

# KWF Grid Connection EIA Report 2023

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## Volume C2: EIAR 2023 Main Report

### Chapter 8: Land & Soils



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Figures and mapping referenced in this topic chapter can be found at the end of the chapter.

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

## Glossary of Terms

<u>Term</u>	<u>Definition</u>
<b>Glacial Till</b>	Glacial sediment that is deposited directly from glacial ice and therefore not sorted. Also can be called overburden or boulder clay.
<b>Mineral Subsoil</b>	Subsoil derived from parent bedrock material such as sandstone and limestone
<b>Mudstone</b>	Argillaceous or clay-bearing sedimentary rock which is non-plastic and has a massive non-foliated appearance.
<b>Sandstone</b>	A clastic rock composed of particles that range in diameter from 1/16 millimetre to 2 millimetres in diameter. Sandstones make up about 25% of all sedimentary rocks.
<b>Siltstone</b>	A typically layered and flaggy rock composed of two thirds silt-sized particles
<b>Topsoil</b>	The uppermost mineral or organic layer

## Glossary of General Terms

<u>Term</u>	<u>Definition</u>
<b>KWF Grid Connection (the subject development)</b>	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.
<b>Authorised Knocknamona Windfarm</b>	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)
<b>Whole Project</b>	KWF Grid Connection with Authorised Knocknamona Windfarm
<b>Sensitive Aspect</b>	Any sensitive receptor in the local environment which could be impacted by the project.



## 8 Environmental Factor: Land & Soils

### 8.1 Introduction to the Land & Soils Chapter

#### 8.1.1 What is Land & Soils?

Land is the portion of the earth's surface not covered by water. In this chapter land and land use is addressed. Land use relates to the various ways in which society uses land. Land take is the removal of productive land from agricultural or other beneficial uses. In the Irish context, land is used for agriculture, forestry, extractive uses, urbanisation, recreation, and infrastructure provision. Certain development undertakings can change current land use to other land use types.

Soil is a biologically active, complex mixture of weathered minerals, organic matter, organisms, air and water. This mixture supports a range of critical functions such as supporting terrestrial ecosystems and biological diversity, agricultural food production, flood alleviation, water filtration and storage, and carbon capture. In this topic chapter, Soil relates to the topsoil and mineral subsoil (collectively referred to as overburden) along with the underlying parent material bedrock.

#### 8.1.2 Overview of Land & Soils in the Local Environment

From a land and land use perspective the existing environment is rural countryside. The dominant usage in the development site is commercial forestry plantation. The plantation is well established and is of mixed age classes. Improved and productive agricultural grassland, mostly supporting dairy farming, is also prominent locally. Single carriageway public roads and private unsurfaced access roads serving domestic houses, farms and forests also feature in the existing land use pattern. The constructed and operational 8 No. turbine Woodhouse Windfarm and Woodhouse Substation overlaps and adjoins the development site to the northwest.

The KWF Grid Connection will be located mainly along forestry roads, the existing Woodhouse Windfarm access roads, one directional drilling crossing of a public road, and two short sections of off-road comprising grassland and scrub. The great majority of the development work is located along forestry roads.

There is an obligation on the state under the LULUCF Regulation (EU 841/2018) to evaluate and monitor CH<sub>4</sub> and N<sub>2</sub>O emissions and removals arising from changes in land use.

Soils (i.e. superficial geology including subsoils) in the study area comprise mainly mineral or organic topsoil over shallow glacial tills. The underlying bedrock in the study area comprises a mixture of sandstone and mudstone.

The soils along the KWF Grid Connection are not sited in designated areas (i.e. NHA, SAC etc), nor are there any County Geological Heritage Sites along the proposed route. Overall, the soil, subsoil and bedrock at the study area can be considered to have a low to medium geological importance.

The location of the KWF Grid Connection and Land Use is illustrated on OSI Mapping in Figure 8.1 and 8.1.1.

#### **Relevant Figure (at the end of this chapter)**

**Figure 8.1: Location of KWF Grid Connection in relation to Land & Soil**

**Figure 8.1.1 Land Use in the KWF Grid Connection Area**

**8.1.3 SENSITIVE ASPECTS of Land & Soils**

Any receptor in the local environment which could be affected by a development is a Sensitive Aspect.

**8.1.3.1 Sensitive Aspects included for detailed evaluation in this Topic Chapter**

The following Sensitive Aspects are **included for detailed evaluation in this topic chapter** as it is likely or there is potential, for these Sensitive Aspects to be affected by the KWF Grid Connection:

Sensitive Aspect No. 1	Soil & Bedrock	Section 8.2
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**The above listed Sensitive Aspect is evaluated in Section 8.2 of this Chapter.**

**8.1.3.2 Sensitive Aspects excluded from further evaluation**

The following Sensitive Aspects are **excluded from further evaluation in this topic chapter** because either there is no likely effects, or any effects caused by the KWF Grid Connection will be Neutral. A Sensitive Aspect may also be excluded from a topic chapter where effects to the Sensitive Aspect are evaluated in one of the other topic chapters within the EIA.

The following Sensitive Aspects **are excluded from this topic chapter:**

<b>Agricultural Landuse</b>	<p>Rationale for excluding this Sensitive Aspect: <b>Neutral Impact</b> because -</p> <p>KWF Grid Connection works in agricultural lands are limited to a 60m length of underground cabling across grassland with an additional 30m (of the 190m new link road total length) across a scrubby agricultural area, with the works restricted to 4 No. landholdings. Using the IMPERIA method (described in Chapter 2: EIA Report Process including Scoping), the sensitivity of agricultural land is considered low due to the very small number of landholdings involved (4), the minimal area of land involved and the prevalence of agricultural land in the surrounding area. The magnitude of impacts is considered to be 'no impact' as no change will be noticeable in practice with any negative effects being negligible. Therefore, it is considered that there will be no impact on Landuse as a result of KWF Grid Connection on its own and there will be a negligible LULUCF impact.</p> <p>In relation to cumulative effects, Knocknamona Windfarm works on agricultural lands are limited to a small extent of works on a separate landholding, thus no cumulative impacts are likely to occur. In relation to Woodhouse Windfarm and Woodhouse Substation, while both of these projects are entirely located on agricultural lands, they are both operational and considered part of the baseline landuse along with the agricultural use. Hence it is considered that there will be no cumulative impacts with these operational projects.</p> <p><b>Figure 8.1.1 Land Use in the KWF Grid Connection Area</b></p>
<b>Forestry Landuse</b>	<p>Rationale for excluding this Sensitive Aspect: <b>Neutral Impact</b> because –</p> <p>KWF Grid Connection works in forestry lands are limited to 30m of trenching in felled forestry (within the footprint of the consented Knocknamona Windfarm substation), 1980m of trenching in an existing forest road. Approximately 960m of this existing forest road will be increased in width by 1m to accommodate the transport of turbine components for the consented Knocknamona Windfarm. The area in</p>

	<p>question is road margin and is not planted with forestry. Another section of forestry lands is along the new link road, which connects the Knocknamona Windfarm to the Woodhouse Windfarm. 160m (of the 190m total length) of the new link road is in a marginal forestry area which in part has naturally progressed to light scrub of no commercial value, this area also includes a farm track. The underground cabling will be placed under the new link road at this location. The new Link Road will be permanent and will remove about 0.1 ha of forestry land (no tree felling) in this marginal forestry scrub area. Using the IMPERIA method, the sensitivity of forestry land is considered low due to the very small-scale work in the forest and the prevalence of forestry land in the surrounding area. The magnitude of impacts is considered to be 'low' to 'no impact' with no noticeable changes in practice with any negative effects being negligible. Therefore, it is considered that there will be no impact on forestry land use as a result of KWF Grid Connection on its own and <b>there will be a negligible LULUCF impact.</b></p> <p>In relation to cumulative effects, the Knocknamona Windfarm is predominately located on forestry lands. However, by co-ordination with the forest manager, the use of the forest for forest management activities during construction works on the windfarm will not be materially affected. The extensive network of existing roads in the forest will ensure access to forest parcels is maintained. Cumulative impacts are considered to be imperceptible due to the slight overlap of the KWF Grid Connection with the Knocknamona Windfarm (280m) and the small change on land use and connectivity within the Knocknamona forest. There is no potential for cumulative impacts with Woodhouse Windfarm or Woodhouse Substation as neither of these projects are located on forestry lands.</p> <p><b>Figure 8.1.1 Land Use in the KWF Grid Connection Area</b></p>
<p><b>River Blackwater River SAC</b></p>	<p>Rationale for excluding this Sensitive Aspect: <b>No likely effects.</b></p> <p>The River Blackwater SAC is located ~3km to the northwest of the KWF Grid Connection at its closest point (the Finisk River which flows to the northwest of the proposed route, forms part of the River Blackwater SAC). No element of the KWF Grid Connection interacts directly with the River Blackwater or the Finisk River as there are no works located within the SAC boundary and therefore no direct impacts on soil and geology within the SAC will take place. <i>Potential Indirect impacts from water quality effects are assessed in the Water Chapter.</i></p>
<p><b>Dungarvan Harbour SPA/pNHA</b></p>	<p>Rationale for excluding this Sensitive Aspect: <b>No likely effects.</b></p> <p>Dungarvan Harbour SPA/pNHA is a coastal habitat which is located ~8.7km to the east of the KWF Grid Connection. No element of the KWF Grid Connection interacts directly with Dungarvan Harbour SPA/pNHA as there are no works located within the SPA/pNHA boundary and therefore no direct impacts on soil and geology within the SPA/ pNHA will take place. <i>Potential Indirect impacts from water quality effects are assessed in the Water Chapter.</i></p>
<p><b>Dungarvan Harbour Irish Geological Heritage Site (WD037)</b></p>	<p>Rationale for excluding this Sensitive Aspect: <b>No likely effects.</b></p> <p>Dungarvan Harbour Irish Geological Heritage Site (IGH) site is a wide coastal embayment, incorporating coastal flats and the Cunnigar spit. No element of the KWF Grid Connection interacts directly with Dungarvan Harbour IGH as there are no works located within the IGH boundary and therefore no direct impacts on soil and geology within the IGH will take place.</p> <p><b>Figure 8.2.2: Study Area for Bedrock</b></p>

<p><b>Cappagh Quarry Irish Geological Heritage Site (WD013)</b></p>	<p>Rationale for excluding this Sensitive Aspect: <b>Neutral effects.</b></p> <p>Cappagh Quarry IGH site is a set in a large working quarry which extracts limestone for aggregate and making concrete, this quarry has good exposures of Waulsortain limestone. It is located ~3km north of the proposed grid connection route. While KWF Grid Connection will source concrete from this quarry, the amounts will be very low (c.4 loads) and in the context of the supply of concrete being part of the daily use of the quarry. Impacts to Cappagh Quarry Irish Geological Heritage Site (IGH) as a result of this supply of concrete will not cause any noticeable effects to the IGH site.</p>
<p><b>Ballynameelagh Caves Irish Geological Heritage Site (WD006)</b></p>	<p>Rationale for excluding this Sensitive Aspect: <b>No likely effects.</b></p> <p>Ballynameelagh Caves IGH site are 4 no. caves from the Holocene period which are located ~2.4km to the north of the proposed KWF Grid Connection. No element of the KWF Grid Connection interacts directly with Ballynameelagh Caves as there are no works located within the IGH boundary and therefore no direct impacts on soil/geology within the IGH will take place.</p>
<p><b>Kilgreany Cave Irish Geological Heritage Site (WD040)</b></p>	<p>Rationale for excluding this Sensitive Aspect: <b>No likely effects.</b></p> <p>Kilgreany Cave IGH site is a cave situated in a disused quarry which is located ~2.8km to the north of the proposed KWF Grid Connection. No element of the KWF Grid Connection interacts directly with Kilgreany Cave as there are no works located within the IGH boundary and therefore no direct impacts on soil and geology within the IGH will take place.</p>
<p><b>Wetlands of Biodiversity Importance</b></p>	<p>Rationale for excluding this Sensitive Aspect: <b>No likely effects.</b></p> <p>An area in Woodhouse townland 2km to the southwest of KWF Grid Connection construction works area is designated locally as a wetland of biodiversity importance WD284 in the Waterford County Development Plan 2022-2028 Appendix 11: Natural heritage Assets. No element of the KWF Grid Connection interacts directly with this area and there can be no direct impacts due to the location of this area in forestry 2km distant.</p>

#### 8.1.4 The Authors of this Land & Soils Chapter

The sections of this report which relate to Land, have been written by Andy Dunne (B.Agr.Sc., M.Sc.(Agr.) PhD) director of Environmental Agricultural Engineering Consultancy (EAEC), a firm of agricultural and engineering consultants. Andy has been involved in a great variety of land use and agricultural development activity for more than 20 years and he is familiar with national and EU regulation and policy in the area.

