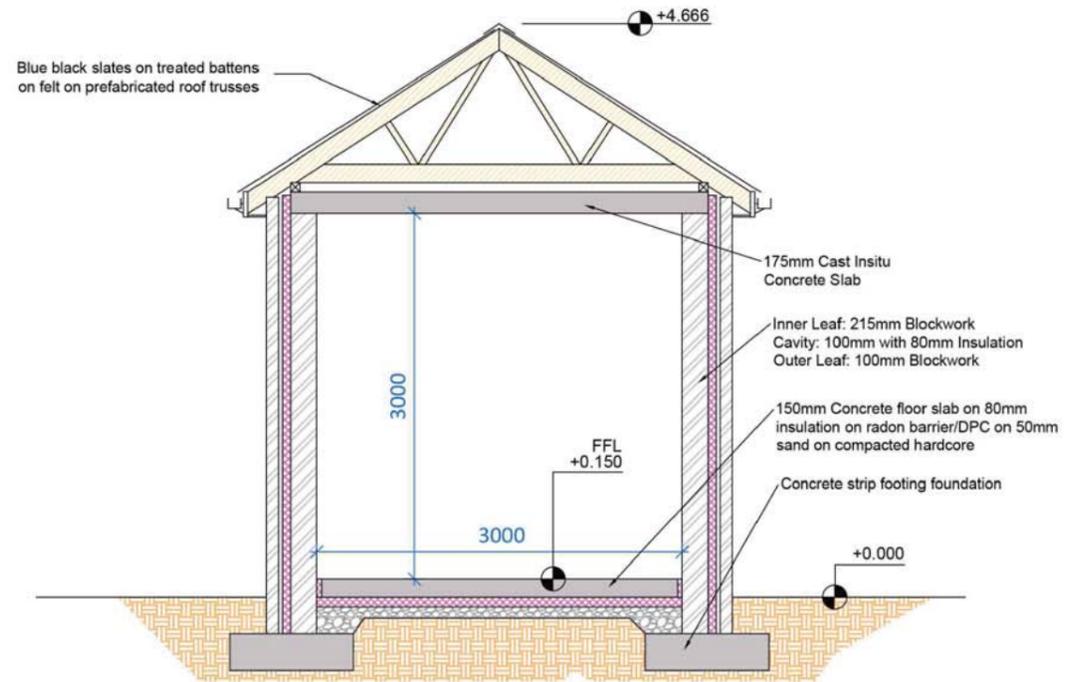
Building Plan



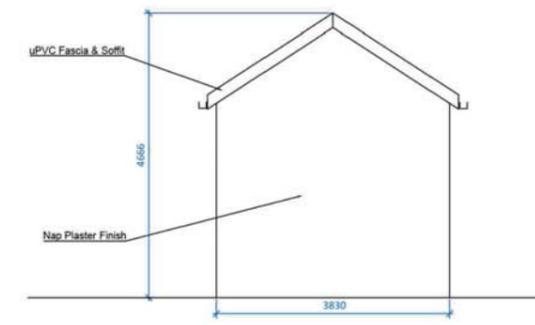
Front Elevation (Western)



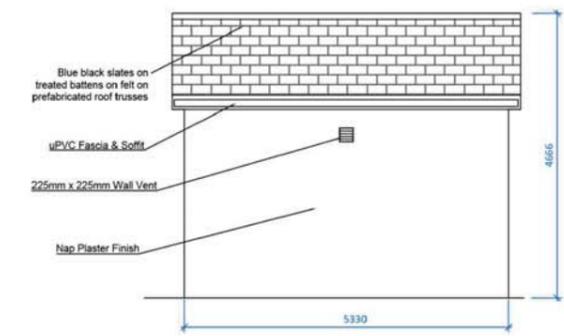
Side Elevation (Northern)