The sections of this report which relate to Soils have been written by David Broderick (BSc, H. Dip Env Eng, MSc): Hydrogeologist; and Michael Gill (P. Geo., B.A., B.A.I., M.Sc., Dip. Geol, MIEI): Environmental Engineer and Hydrogeologist of Hydro-Environmental Services (HES). HES was established in 2005 as a hydrological, hydrogeological and environmental practice, specialising in soils and geology, and peatland and upland hydrology.

#### 8.1.5 Sources of EIA Information

The following sources of information were used to gather information on the baseline environment and

evaluate impacts, including cumulative impacts.

**Table 8-1: Sources of EIA Information**

Type	Information Source
Consultation	Feedback received from Geological Survey of Ireland was general in nature. No feedback was received from the Department of Agriculture, Food and the Marine. See Chapter 3: The Scoping Consultations, and Appendices for further details.
Guidelines	<ul style="list-style-type: none"> <li>National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes; and,</li> <li>Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology &amp; Hydrogeology Chapters in Environmental Impact Statements</li> </ul>
Desktop	<ul style="list-style-type: none"> <li>Environmental Protection Agency database (<a href="http://www.epa.ie">www.epa.ie</a>);</li> <li>Environmental Protection Agency Corine Landcover database (<a href="https://gis.epa.ie/EPAMaps/">https://gis.epa.ie/EPAMaps/</a>)</li> <li>Environmental protection Agency LULUCF <a href="https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/LULUCF-July-2020.pdf">https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/LULUCF-July-2020.pdf</a></li> <li>Geological Survey of Ireland Database (<a href="http://www.gsi.ie">www.gsi.ie</a>);</li> <li>National Parks &amp; Wildlife Services Public Map Viewer (<a href="http://www.npws.ie">www.npws.ie</a>);</li> <li>Department of Agriculture, Food and Forestry's Rural Development Programme 2014-2020</li> <li>Available online aerial imagery from National Parks and Wildlife Service, Bing and Google</li> <li>Waterford City and County Council. Waterford County Development Plan 2022-2028. Appendix 11 Natural Heritage Assets.</li> <li>In co-ordination with and by review of Chapter 5: Description of Development and Chapter 9: Water</li> </ul> <p><u>Review of Authorised Knocknamona Windfarm Planning Docs</u></p> <ul style="list-style-type: none"> <li>Knocknamona Windfarm Revised EIS 2015</li> <li>Amendment to Knocknamona Windfarm – Larger Turbines Revised EIA 2021</li> <li>Junction &amp; Bend Widening Works Screening for EIA 2022</li> </ul> <p>Available in EIA 2023 Volume F: Reference Documents</p>
Fieldwork	<ul style="list-style-type: none"> <li>Site Visit, field walking, ground surveys and trial pits.</li> <li>Walkover surveys carried out on February 2019, August 2019 &amp; March 2023</li> </ul>

## 8.1.6 Methodology used to Describe the Baseline Environment and to Evaluate Impacts

### 8.1.6.1 NRA Soil Evaluation Criteria

The criteria used for soils appraisals are derived from the above listed NRA Guidelines. Whilst this is tailored to the soil appraisal, the significance judgements correspond very closely with the EPA significance criteria which ranges from “Imperceptible to Profound”. The criteria and approach for evaluation of soil are set out below.

Using the National Roads Authority (2008) guidance, an estimation of the importance of the soil and geological environment within the study area is quantified, using the criteria set out in Table 8-2 below. An estimation of the magnitude of the impact is assessed using criteria in Table 8-3 (NRA, 2008) and the rating of environmental impacts is then assessed using criteria in Table 8-4 (NRA, 2008).

**Table 8-2: NRA Criteria for Determining the Importance of Soil and Geology**

Importance	Criteria <sup>1</sup>	Typical Example
<b>Very High</b>	<ul style="list-style-type: none"> <li>Attribute has a high quality, significance or value on a regional or national scale.</li> <li>Degree or extent of soil contamination is significant on a national or regional scale.</li> <li>Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.</li> </ul>	<ul style="list-style-type: none"> <li>Geological feature rare on a regional or national scale (NHA/SAC).</li> <li>Large existing quarry or pit.</li> <li>Proven economically extractable mineral resource.</li> </ul>
<b>High</b>	<ul style="list-style-type: none"> <li>Attribute has a high quality, significance or value on a local scale.</li> <li>Degree or extent of soil contamination is significant on a local scale.</li> <li>Volume of peat and/or soft organic soil underlying site is significant on a local scale.</li> </ul>	<ul style="list-style-type: none"> <li>Contaminated soil on site with previous heavy industrial usage.</li> <li>Large recent landfill site for mixed wastes.</li> <li>Geological feature of high value on a local scale (County Geological Site).</li> <li>Well drained and/or high fertility soils.</li> <li>Moderately sized existing quarry or pit.</li> <li>Marginally economic extractable mineral resource.</li> </ul>
<b>Medium</b>	<ul style="list-style-type: none"> <li>Attribute has a medium quality, significance or value on a local scale.</li> <li>Degree or extent of soil contamination is moderate on a local scale.</li> <li>Volume of peat and/or soft organic soil underlying site is moderate on a local scale.</li> </ul>	<ul style="list-style-type: none"> <li>Contaminated soil on site with previous light industrial usage.</li> <li>Small recent landfill site for mixed Wastes.</li> <li>Moderately drained and/or moderate fertility soils.</li> <li>Small existing quarry or pit.</li> <li>Sub-economic extractable mineral resource.</li> </ul>
<b>Low</b>	<ul style="list-style-type: none"> <li>Attribute has a low quality, significance or value on a local scale.</li> <li>Degree or extent of soil contamination is minor on a local scale.</li> <li>Volume of peat and/or soft organic soil underlying site is small on a local scale.</li> </ul>	<ul style="list-style-type: none"> <li>Large historical and/or recent site for construction and demolition wastes.</li> <li>Small historical and/or recent landfill site for construction and demolition wastes.</li> <li>Poorly drained and/or low fertility soils.</li> <li>Uneconomically extractable mineral resource.</li> </ul>

High quality and a high degree of site contamination are put side by side in this table, because either could be a potentially constraining factor when developing a site. High quality will likely be more relevant to a Greenfield site, while the extent of contamination will likely be more relevant to a Brownfield site. The higher the quality or contamination means the higher the potential for constraints (i.e. the higher the importance).

**Table 8-3: NRA Estimation of Magnitude of Impact (NRA, 2008)**



<b>Magnitude of Impact</b>	<b>Criteria</b>	<b>Typical Examples</b>
<b>Large Adverse</b>	Results in loss of attribute	<ul style="list-style-type: none"> <li>Loss of high proportion of future quarry or pit reserves</li> <li>Irreversible loss of high proportion of local high fertility soils</li> <li>Removal of entirety of geological heritage feature</li> <li>Requirement to excavate / remediate entire waste site</li> <li>Requirement to excavate and replace high proportion of peat,</li> </ul>
<b>Moderate Adverse</b>	Results in impact on integrity of attribute or loss of part of attribute	<ul style="list-style-type: none"> <li>Loss of moderate proportion of future quarry or pit reserves</li> <li>Removal of part of geological heritage feature</li> <li>Irreversible loss of moderate proportion of local high fertility soils</li> <li>Requirement to excavate / remediate significant proportion of waste site</li> <li>Requirement to excavate and replace moderate proportion of peat,</li> <li>organic soils and/or soft mineral soils beneath alignment</li> </ul>
<b>Small Adverse</b>	Results in minor impact on integrity of attribute or loss of small part of attribute	<ul style="list-style-type: none"> <li>Loss of small proportion of future quarry or pit reserves</li> <li>Removal of small part of geological heritage feature</li> <li>Irreversible loss of small proportion of local high fertility soils and/or</li> <li>High proportion of local low fertility soils</li> <li>Requirement to excavate / remediate small proportion of waste site</li> <li>Requirement to excavate and replace small proportion of peat.</li> </ul>
<b>Negligible</b>	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	<ul style="list-style-type: none"> <li>No measurable changes in attributes</li> </ul>

**Table 8-4: NRA Rating of Environmental Impacts at EIA Stage (NRA, 2008)**

<b>Importance of Tribute</b>	<b>Magnitude of Impact</b>			
	<b>Negligible</b>	<b>Small Adverse</b>	<b>Moderate Adverse</b>	<b>Large Adverse</b>
<b>Extremely High</b>	Imperceptible	Significant	Profound	Profound
<b>Very High</b>	Imperceptible	Significant/Moderate	Profound/Significant	Profound
<b>High</b>	Imperceptible	Moderate/Slight	Significant/Moderate	Profound/Significant
<b>Medium</b>	Imperceptible	Slight	Moderate	Significant
<b>Low</b>	Imperceptible	Imperceptible	Slight	Slight/Moderate

### 8.1.7 Certainty and Sufficiency of the Evaluation/Information

The criteria used for soils appraisals are derived from the National Roads Authority (2008) guidance document. A clear documentary trail is provided throughout this chapter and chapter appendices to the

competency of data and methods used and the rationale for selection of same. The information used to compile this chapter is collated from site specific investigations, data and documents generated by public bodies and statutory agencies. The online baseline data was verified in the field.

Impacts on soils and geology are generally quantifiable to a high degree of certainty as impacts are typically direct and measurable (i.e. excavation volumes, storage volumes and working area footprints susceptible to compaction and erosion). All excavation volumes for the KWK Grid Connection have been clearly tabulated in this EIA.

In respect of soil no significant limitations or difficulties were encountered.

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## 8.2 Sensitive Aspect No.1: Soils & Bedrock

This Section 8.2 provides a description of the baseline environment and an evaluation of the likely impacts of KWF Grid Connection, both alone and cumulatively, on **Soils & Bedrock**.

### 8.2.1 Description of the BASELINE ENVIRONMENT for Soils & Bedrock

This Section 8.2.1 comprises the identification of the Study Area for direct or indirect effects and for cumulative effects, and a description of the context, character, importance and sensitivity of the Soils & Bedrock in the area. Trends or changes in the baseline environment and expected receiving environment are also identified.

#### 8.2.1.1 STUDY AREA for Soils & Bedrock

Study areas relate to areas which could be affected by impacts from KWF Grid Connection, whether direct impacts from the KWF Grid Connection on its own or cumulative impacts from KWF Grid Connection and other projects or activities.

The KWF Grid Connection study areas are described in the table below and relevant figures.

**Relevant Figure (at the end of this chapter)**

Figure 8.2.1: Study Area for Soils

Figure 8.2.2: Study Area for Bedrock

**Table 8-5: Study Area for Soils & Bedrock**

KWF Grid Connection Study Area (direct or indirect effects)	Cumulative Study Area
<p><u>Study Area Extent:</u> Within the KWF Grid Connection construction works area boundary and immediate adjacent lands that adjoin the works area boundary</p>	<p><u>Study Area Extent:</u> Within the KWF Grid Connection works boundary and immediate adjacent lands that adjoin the works area boundary.</p>
<p><u>Justification for Study Area Extent:</u> Only direct effects on soils and geology are anticipated.</p>	<p><u>Justification for Study Area Extent:</u> The same study area as direct impacts is used, because only direct effects on soils and geology are anticipated, therefore the potential for cumulative effects only relates to those soils affected by the KWF Grid Connection development.</p>
<p><u>Relevant development stage:</u> Construction Stage <u>Justification:</u> No effects are expected during the operational stage or any decommissioning of the cabling as no groundworks are anticipated during the operation or decommissioning of KWF Grid Connection.</p>	<p><u>Relevant development stage</u> Construction Stage <u>Justification:</u> The construction works area for KWF Grid Connection overlaps a small part of the construction works area for the consented Knocknamona Windfarm, which could be constructed at the same time as KWF Grid Connection and therefore any cumulative effects within the identified area of impact will be evaluated.  No effects are expected during the operational stage or any decommissioning of the cabling as no groundworks are anticipated during operation or decommissioning.</p>

	No decommissioning impacts are anticipated because ducting outside of Woodhouse Substation will be left in-situ and the cables will be pulled through and out of the ducting should decommissioning be required. Installations inside of Woodhouse Substation will be permanent and operated as part of the National Grid by ESB Networks.
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### 8.2.1.2 Description of the BASELINE CONTEXT and CHARACTER of Soils & Bedrock

The baseline context includes a description of the KWF Grid Connection Study Area and also the wider area which includes the Cumulative Study Area; Knocknamona Windfarm project area; Woodhouse Substation and Woodhouse Windfarm project areas.

#### 8.2.1.2.1 Baseline for KWF Grid Connection Study Area (Soils & Bedrock)

The published soils map ([www.epa.ie](http://www.epa.ie)) for the area shows that thin peaty podzols (AminSRPT) are dominant along the proposed KWF Grid Connection route within the permitted Knocknamona Windfarm site while well-draining soil (AminDW and AminSW) become more dominant along the section within the Woodhouse Windfarm site.

The GSI subsoils map ([www.gsi.ie](http://www.gsi.ie)) shows that sandstone tills are present on the more low-lying sections of the route (Knocknamona Substation end and the Woodhouse Substation end) with bedrock being close or at the ground surface along the more elevated central section of the route within the Knocknamona Windfarm site.

8 no. trial pits were undertaken by HES to assess the depth to bedrock and subsoils conditions along the grid connection cable route. The trial pit logs are shown in Appendix 8.2: Trial Pit Investigations for KWF Grid Connection. The trial pits indicate a predominance of SILT/CLAY (with abundant angular rock clasts over weathered bedrock). No peat was encountered during the investigations. Bedrock was encountered in the trial pits at depths ranging from 1.3m (TH07 & TH08) to 1.6m (TH03). The composition of the soil and subsoil was such that the excavator was able to dig with a bucket without 'Refusal to Rock' to below the depth of the cable trench (1.25m). Therefore no rock breaker will be required for the excavations. The findings of the 8 No. Trial Pits also indicate that the subsoil of the composition found can be used as backfill in the cable trench.

The published bedrock geology map ([www.gsi.ie](http://www.gsi.ie)) for the area shows that the southern half of the proposed KWF Grid Connection is underlain by the Ballytrasna Formation which comprises purple mudstone and sandstone while the northern half is mapped to be underlain by the Ballyquin Member which comprises red sandstone and mudstone.

#### **Relevant Figure (at the end of this chapter)**

Figure 8.1: Location of KWF Grid Connection in relation to Land & Soil

Figure 8.2.1: Study Area for Soils

Figure 8.2.2: Study Area for Bedrock

#### **Relevant Appendix (at the end of this chapter)**

Appendix 8.2 Trial Pit Photos, Location and Trial Pit Logs

#### 8.2.1.2.2 Baseline for the Cumulative Study Area (Soils & Bedrock)

The KWF Grid Connection Cumulative Study Area has the same extent as the KWF Grid Connection Direct Impacts Study area, and therefore the description of the baseline character of Soils and Bedrock provided above is also relevant to the Cumulative Study Area.

The footprint of Authorised Knocknamona Windfarm will occur within the Cumulative Evaluation Study Area where the existing forestry road approaches the Knocknamona Windfarm substation location from the north, specifically along the existing forestry road between the Substation and the turnoff for the authorised meteorological measurement mast. In this area, soils are mapped as thin peaty podzols over sandstone till with bedrock being close to the surface. See also Figure 8.2.1 Study Area Soils. Trial Pit TH03 was undertaken along the forestry road in this location - the overlap of Knocknamona Windfarm construction works and KWF Grid Connection construction works. See Trial Pit Location Figure in Appendix 8.2. The soil in TH03 is described as gravelly SILT/CLAY under 200mm of TOPSOIL.

An overview of soils within the Knocknamona Windfarm site is also provided in order to facilitate the evaluation of the whole project effect. In the area of the Knocknamona Windfarm, EPA data shows thin peaty podzols and peaty gleys overlie sandstone till with bedrock being close or at ground surface. The underlying bedrock is mapped as grey and red sandstone/mudstone and purple mudstone/sandstone. The results of trial pit investigations (15 in total) undertaken in 2014 for the Knocknamona Windfarm, indicate a predominance of soft CLAY over bedrock. No peat was encountered during the investigations. Bedrock was encountered in all trial pits at depths ranging from 0.6 to 4.0m, but with most trial pits encountering bedrock (grey to white, fine-grained sandstone or hard siltstone) between 1.5 and 2.0m. These 2014 trial pit logs are also included in Appendix 8.2.

The Authorised Junction & Bend Widening Works involves widening of the junctions and bends at three locations. Soils at the works locations are mineral or organic topsoil over sandstone tills. These works are minimal in scale.

In the area of the Operational Woodhouse Substation, deep well-draining soil overlies sandstone till with the underlying bedrock mapped as grey and red sandstone/mudstone.

In the area of the Operational Woodhouse Windfarm, deep and shallow well-draining soil overlies sandstone till with the underlying bedrock mapped as grey and red sandstone/mudstone and purple mudstone/sandstone.

#### 8.2.1.2.3 Consideration of the Passage of Time

A description of the baseline environment at the Authorised Knocknamona Windfarm site along with descriptions of the construction material haulage routes and turbine component haul route, was contained in the Knocknamona Windfarm Revised EIS 2015. The 2015 baseline conditions were reviewed in the context of the current baseline conditions. The passage of time was considered during this review. There have been no material changes in the baseline Land or Soils environment since then, except for the authorisation of Knocknamona Windfarm. The EPA Corine Landcover data has been updated with the latest iteration being Corine Landcover 2018. The Corine Landcover 2012 data was compared to the latest 2018 data and no material changes were identified save for changes within the commercial forest area where felling has occurred. The overall forested area has not increased or decreased in the period between 2012 and 2018. Changes since 2018 are in line with normal commercial forest management.

### 8.2.1.3 IMPORTANCE of Soils & Bedrock

Soil, subsoil and bedrock in the KWF Grid Connection works area is not designated (i.e. NHA/SAC etc) nor of any geological heritage value. The soil and bedrock types are locally and regionally abundant and are not unique in any way. These soils are altered by the existing landuse such as forestry, agriculture and the existing Woodhouse Windfarm and Woodhouse Substation. Therefore, based on the criteria set out in Section 8.1.6 (methodology), the importance of the local soils is classed as having a **low to medium importance**.

### 8.2.1.4 SENSITIVITY of Soils & Bedrock

Soils and geology can be sensitive to processes such as erosion, compaction and drainage. The rate of these processes can be increased by certain landuse practices or landuse changes such as deforestation. Soil is also biologically active and it supports complex ecosystems which are sensitive to chemical and biological changes.

### 8.2.1.5 TRENDS for Soils & Bedrock in the Baseline Environment

The soils and subsoils in the study areas have all been altered to some extent by drainage or by other land improvement works related to the existing land use (i.e. forestry, agriculture) and by the development of the existing Woodhouse Windfarm and Woodhouse Substation. Landuse improvement practices are expected to continue, as agricultural land and forestry regularly needs continued ploughing, seeding, planting etc to improve soil and subsoil structure. This leaves land susceptible for periods to erosion and compaction. Forestry tracks and farm tracks are also regularly upgraded and forestry is felled and replanted in a growing and harvesting cycle. The other main, on-going, land use improvement practice that will directly affect soil and subsoil is drainage works. The soils and subsoils in the Knocknamona forestry will be subject to excavation and storage during the construction of the consented Knocknamona Windfarm.

### 8.2.1.6 The 'Do Nothing Scenario' (the Environment if the Development is not carried out)

If the KWF Grid Connection does not proceed, the effects on the environment will not occur, and the baseline environment will only change in line with the trends identified above.

### 8.2.1.7 Description of the RECEIVING ENVIRONMENT for Soils & Bedrock

The receiving environment is the likely state of the baseline environment at the time of construction/operation/decommissioning as relevant i.e. baseline + trends.

With the exception of the future construction of the consented Knocknamona Windfarm area, rates of natural processes (i.e. erosion and weathering) and changes made by landuse practices are typically relatively slow. Therefore, it is assumed in this report that the baseline environment for soils as identified above will be the receiving environment at the time of construction.

#### **Relevant Figures (at the end of this chapter)**

Figure 8.1: Location of KWF Grid Connection in relation to Land & Soil

Figure 8.1.1 Land Use in the KWF Grid Connection area

Figure 8.2.1: Study Area for Soils

Figure 8.2.2: Study Area for Bedrock

#### **Relevant Appendix (at the end of this chapter)**

Appendix 8.2 Trial Pit Logs

## 8.2.2 EVALUATION OF IMPACTS to Soils & Bedrock

In this Section, the direct or indirect impacts and the cumulative impacts of KWF Grid Connection on Soils & Bedrock are described.

### 8.2.2.1 Potential Impacts Evaluated for Soils & Bedrock

A conceptual site model exercise was carried out to identify potential impacts through the examination of the specific pathways between the project (source) and the sensitive aspect (receptor).

The potential for impacts was **examined in the absence of mitigation measures**, and **based on the description of development, standard construction methodologies, construction activities and operational activities as described in Chapter 5: Description of the Development**.

The potential impacts which were evaluated are listed in the 1<sup>st</sup> column of the table below. As summarised in the table below, **no significant effects are likely to occur**.

**Table 8-6: Conclusion of the Evaluation of Potential Impacts to Soils & Bedrock**

Potential Impacts which were evaluated	Relevant Stage of KWF Grid Connection	Direct Impact of KWF Grid Connection	Cumulative Impact with the Authorised Knocknamona Windfarm	Impact with Woodhouse Windfarm and Woodhouse Substation	Cumulative Whole Knocknamona Windfarm Project Impact
Excavation & Relocation of soils, subsoil, bedrock	Construction	<b>Imperceptible</b>	Imperceptible	No additional cumulative impact	Not significant
Soil and Subsoil Compaction	Construction	<b>Imperceptible</b>	Imperceptible	Imperceptible	Not significant
Soil and Subsoil Erosion	Construction	<b>Imperceptible</b>	Imperceptible	Neutral	Not significant
Contamination by Oils, Fuels & Chemicals	Construction	<b>Imperceptible</b>	Imperceptible	No additional cumulative impact	Not significant
Contamination by Cement Based Compounds	Construction	<b>No likely impact</b>	No cumulative impact	No potential for cumulative impact	Not significant
Ground Instability	Construction	<b>No likely impact</b>	No likely cumulative impact	No likely cumulative impact	Neutral

In order to keep this EIA Report concise and focused on potential significant impacts, where the evaluation of potential impacts found no significant impacts from the

development, the evaluation tables are presented in the appendix to the chapter.