Section A-A



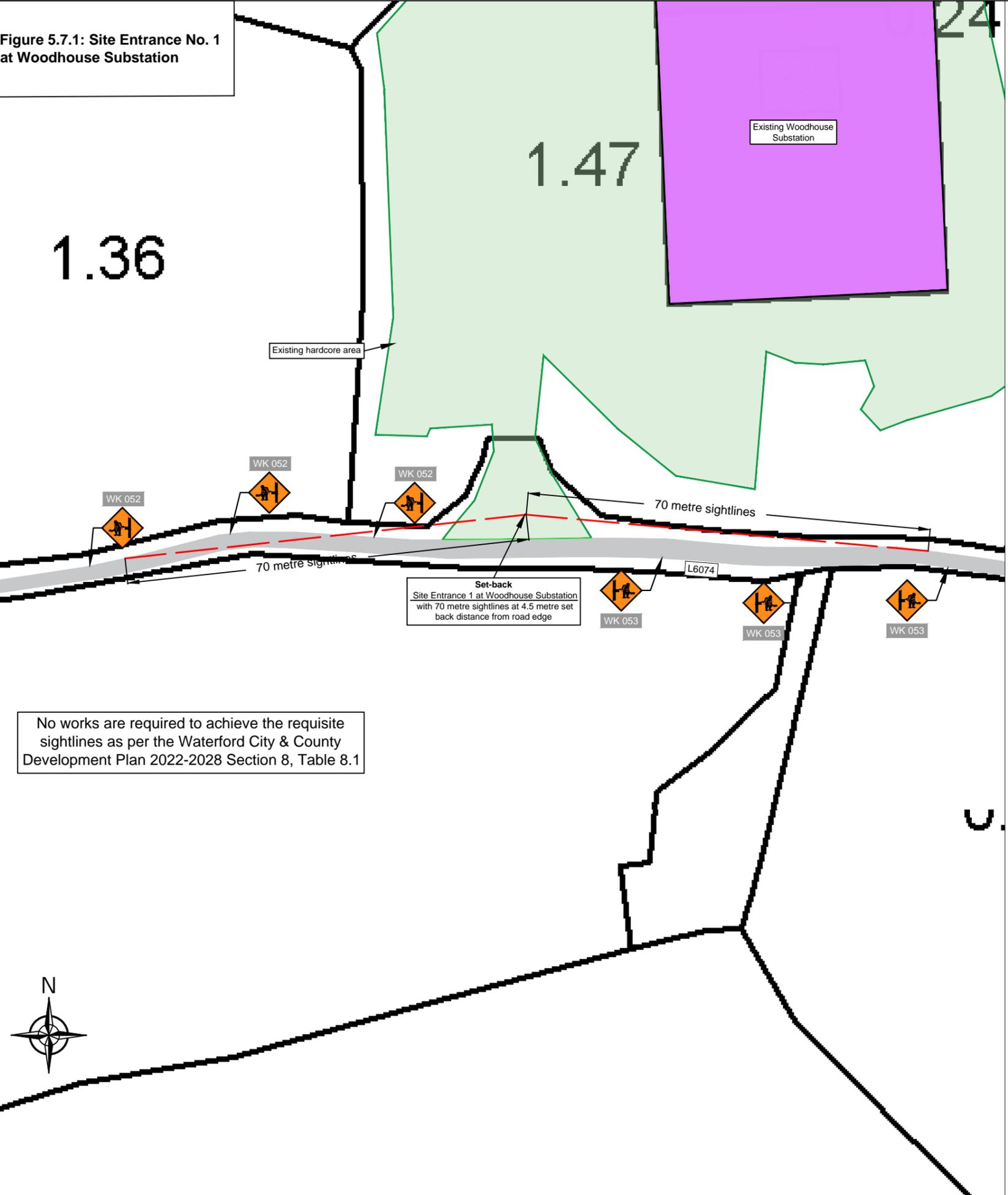
Rear Elevation (Eastern)



Side Elevation (Southern)