Because no significant impacts to Soils & Bedrock are likely to occur, the Impact Evaluation Tables for the potential impacts listed in the table above are in Appendix 8.1.

**Relevant Appendix (at the end of this chapter)**

[Appendix 8.1 Evaluation of Potential Impacts to Land & Soils – Evaluation of Potential Impacts to Soils & Bedrock \(Tables 1 to 6\)](#)

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### 8.2.2.2 Summary of the Significance of the Potential Impacts to Soils & Bedrock

As outlined in the table above, where there is a **likely negative impact to Soils and bedrock as a direct result of KWF Grid Connection, the impact will be no greater than Imperceptible**. This is due to most of the works taking place along existing forestry/windfarm roads and within the existing Woodhouse Substation Compound, the relatively small volumes of excavations, concrete, fuels and oils, the small area of lands subject to works, no peat coverage at the site and bedrock is relatively close to the surface. All effects will be relatively localised, temporary and transient in nature.

**Cumulative impacts of KWF Grid Connection with Authorised Knocknamona Windfarm, where there is a likely impact, will not be greater than Imperceptible**, this is generally due to the limited extent of overlap of KWF Grid Connection works with Authorised Knocknamona Windfarm. **Overall the 'whole project' effect of KWF Grid Connection and Authorised Knocknamona Windfarm will not be significant**

**When Woodhouse Windfarm and Woodhouse Substation are also taken into account, negative cumulative impacts where cumulative impact is likely, will not be greater than Imperceptible**, this is generally due to Woodhouse Windfarm and Woodhouse Substation already been constructed and the lands have been reinstated and landscaped, accordingly no further excavation or relocation of soils is expected to take place. No potential for cumulative impacts with Knocknamona Windfarm due to separation distances. Furthermore, any vehicles used for operational maintenance will be parked/driven on hardcore areas such as roads, turbine hardstands and the substation compound.

## 8.3 Summary of the Land & Soils Chapter

**Land** relates to land-use and land-take. Land-use is the various ways in which society uses land. Land-take is the removal of productive land from agricultural or other beneficial uses. The dominant land usage in the development site is commercial forestry plantation, while land-take in the area relates to Woodhouse Windfarm and Woodhouse Substation which overlaps and adjoins the development site to the northwest. **Soil** relates to the topsoil and mineral subsoil (collectively referred to as overburden) along with the underlying parent material bedrock. Trial pits investigations on the development site, indicate a predominance of SILT/CLAY (with abundant angular rock clasts over weathered bedrock. Bedrock was encountered in the trial pits at depths ranging from 1.3m to 1.6m.

The following aspects of Land & Soils were considered during scoping for this topic chapter: Soils & Bedrock, Agricultural Landuse, Forestry Landuse, Cappagh Quarry Irish Geological Heritage Site, River Blackwater SAC, Dungarvan Harbour SPA/pNHA, Dungarvan Harbour Irish Geological Heritage Site, Ballynameelagh Caves Irish Geological Heritage Site, Kilgreany Cave Irish Geological Heritage Site and Woodhouse wetland of biodiversity importance local designation WD284.

**Soils & Bedrock** were aspects deemed to be sensitive to the development and were scoped in for detailed examination.

The other aspects listed were scoped out because the effects would be Neutral (Agricultural Landuse, Forestry Landuse, Cappagh Quarry Irish Geological Heritage Site) or there is no likely effect (River Blackwater SAC, Dungarvan Harbour SPA/pNHA, Dungarvan Harbour Irish Geological Heritage Site, Ballynameelagh Caves Irish Geological Heritage Site, Kilgreany Cave Irish Geological Heritage Site and Woodhouse WD284). (Rationale for scoping out Section 8.1.3.2)

In relation to the sensitive aspects which were scoped in for evaluation, the results were as follows:

**Soils & Bedrock** (excavations potentially causing erosion, compaction, drainage, contamination): potential negative impacts were evaluated as ranging from **No Likely Impact to Imperceptible**. (Section 8.2)

### Relevant References

Non-Technical Summary of this chapter can be found in Volume C1: Non-Technical Summary: Section 8

### Figures for Land & Soils Chapter

- Figure 8.1 Location of KWF Grid Connection in relation to Land & Soils
- Figure 8.1.1 Land Use in the KWF Grid Connection Area
- Figure 8.2.1 Study Area for Soils
- Figure 8.2.2 Study Area for Bedrock

### Appendices for Land & Soils Chapter

- Appendix 8.1 Evaluation of Potential Impacts to Land & Soils – Evaluation of Potential Impacts to Soils & Bedrock (Tables 1 to 6)
- Appendix 8.2 Trial Pit Logs



## 8.4 Reference List

Department of Agriculture, Fisheries and Food (January 2021) Food Harvest 2020. A Vision for Irish Agri-food and Fisheries. Dublin.

Department of Agriculture, Food and the Marine (2015) Local Roots Global Reach. Food Wise 2025. A 10 year vision for the Irish Agri-food Industry. Dublin.

Department of Agriculture, Food and the Marine (2015) Forestry Programme 2014 – 2020: IRELAND. Dublin

Department of Agriculture, Food and the Marine (2022). Ireland's Forest Strategy (2022 – 2030) Draft for public consultation

European Environmental Agency Landuse (Online) Accessed at <https://www.eea.europa.eu/themes/landuse>

EPA Corine Landcover 2018 – Datasets. Accessed on <https://gis.epa.ie/GetData/Download>

Geological Survey of Ireland (1995) Bedrock Geology 1:100,000 scale map series, Sheet 22 (Geology of East Cork and Waterford).

Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements.

Malachy Walsh and Partners (2014): Windfarm Development Knocknamona, Dungarvan, Co. Waterford - Geotechnical Assessment Report (EIS Chapter 14).

National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. Accessed on <https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf>

Waterford City and County Council. Waterford County Development Plan 2022-2028. Appendix 11 Natural Heritage Assets. Accessed on <https://consult.waterfordcouncil.ie/en/consultation/waterford-city-county-development-plan-2022-%E2%80%93-2028/chapter/appendix-11-natural-heritage-assets>



Figure 8.1 - Location of KWF Grid Connection in relation to Land & Soils

- Legend:
- KWF Grid Connection:**
- KWF Grid Connection Construction Works Area
  - Access Road through Woodhouse Windfarm Entrance
- Map Features:**
- Townlands
  - Corine Landcover 2018: Agricultural Area - Arable Land
  - Corine Landcover 2018: Agricultural Area - Heterogeneous Agricultural Area
  - Corine Landcover 2018: Agricultural Area - Pastures
  - Corine Landcover 2018: Forestry and Semi Natural Area - Forest
  - Corine Landcover 2018: Forestry and Semi Natural Area - Scrub

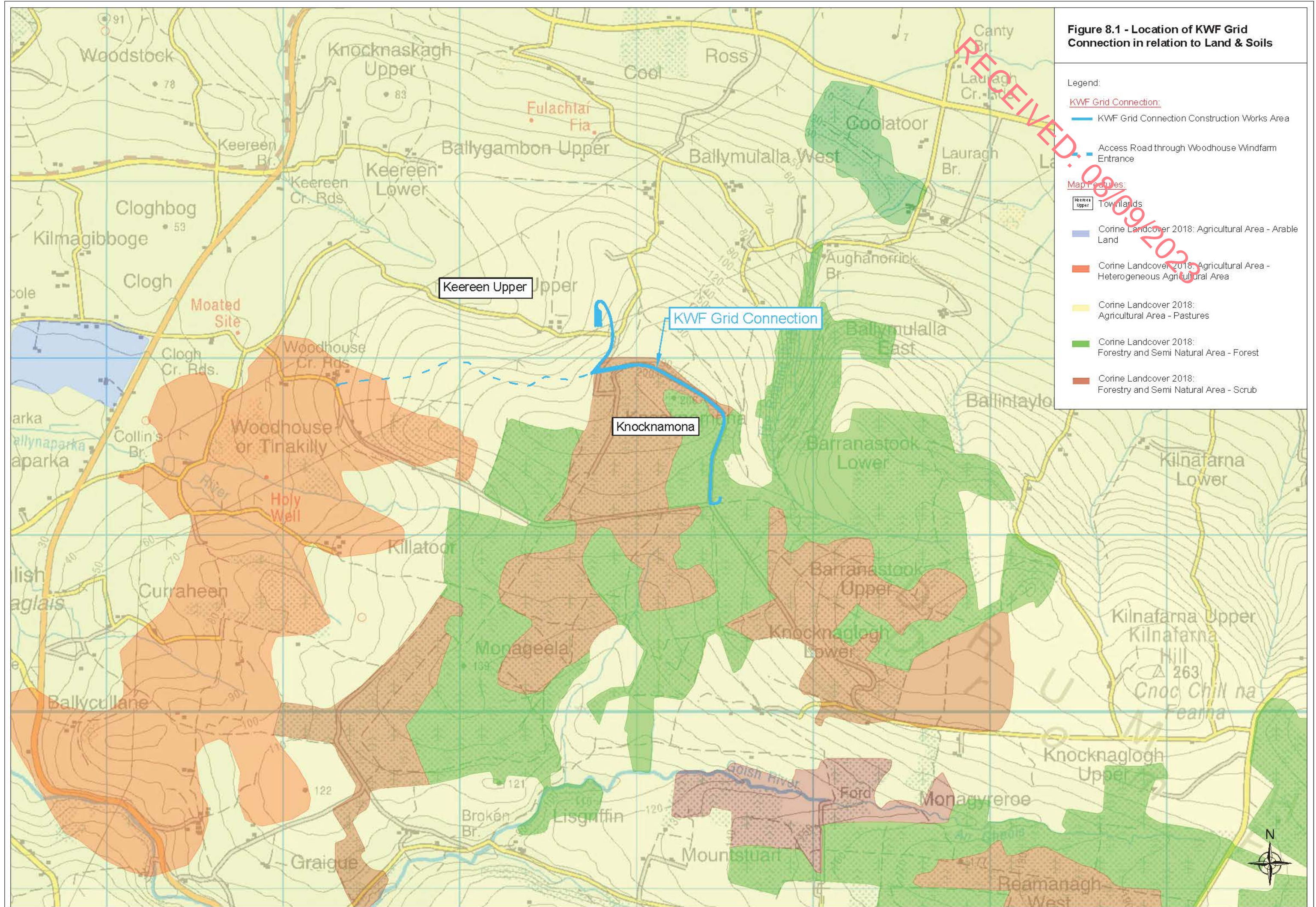




Figure 8.1.1 - Land Use in the KWF Grid Connection Area

Legend:

**KWF Grid Connection:**

- KWF Grid Connection Construction Works Area
- Access Road through Woodhouse Windfarm Entrance

**Land Use:**

- Agricultural Land
- Forestry
- Townlands

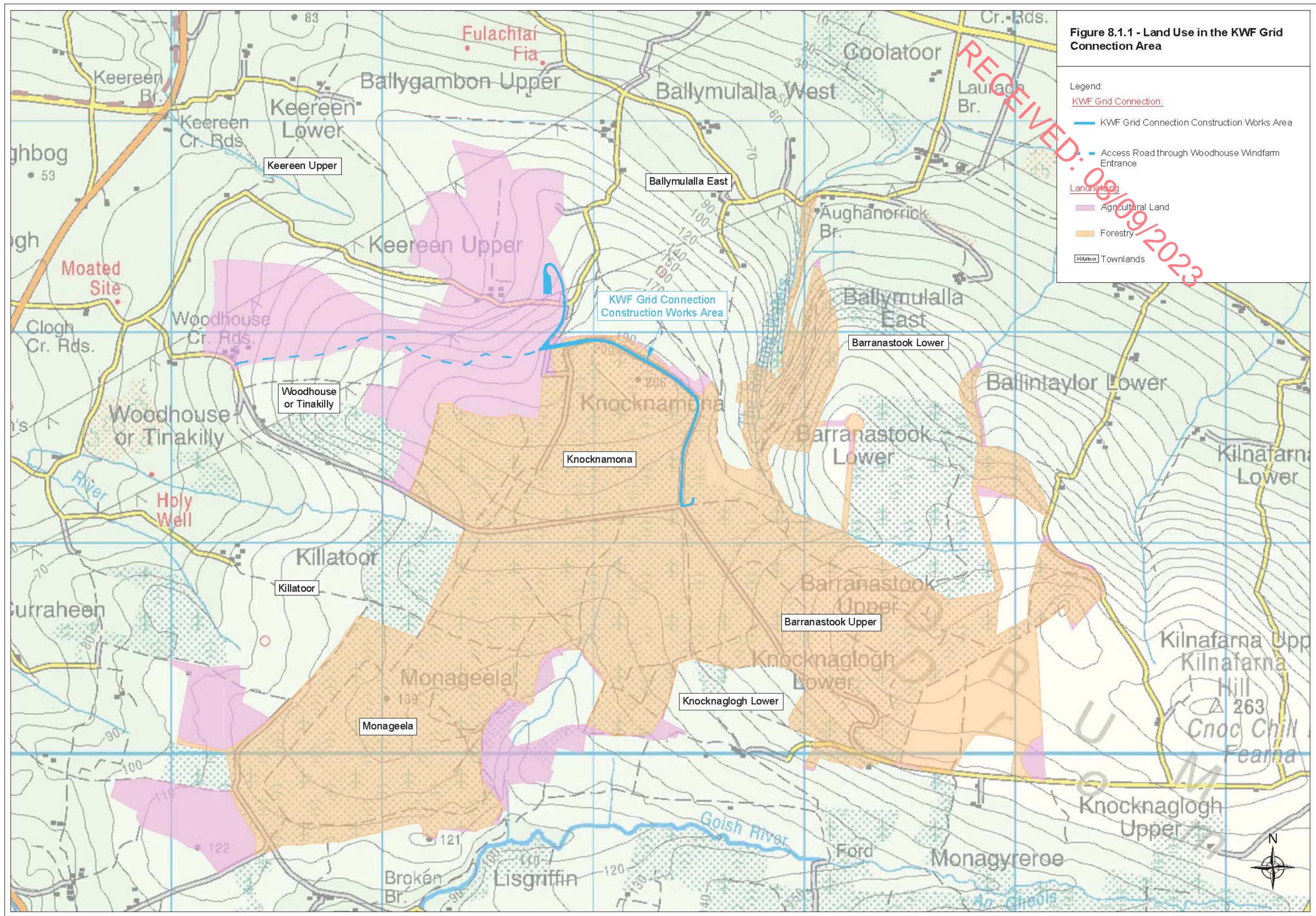
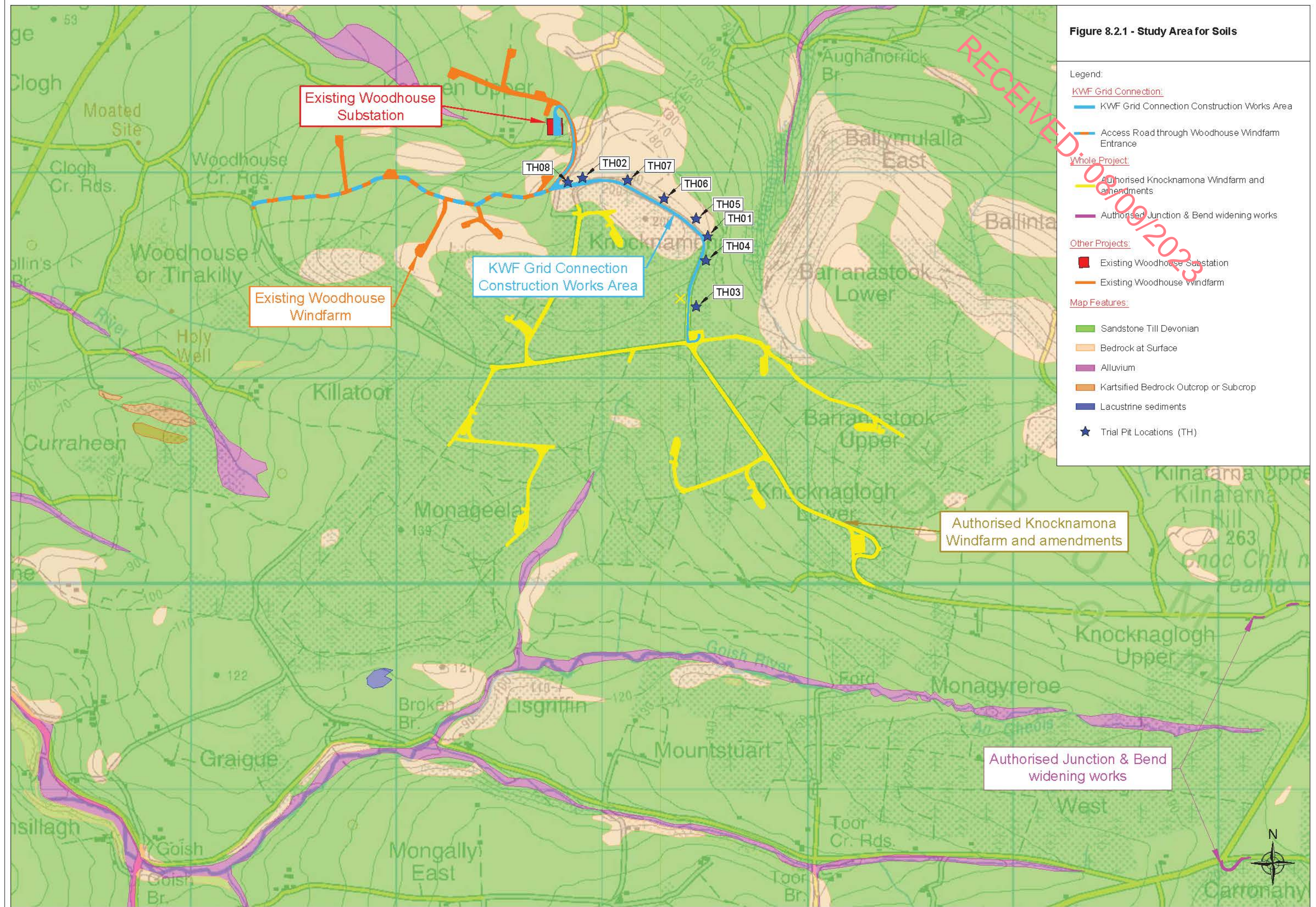




Figure 8.2.1 - Study Area for Soils

- Legend:
- KWF Grid Connection:**
    - KWF Grid Connection Construction Works Area
    - Access Road through Woodhouse Windfarm Entrance
  - Whole Project:**
    - Authorised Knocknamona Windfarm and amendments
    - Authorised Junction & Bend widening works
  - Other Projects:**
    - Existing Woodhouse Substation
    - Existing Woodhouse windfarm
  - Map Features:**
    - Sandstone Till Devonian
    - Bedrock at Surface
    - Alluvium
    - Kartsified Bedrock Outcrop or Subcrop
    - Lacustrine sediments
    - Trial Pit Locations (TH)



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Figure 8.2.2 - Study Area for Bedrock

Legend:

KWF Grid Connection:

— KWF Grid Connection Construction Works Area

— Access Road through Woodhouse Windfarm Entrance

Whole Project:

— Authorised Knocknamona Windfarm and amendments

— Authorised junction & Bend widening works

Other Projects:

■ Existing Woodhouse Substation

— Existing Woodhouse Windfarm

Map Features

— Upper Devonian Purple Mudstone & Sandstone

— Upper Devonian Grey & Red Sandstone & Red Mudstone

— Upper Devonian Grey to Red Sandstone & Grey Siltstone

— Dinantian Massive & thick-bedded Grey Sandstone

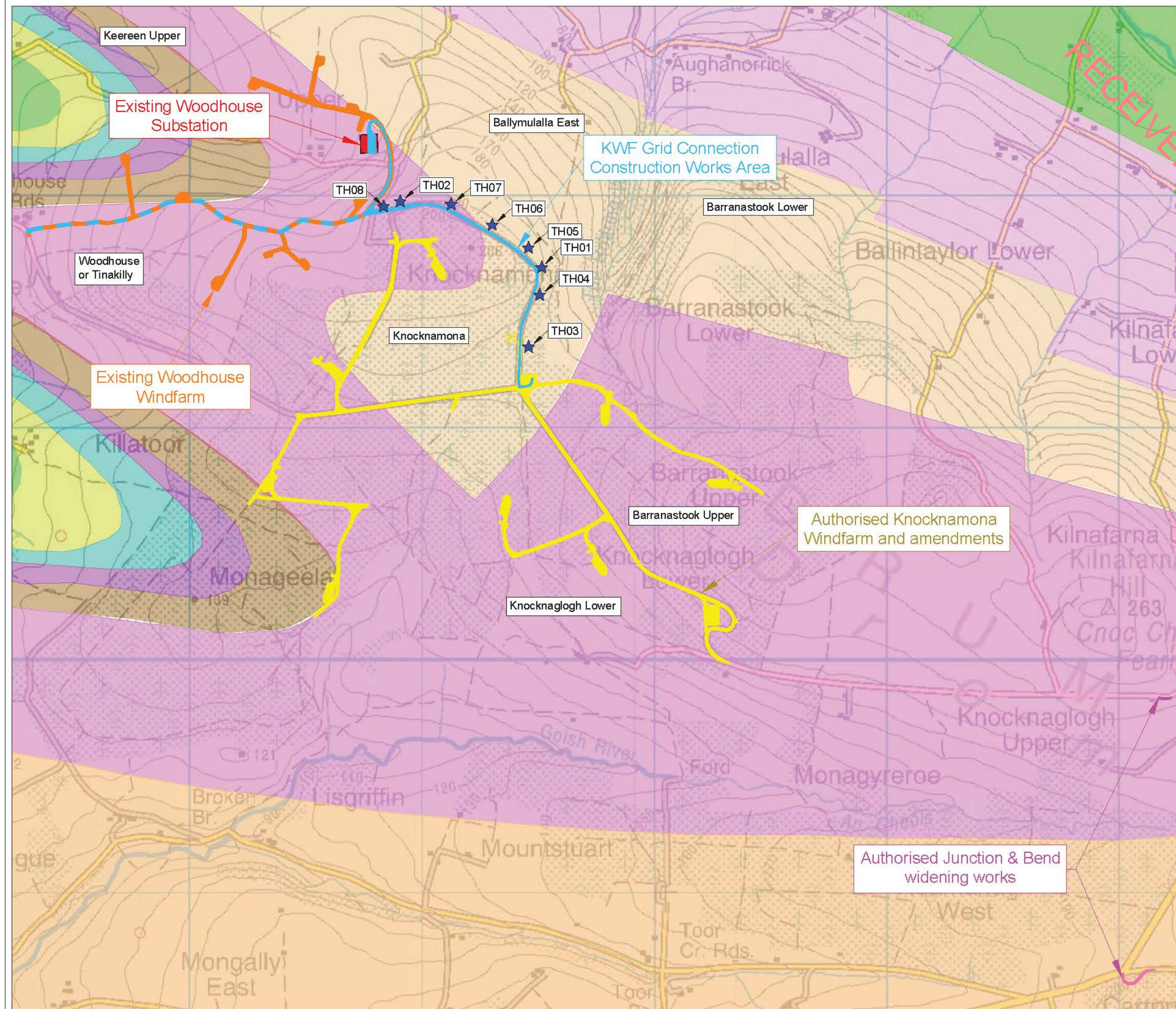
— Dinantian Massive Unbedded Lime-Mudstone