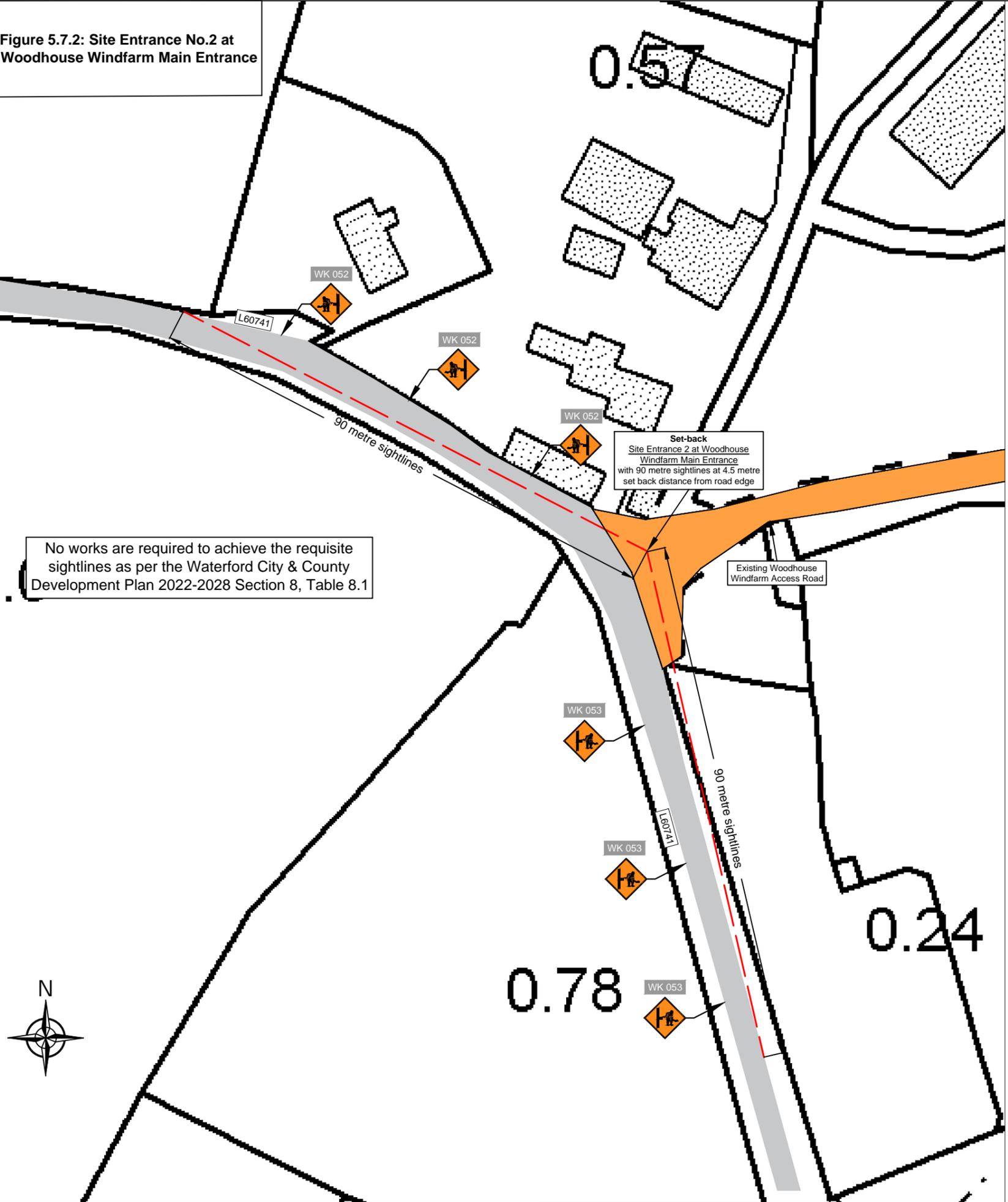
Figure 5.7.1: Site Entrance No. 1 at Woodhouse Substation



No works are required to achieve the requisite sightlines as per the Waterford City & County Development Plan 2022-2028 Section 8, Table 8.1



Figure 5.7.2: Site Entrance No.2 at Woodhouse Windfarm Main Entrance



No works are required to achieve the requisite sightlines as per the Waterford City & County Development Plan 2022-2028 Section 8, Table 8.1