— Dinantian Massive Unbedded Lime-Mudstone

— Dinantian Sandstone, Mudstone & Thin Limestone

★ Trial Pit Locations (TH)

□ Townlands



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## Appendix 8.1: Evaluation of Potential Impacts to Land & Soils

This Appendix contains Impact Evaluation Table for the following Sensitive Aspect:

Sensitive Aspect Details as per Main EIA Report		Relevant Section of Main EIA Report:
Sensitive Aspect No. 1	Soil & Bedrock	Section 8.2 of the Main Report

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### Evaluation of Potential Impacts to SOILS & BEDROCK

In relation to **Soils & Bedrock**, the following potential impacts were evaluated:

Potential Impacts which were evaluated	Relevant Stage of KWF Grid Connection	Evaluated in this Appendix in Table:
Excavation & Relocation of soils, subsoil, bedrock	Construction Stage	A8.1, Table 1
Soil and Subsoil Compaction	Construction Stage	A8.1, Table 2
Soil and Subsoil Erosion	Construction Stage	A8.1, Table 3
Contamination by Oils, Fuels & Chemicals	Construction Stage	A8.1, Table 4
Contamination by Cement Based Compounds	Construction Stage	A8.1, Table 5
Ground Instability	Construction Stage	A8.1, Table 6

<b>A8.1 Table 1 Soils and Bedrock - Excavation &amp; Relocation of soils, subsoil, bedrock</b>	
Impact Source	Groundworks, relocation and storage of overburden
Impact Pathway (between Source and Sensitive Aspect)	Excavation, movement and mounding of overburden
Brief Impact Description	<p>The physical excavation and relocation of soil and subsoil and to a lesser extent bedrock from its natural location to a different location.</p> <p>In total, approximately 1,860m<sup>3</sup> of geological material will be excavated and this will arise from the Underground Cabling trenching, 190m new link road and 960m of 1m widening along the existing forestry road and will comprise topsoil (c.290m<sup>3</sup>), subsoil, (c.1290m<sup>3</sup>) and rock (c.280m<sup>3</sup>).</p>
Project Stage:	Construction
<b>A: Direct/Indirect Impacts of KWF Grid Connection</b>	<p>The impact will have <b>Imperceptible</b> significance because:</p> <ul style="list-style-type: none"> <li>• The relatively small excavation volumes required by virtue of the relatively narrow and shallow depth of excavations required for the Underground Cabling, the short length of the new link road, and the narrow and shallow nature of excavations to widen the existing forestry road;</li> <li>• The small area of lands subject to works, in the context of the overall landholding area (&lt;1% for agricultural and for forestry);</li> <li>• No works required along the haul route for turbine components for Knocknamona Windfarm;</li> <li>• The Underground Cabling trench will be fully reinstated and landscaped immediately after the works;</li> <li>• All effects will be direct and relatively localised;</li> <li>• All works will be temporary and transient in nature;</li> <li>• The soil and geology along the KWF Grid Connection route are abundant and are not unique in any way;</li> <li>• As per Section 8.1.6 in the Main Report, Small Adverse magnitude combined with the Low to Medium Importance of soils and geology within the study area.</li> </ul>
<b>B: Cumulative Impact of the Whole Project - KWF Grid Connection with the authorised Knocknamona Windfarm i.e. the windfarm; amendments to the windfarm to provide for larger turbines and Junction &amp; Bend Widening Works to facilitate</b>	<p>The cumulative impact will have <b>Imperceptible</b> significance because:</p> <ul style="list-style-type: none"> <li>• The limited extent of overlap of KWF Grid Connection works with Knocknamona Windfarm, being limited to a short (280m) of Underground Cabling. 250m of this section is along the existing forestry road, which will be upgraded by Knocknamona Windfarm, and 30m of this section is within an area of felled forestry which is within the footprint of the consented Knocknamona Windfarm substation. KWF Grid Connection will result in the additional excavation of 25m<sup>3</sup> of material within the footprint of the consented substation.</li> <li>• The Larger Turbines do not require additional groundworks or larger foundations than the originally permitted wind turbines.</li> <li>• The Junction &amp; Bend Widening Works are very small/small scale on agricultural and forestry lands.</li> </ul>

<p><b>turbine component access through the windfarm site entrance at Knocknaglogh Lower</b></p>	<ul style="list-style-type: none"> <li>• The relatively small cumulative excavation volumes (210m<sup>3</sup>) required for KWF Grid Connection and Authorised Knocknamona Windfarm in the cumulative study area;</li> <li>• The small area of lands within the forestry landholding subject to both Authorised Knocknamona Windfarm and KWF Grid Connection works (&lt;1%);</li> <li>• As per Section 8.1.6 in the Main Report, Small Adverse magnitude combined with the Low to Medium Importance of soils and geology within the study area; and,</li> <li>• Impacts to Soils as a result of Knocknamona Windfarm were previously assessed in 2016 and 2022 by An Bord Pleanála as not significant. When the additional effects of KWF Grid Connection are taken into account, the combined whole project effect remains not significant.</li> </ul>
<p><b>C: Cumulative Impact with Woodhouse Substation and Woodhouse Windfarm</b></p>	<p><b>No Additional Cumulative Impact</b> because:</p> <ul style="list-style-type: none"> <li>• The Woodhouse Windfarm and Woodhouse Substation are already constructed and the lands have been reinstated and landscaped accordingly, no further excavation or relocation of soils is expected to take place.</li> </ul>



<b>A8.1 Table 2 Soils and Bedrock - Soil and Subsoil Compaction</b>	
Impact Source	Construction traffic movement, temporary infrastructure and storage of overburden
Impact Pathway (between Source and Sensitive Aspect)	Physical Compression
Brief Impact Description	Soil and subsoil compaction due to the additional weight of construction machinery and traffic travelling on lands, temporary infrastructure and the compaction of the soil and subsoil layers during storage.
Project Stage:	Construction
<b>A: Direct/Indirect Impacts of KWF Grid Connection</b>	<p>The impact will have <b>Imperceptible</b> significance because:</p> <ul style="list-style-type: none"> <li>As per Section 8.1.6 in the Main Report, Negligible Magnitude combined with the Low to Medium Importance of soils and geology within the study area;</li> <li>The majority of the KWF Grid Connection is along existing forestry roads and the existing Woodhouse Windfarm access roads and therefore any additional ground compaction would be negligible; and,</li> <li>Excess overburden as a result of the KWF Grid Connection works will be spread out over the ground surface to reinstate the works area alongside the link road and widened forestry road and used to reinstate the trench at other works areas along the underground cabling route. Therefore, the potential for compaction from permanently stored overburden is negligible.</li> </ul>
<b>B: Cumulative Impact of the Whole Project - KWF Grid Connection with the authorised Knocknamona Windfarm i.e. the windfarm; amendments to the windfarm to provide for larger turbines and Junction &amp; Bend Widening Works to facilitate turbine component access through the windfarm site entrance at Knocknaglogh Lower</b>	<p>The cumulative impact will have <b>Imperceptible</b> significance because:</p> <ul style="list-style-type: none"> <li>As per the Revised EIS 2015, compaction effects to Soils as a result of Authorised Knocknamona Windfarm are limited to imperceptible residual effects under existing forestry roads and under permanent soil storage berms around turbine hardstands and along roadside drainage.</li> <li>The contribution of KWF Grid Connection to compaction effects with Knocknamona Windfarm will be negligible due to the very small extent of overlap of the footprints of both developments,</li> <li>The Larger Turbines do not require additional groundworks or larger foundations than the originally permitted wind turbines.</li> <li>The Junction &amp; Bend Widening Works are very small/small scale on agricultural and forestry lands.</li> <li>As per Section 8.1.6 in the Main Report, Negligible Cumulative Magnitude combined with the Low to Medium Importance of soils and geology within the study area; and,</li> <li>Impacts to Soils as a result of Knocknamona Windfarm were previously assessed in 2015 and 2022 by An Bord Pleanála as not significant. When the additional effects of KWF Grid Connection are taken into account, the cumulative impact remains not significant.</li> </ul>
<b>C: Cumulative</b>	The cumulative impact will have <b>Imperceptible</b> significance because:

<p><b>Impact with Woodhouse Substation and Woodhouse Windfarm</b></p>	<ul style="list-style-type: none"> <li>• The contribution of Woodhouse Windfarm and Woodhouse Substation during the construction of the KWF Grid Connection is likely to be negligible as these two projects are now operational and any residual compaction effects from the construction phase are likely to be negligible.</li> <li>• No potential for cumulative impacts with Knocknamona Windfarm due to separation distances,</li> <li>• As per Section 8.1.6 in the Main Report, Negligible Cumulative Magnitude combined with the Low to Medium Importance of soils and geology within the study area</li> </ul>

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<b>A8.1 Table 3 Soils and Bedrock - Soil and Subsoil Erosion</b>	
Impact Source	Groundworks and storage of overburden
Impact Pathway (between Source and Sensitive Aspect)	Excavations, tracking of construction traffic and wind and rain action
Brief Impact Description	Erosion of soil and subsoil as a result of construction traffic and also as a result of natural process such as rain and wind action on exposed soil and subsoil during storage.
Project Stage:	Construction
<b>A: Direct/Indirect Impacts of KWF Grid Connection</b>	<p>The impact will have <b>Imperceptible</b> significance because:</p> <ul style="list-style-type: none"> <li>• The majority of the KWF Grid Connection is along existing forestry roads and the existing Woodhouse Windfarm access roads and therefore any additional ground erosion would be negligible; and,</li> <li>• There will be no long-term storage of overburden as a result of the KWF Grid Connection works as all excavated overburden will be used to reinstate the works area and will be reseeded and revegetated after the completion of construction works. Therefore, the potential for erosion is negligible.</li> <li>• No works required along the haul route for turbine components for Knocknamona Windfarm;</li> <li>• As per Section 8.1.6 in the Main Report, Negligible Magnitude combined with the Low to Medium Importance of soils and geology within the study area;</li> </ul>
<b>B: Cumulative Impact of the Whole Project - KWF Grid Connection with the authorised Knocknamona Windfarm i.e. the windfarm; amendments to the windfarm to provide for larger turbines and Junction &amp; Bend Widening Works to facilitate turbine component access through the windfarm site entrance at Knocknaglogh Lower</b>	<p>The cumulative impact will have <b>Imperceptible</b> significance because:</p> <ul style="list-style-type: none"> <li>• As per the Revised EIS 2015, erosion effects to Soils as a result of Authorised Knocknamona Windfarm are expected to be Imperceptible.</li> <li>• The contribution of KWF Grid Connection to compaction effects with Knocknamona Windfarm will be negligible due to the very small extent of overlap of the footprints of both developments;</li> <li>• The Larger Turbines do not require additional groundworks or larger foundations than the originally permitted wind turbines.</li> <li>• The Junction &amp; Bend Widening Works are very small/small scale on agricultural and forestry lands.</li> <li>• As per Section 8.1.6 in the Main Report, Negligible Cumulative Magnitude combined with the Low to Medium Importance of soils and geology within the study area;</li> <li>• Impacts to Soils as a result of Knocknamona Windfarm were previously assessed in 2015 and 2022 by An Bord Pleanála as not significant. When the additional effects of KWF Grid Connection are taken into account, the combined whole project effect remain not significant.</li> </ul>
<b>C: Cumulative Impact with Woodhouse</b>	<p>The cumulative impact will have <b>Neutral</b> significance because:</p> <ul style="list-style-type: none"> <li>• The contribution of Woodhouse Windfarm and Woodhouse Substation to soils</li> </ul>