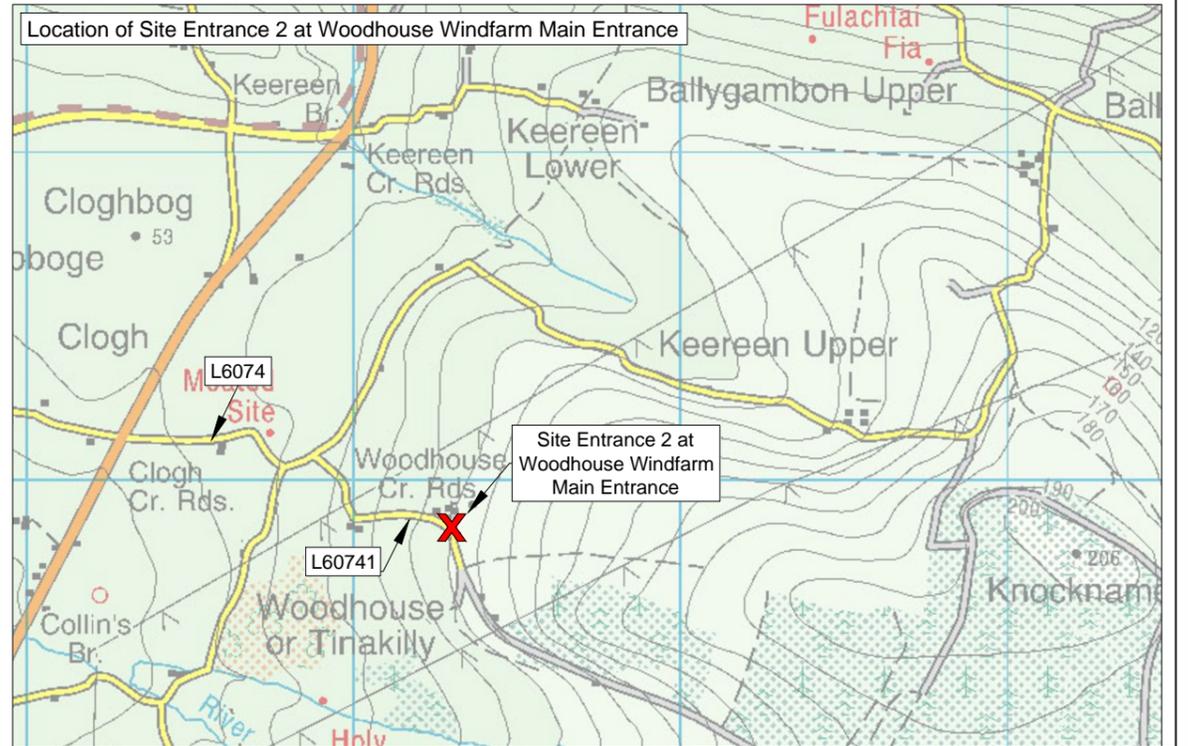
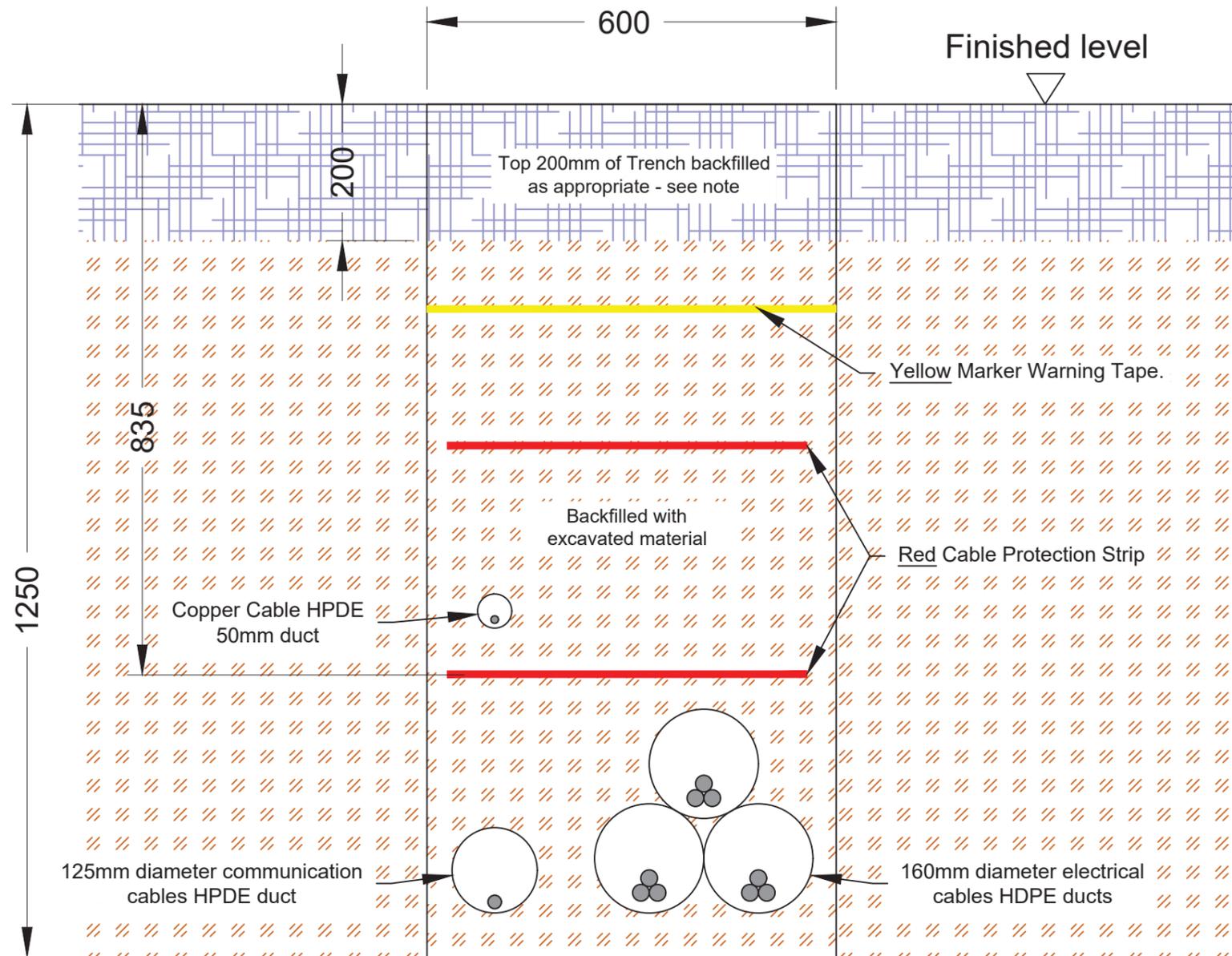