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<b>Substation and Woodhouse Windfarm</b>	erosion effects will be negligible as these projects are now operational and ongoing erosional effects on soil and subsoil are not expected, and <ul style="list-style-type: none"><li>• As per Section 8.1.6 in the Main Report, Negligible cumulative Magnitude combined with the Low to Medium Importance of soils and geology within the study area.</li></ul>

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**A8.1 Table 4 Soils and Bedrock - Contamination by Oils, Fuels & Chemicals**

Impact Source	Oils, Fuels and Chemicals
Impact Pathway (between Source and Sensitive Aspect)	Soil, subsoil and bedrock pore space
Brief Impact Description	The plant and equipment that will be used during the construction phase will be on fuels and oils. This creates the potential for spillage and leakage of hydrocarbons from plant during refuelling or storage of oils and fuels. The effect on soil, subsoil and bedrock will be a direct, local effect.
Project Stage:	Construction
A: Direct/Indirect Impacts of KWF Grid Connection	<p>The impact will have Imperceptible significance because:</p> <ul style="list-style-type: none"> <li>• The volume of fuels, oils and chemicals on-site will be very small;</li> <li>• Any effects that do occur will be very localised to the soils and subsoils at the source / works activity area; and,</li> <li>• Any effects would be fully reversible.</li> <li>• As per Section 8.1.6 in the Main Report, Negligible Magnitude combined with the Low to Medium Importance of soils and geology within the study area.</li> </ul>
B. Cumulative Impact of the Whole Project - KWF Grid Connection with the authorised Knocknamona Windfarm i.e. the windfarm; amendments to the windfarm to provide for larger turbines and Junction & Bend Widening Works to facilitate turbine component access through the windfarm site entrance at Knocknaglogh Lower	<p>The cumulative impact will have Imperceptible significance because:</p> <ul style="list-style-type: none"> <li>• As per the Knocknamona Windfarm Revised EIS 2015, at worst, only minor accidental spillage (i.e. small spillage volumes) are likely to occur due to the storage and refueling of construction/ excavation plant with petroleum hydrocarbons, and any contamination effects are expected to be Imperceptible, with the implementation of the Knocknamona Windfarm Environmental Management Plan.</li> <li>• The contribution of KWF Grid Connection to contamination effects with Knocknamona Windfarm will be negligible due to the very small extent of overlap of the footprints of both developments.</li> <li>• The Larger Turbines do not require additional groundworks or larger foundations than the originally permitted wind turbines.</li> <li>• The Junction &amp; Bend Widening Works are very small/small scale on agricultural and forestry lands.</li> <li>• As per Section 8.1.6 in the Main Report, Negligible Cumulative Magnitude combined with the Low to Medium Importance of soils and geology within the study area;</li> <li>• Impacts to Soils as a result of Knocknamona Windfarm were previously assessed in 2015 and 2022 by An Bord Pleanála as not significant. When the additional effects of KWF Grid Connection are taken into account, the combined whole project effect remain not significant.</li> </ul>
C: Cumulative Impact with	No Additional Cumulative Impact because:

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Woodhouse Substation and Woodhouse Windfarm	Woodhouse Substation and Woodhouse Windfarm are operational and will not be a source of oil or fuel contamination at KWF Grid Connection works areas. Furthermore, any vehicles used for operational maintenance will be parked/driven on hardcore areas such as roads, turbine hardstands and the substation compound.

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## Appendix 8.2: Trial Pit Logs

The data and descriptions in this appendix have informed Chapter 8: Land & Soils of the EIA Report

### CONTENTS

- Trial Pit Location Map
- Trial Pit Logs TH01 to TH08
- Extract from Knocknamona Windfarm EIS - Appendix 14.3

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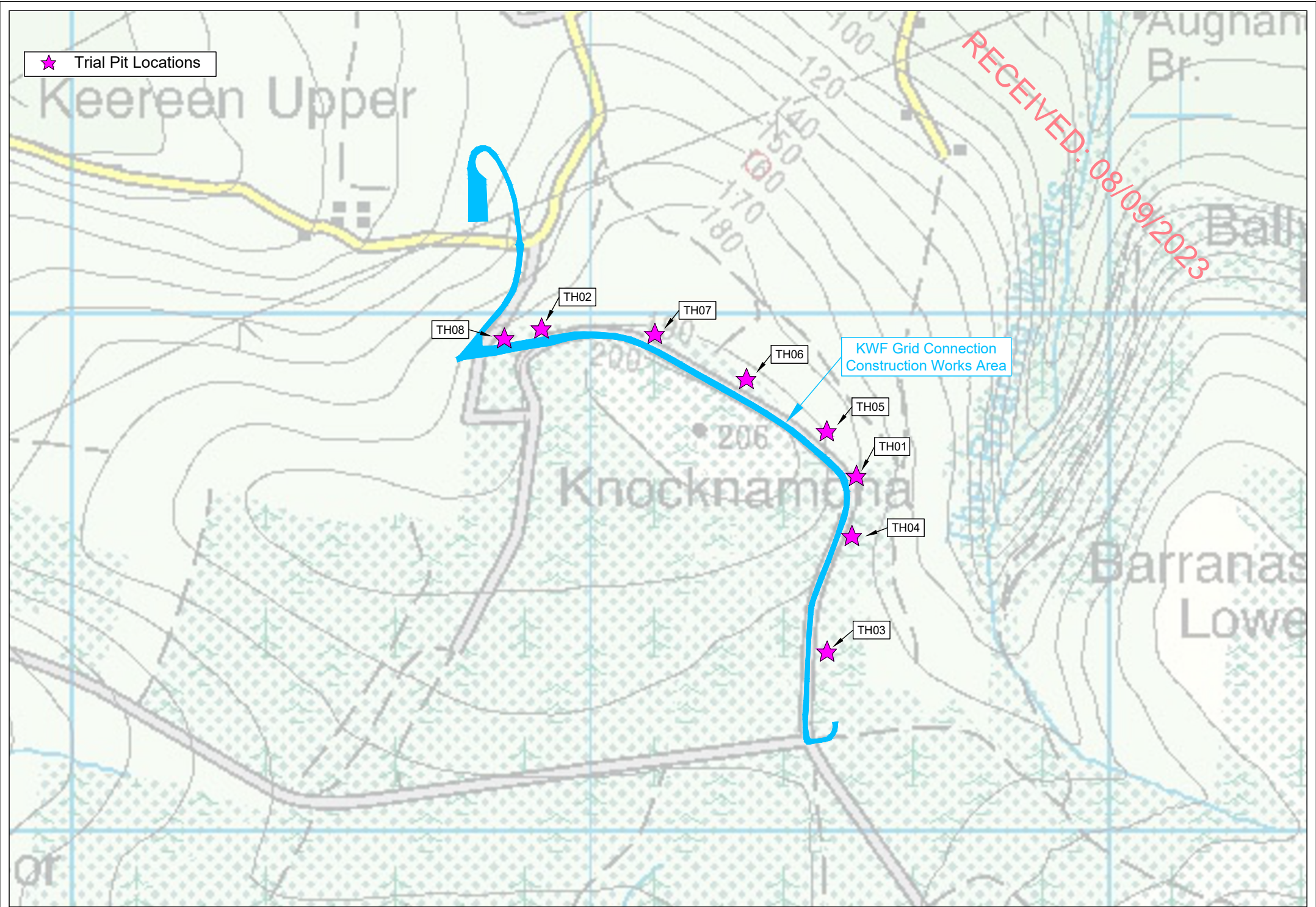


★ Trial Pit Locations

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- TH08
- TH02
- TH07
- TH06
- TH05
- TH01
- TH04
- TH03

KWF Grid Connection Construction Works Area








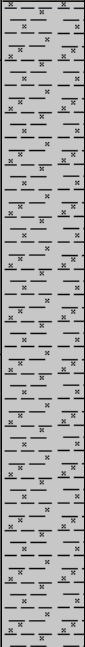
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Trial Pit TH01



Trial Pit TH01

		<b>TRIAL PIT LOG</b>				<b>TRIAL PIT NUMBER: TH01</b>	
		<b>PROJECT NUMBER: P1236-3</b>		<b>DATE STARTED: 6/02/2019</b>		<b>EASTING: 216483</b>	
<b>SITE: Knocknamona, Co. Waterford</b>		<b>LOGGED BY: D. Broderick</b>		<b>NORTHING: 91692</b>		<b>ELEVATION: 180m</b>	
<b>CLIENT: Knocknamon Windfarm</b>		<b>CONTRACTOR: G. Neville</b>					
Comments	Sample Number	Sample Type	Water Strikes	Elevation	Meters Below Ground Surface	Lithology	Formation Description
				0.00	0		Ground Surface
				-0.15			<b>TOPSOIL</b> Dark grey peaty TOPSOIL
				-0.40			<b>SILT / CLAY</b> Firm, reddish brown gravelly SILT / CLAY
				-1.50	1		<b>SILT / CLAY</b> Firm, grey, gravelly SILT / CLAY with abundant angular clasts  Refusal on rock
							E.O.H. at 1.5mbgl
<b>REMARKS:</b>						<b>PIT LENGTH: 2.5m</b> <b>PIT BREADTH: 1m</b> <b>FINAL DEPTH: 1.5m</b> <b>EXCAVATOR:</b>	
<b>LEGEND</b> ∇ - Water strike D - Disturbed sample B - Bulk disturbed sample C - Composite sample W - Water sample V - Vane test T - No. of threads R - Average length of ribbons Dil - Dilatancy recorded ND - No dilatancy recorded						<b>PAGE 1 of 1</b>	
						<b>SCALE</b>	
<b>HYDRO-ENVIRONMENTAL SERVICES 22 Lower Main Street Dungarvan Co. Waterford Tel: 058-44122 Fax: 058-44244 Email: info@hydroenvironmental.ie</b>							

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Trial Pit TH02




Trial Pit TH02

		<b>TRIAL PIT LOG</b>				<b>TRIAL PIT NUMBER: TH02</b>	
		<b>PROJECT NUMBER: P1236-3</b>		<b>DATE STARTED: 6/02/2019</b>		<b>EASTING: 215910</b>	
<b>SITE: Knocknamona, Co. Waterford</b>		<b>LOGGED BY: D. Broderick</b>		<b>NORTHING: 91944</b>		<b>ELEVATION: 180m</b>	
<b>CLIENT: Knocknamona Windfarm</b>		<b>CONTRACTOR: G.Neville</b>					
Comments	Sample Number	Sample Type	Water Strikes	Elevation	Meters Below Ground Surface	Lithology	Formation Description
				Elevation	Meters Below Ground Surface		
				0.00	0		Ground Surface
				-0.10			<b>TOPSOIL</b> Dark grey peaty TOPSOIL
							<b>SILT / CLAY</b> Firm, orange, gravelly SILT / CLAY with abundant angular clasts  Refusal on rock
				-1.40			E.O.H. at 1.4mbgl
<b>REMARKS:</b>							<b>PIT LENGTH: 2.5m</b>
							<b>PIT BREADTH: 1m</b>
							<b>FINAL DEPTH: 1.4m</b>
							<b>EXCAVATOR:</b>
<b>LEGEND</b> ∇ - Water strike D - Disturbed sample B - Bulk disturbed sample C - Composite sample W - Water sample V - Vane test T - No. of threads R - Average length of ribbons Dil - Dilatancy recorded ND - No dilatancy recorded							<b>PAGE 1 of 1</b>
							<b>SCALE</b>
<b>HYDRO-ENVIRONMENTAL SERVICES 22 Lower Main Street Dungarvan Co. Waterford Tel: 058-44122 Fax: 058-44244 Email: info@hydroenvironmental.ie</b>							