Figure 5.8 - Cross Section of Typical Cable Trench

Note on top of trench backfill:

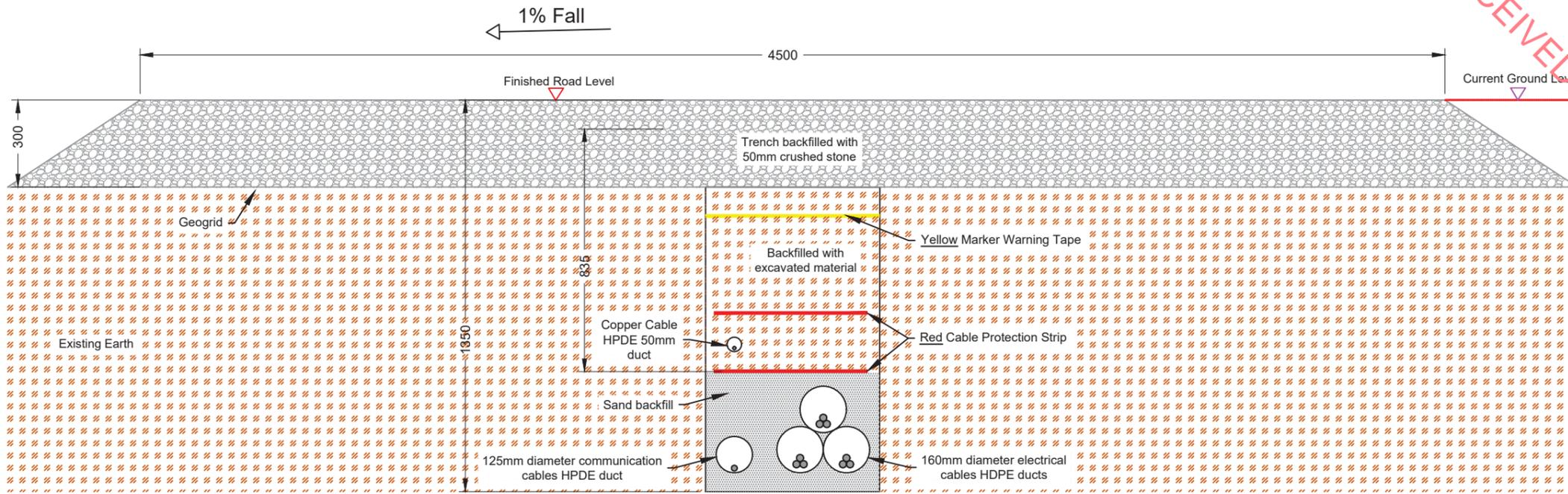
1. Cables trench in forestry lands, forestry roads and farm roads backfilled with granular fill.
2. Cables trench in grassland backfilled with topsoil layer.

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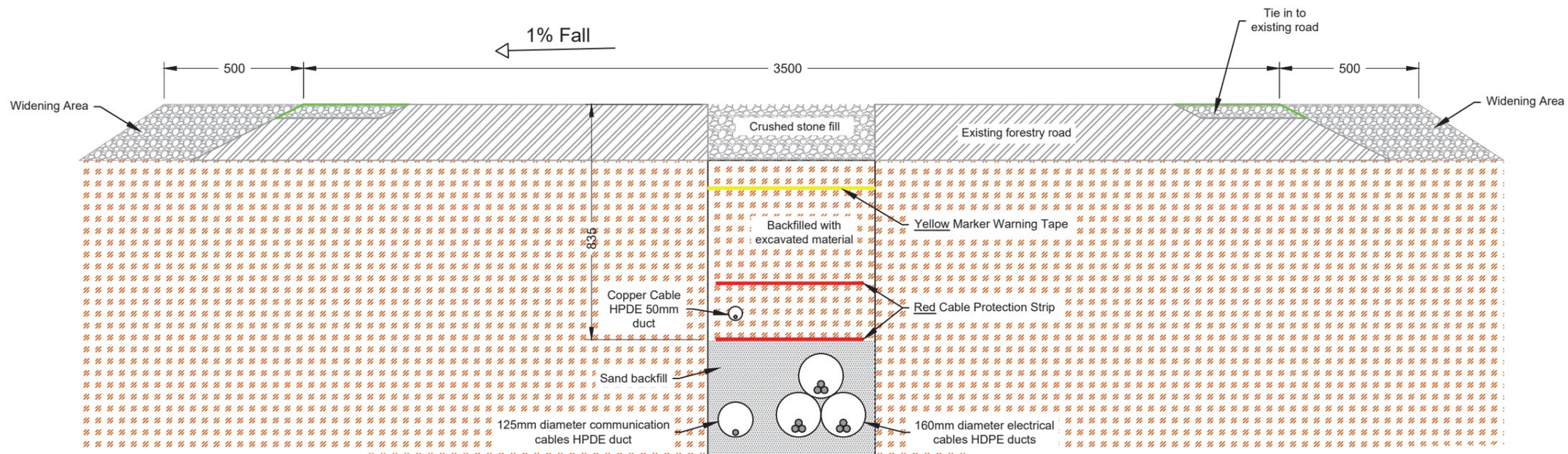


TYPICAL CABLE TRENCH

Figure 5.9 - Cross Section of New Link Road & Widening of Existing Forestry Road



NEW LINK ROAD - SCA



WIDENING OF EXISTING FORESTRY ROAD - SCA

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