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 HYDRO-ENVIRONMENTAL SERVICES	<b>TRIAL PIT LOG</b>			TRIAL PIT NUMBER: TH03	
	PROJECT NUMBER: P1236-4 SITE: Knocknamona WF, Co. Waterford CLIENT: Ecopower	DATE STARTED: 13/08/2019 LOGGED BY: D. Broderick CONTRACTOR: N/A	EASTING: 616405 NORTHING: 591408 ELEVATION:		


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Photograph	Sample Number	Sample Type	Water Strikes	Elevation	Meters Below Ground Surface	Lithology	Formation Description
				0.00	0		Ground Surface
				-0.20			Dark brown, soft, organic TOPSOIL
							Purple and orange brown, very firm, gravelly SILT/CLAY with flat and angular cobbles/clasts
					-1.60		


<b>REMARKS:</b> Dry hole.	PIT LENGTH: PIT BREADTH: FINAL DEPTH: EXCAVATOR:
------------------------------	---

<b>LEGEND</b> ∇ - Water strike D - Disturbed sample B - Bulk disturbed sample W - Water sample V - Vane test T - No. of threads R - Average length of ribbons Dil - Dilatancy recorded		PAGE 1 of 1
		SCALE




 <p>HYDRO-ENVIRONMENTAL SERVICES</p>	TRIAL PIT LOG	TRIAL PIT NUMBER: TH04
PROJECT NUMBER: P1236-4 SITE: Knocknamona WF, Co. Waterford CLIENT: Ecopower	DATE STARTED: 13/08/2019 LOGGED BY: D. Broderick CONTRACTOR: N/A	EASTING: 616455 NORTHING: 591621 ELEVATION:

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Photograph	Sample Number	Sample Type	Water Strikes	Elevation	Meters Below Ground Surface	Lithology	Formation Description
				0.00	0		Ground Surface
				-0.40			Dark brown, soft, organic TOPSOIL with abundant roots
				-0.90			Reddish brown, very firm, gravelly SILT/CLAY
				-1.40	1		Light brown/grey, very firm, SILT/CLAY with abundant purple, angular cobbles/clasts (top of weathered mudstone bedrock)
							Total Depth of Trial Pit

REMARKS: Dry hole.	PIT LENGTH: PIT BREADTH: FINAL DEPTH: EXCAVATOR:
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<b>LEGEND</b> ∇ - Water strike D - Disturbed sample B - Bulk disturbed sample W - Water sample V - Vane test T - No. of threads R - Average length of ribbons Dil - Dilatancy recorded		PAGE 1 of 1
		SCALE


 <p>HYDRO-ENVIRONMENTAL SERVICES</p>	<p>TRIAL PIT LOG</p>	<p>TRIAL PIT NUMBER: TH05</p>
<p>PROJECT NUMBER: P1236-4                  SITE: Knocknamona WF, Co. Waterford                  CLIENT: Ecopower</p>	<p>DATE STARTED: 13/08/2019                  LOGGED BY: D. Broderick                  CONTRACTOR: N/A</p>	<p>EASTING: 616402                  NORTHING: 591830                  ELEVATION:</p>

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Photograph	Sample Number	Sample Type	Water Strikes	Elevation	Meters Below Ground Surface	Lithology	Formation Description
				0.00	0		Ground Surface
				-0.30			Dark brown, soft, organic TOPSOIL
				-0.50			Dark brown, very firm, gravelly SILT/CLAY
				-1.40	1		Orangey grey, very firm, SILT/CLAY with abundant, purple, angular cobbles/clasts (top of weathered mudstone bedrock)
							Total Depth of Trial Pit

<p>REMARKS: Dry hole.</p>	<p>PIT LENGTH:                  PIT BREADTH:                  FINAL DEPTH:                  EXCAVATOR:</p>
-------------------------------	--

<p><b>LEGEND</b>                  ∇ - Water strike                  D - Disturbed sample                  B - Bulk disturbed sample                  W - Water sample                  V - Vane test                  T - No. of threads                  R - Average length of ribbons                  Dil - Dilatancy recorded</p>		<p>PAGE 1 of 1</p> <hr/> <p>SCALE</p>
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 <p>HYDRO-ENVIRONMENTAL SERVICES</p>	TRIAL PIT LOG	TRIAL PIT NUMBER: TH06
PROJECT NUMBER: P1236-4 SITE: Knocknamona WF, Co. Waterford CLIENT: Ecopower	DATE STARTED: 13/08/2019 LOGGED BY: D. Broderick CONTRACTOR: N/A	EASTING: 616249 NORTHING: 591932 ELEVATION:


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Photograph	Sample Number	Sample Type	Water Strikes	Elevation	Meters Below Ground Surface	Lithology	Formation Description
				0.00	0		Ground Surface
				-0.30			Dark brown, soft, organic TOPSOIL
				-0.60			Orangey brown, firm, gravelly SILT/CLAY
				-1.40	1		Purple, soft to loose, angular cobbles/clast (weathered mudstone bedrock)
							Total Depth of Trial Pit


REMARKS: Dry hole.	PIT LENGTH: PIT BREADTH: FINAL DEPTH: EXCAVATOR:
-----------------------	---

<b>LEGEND</b> ∇ - Water strike D - Disturbed sample B - Bulk disturbed sample W - Water sample V - Vane test T - No. of threads R - Average length of ribbons Dil - Dilatancy recorded	PAGE 1 of 1  SCALE
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 <p>HYDRO-ENVIRONMENTAL SERVICES</p>	<p>TRIAL PIT LOG</p>	<p>TRIAL PIT NUMBER: TH07</p>
<p>PROJECT NUMBER: P1236-4                  SITE: Knocknamona WF, Co. Waterford                  CLIENT: Ecopower</p>	<p>DATE STARTED: 13/08/2019                  LOGGED BY: D. Broderick                  CONTRACTOR: N/A</p>	<p>EASTING: 616072                  NORTHING: 592020                  ELEVATION:</p>

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Photograph	Sample Number	Sample Type	Water Strikes	Elevation	Meters Below Ground Surface	Lithology	Formation Description
				0.00	0		Ground Surface
				-0.30			Dark brown, soft, organic TOPSOIL
				-0.60			Orangey brown, firm, gravelly SILT/CLAY
				-1.30	1		Purple, soft to loose, angular cobbles/clast (weathered mudstone bedrock)
							Total Depth of Trial Pit

<p>REMARKS: Dry hole.</p>	<p>PIT LENGTH: PIT BREADTH: FINAL DEPTH: EXCAVATOR:</p>
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<p><b>LEGEND</b>                  ∇ - Water strike                  D - Disturbed sample                  B - Bulk disturbed sample                  W - Water sample                  V - Vane test                  T - No. of threads                  R - Average length of ribbons                  Dil - Dilatancy recorded</p>	<p>PAGE 1 of 1</p> <p>SCALE</p>
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<b>TRIAL PIT LOG</b>		<b>TRIAL PIT NUMBER:</b> TH08
<b>PROJECT NUMBER:</b> P1236-4	<b>DATE STARTED:</b> 13/08/2019	<b>EASTING:</b> 615776
<b>SITE:</b> Knocknamona WF, Co. Waterford	<b>LOGGED BY:</b> D. Broderick	<b>NORTHING:</b> 592011
<b>CLIENT:</b> Ecopower	<b>CONTRACTOR:</b> N/A	<b>ELEVATION:</b>

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Photograph	Sample Number	Sample Type	Water Strikes	Elevation	Meters Below Ground Surface	Lithology	Formation Description
				0.00	0		Ground Surface
				-0.30			Dark brown, soft, organic TOPSOIL
				-1.30	1		Purple and grey, soft to loose, angular cobbles/clast (weathered mudstone/sandstone bedrock)
							Total Depth of Trial Pit

<b>REMARKS:</b> Dry hole.	<b>PIT LENGTH:</b> <b>PIT BREADTH:</b> <b>FINAL DEPTH:</b> <b>EXCAVATOR:</b>
------------------------------	---

<b>LEGEND</b> ▽ - Water strike D - Disturbed sample B - Bulk disturbed sample W - Water sample V - Vane test T - No. of threads R - Average length of ribbons Dil - Dilatancy recorded	<b>PAGE</b> 1 of 1
	<b>SCALE</b>

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**APPENDIX 14.3**  
Trial pit logs and photographs

Extract Knocknamona Windfarm EIS 2015

## Trial Pit Log

<b>Project:</b>	Wind Farm Development	<b>Trial Pit ID</b>			T01		
<b>Location:</b>	Knocknamona, Dungarvan, County Waterford	<b>ING Coordinates</b>			E: 216782 N: 90377		
<b>Client:</b>	Ecopower Developments Limited	<b>Elevation (mOD):</b>			Z: 187		
<b>Date:</b>	04 November 2013	<b>Logged by:</b>			Sean Doyle		
<b>Strata Description</b>	Depth (m)	OD level	Water depth	<b>Samples / Tests</b>			
				Type	Depth	Result	
Organic soil	0.30						
Gravelly CLAY with some angular cobbles	2.10						
End of trial pit at SANDSTONE bedrock							
<b>Remarks:</b> No groundwater encountered in the excavation. Clay layer is very dry and loose.							

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**Trial pit at T01**

## Trial Pit Log

<b>Project:</b>	Wind Farm Development	<b>Trial Pit ID</b>	T02			
<b>Location:</b>	Knocknamona, Dungarvan, County Waterford	<b>ING Coordinates</b>	E:	216365		
<b>Client:</b>	Ecopower Developments Limited	<b>Elevation (mOD):</b>	N:	90699		
<b>Date:</b>	04 November 2013	<b>Logged by:</b>	Z:	164		
<b>Strata Description</b>		<b>Depth (m)</b>	<b>OD level</b>	<b>Water depth</b>	<b>Samples /Tests</b>	
					<b>Type</b>	<b>Depth</b>
Organic soil		0.10				
Light brown soft CLAY		1.10				
Light brown soft CLAY getting progressively whiter with depth		3.00				
Stiff white gravelly CLAY		4.00				
White fine-grained SANDSTONE bedrock						

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**Remarks:**  
No groundwater encountered at in the excavation

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**Trial pit at T02**

## Trial Pit Log

<b>Project:</b>	Wind Farm Development	<b>Trial Pit ID</b>		T03		
<b>Location:</b>	Knocknamona, Dungarvan, County Waterford	<b>ING Coordinates</b>		E: 216787	N: 91024	
<b>Client:</b>	Ecopower Developments Limited	<b>Elevation (mOD):</b>		Z: 183		
<b>Date:</b>	04 November 2013	<b>Logged by:</b>		Sean Doyle		
<b>Strata Description</b>		<b>Depth (m)</b>	<b>OD level</b>	<b>Water depth</b>	<b>Samples / Tests</b>	
					<b>Type</b>	<b>Depth</b>
Organic soil		0.10				
Soft gravelly grey CLAY, very dry		2.20				
Weathered red SHALE		2.30				
End of trial pit at grey/yellow SANDSTONE bedrock						
<b>Remarks:</b> Clay stratum is very dry, crumbly, easily excavated. Some infiltration of groundwater into bottom of excavation.						

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**Trial pit at T03**

## Trial Pit Log

<b>Project:</b>	Wind Farm Development	<b>Trial Pit ID</b>		TP04		
<b>Location:</b>	Knocknamona, Dungarvan, County Waterford	<b>ING Coordinates</b>		E: 217201	N: 90705	
<b>Client:</b>	Ecopower Developments Limited	<b>Elevation (mOD):</b>		Z: 223		
<b>Date:</b>	04 November 2013	<b>Logged by:</b>		Sean Doyle		
<b>Strata Description</b>	Depth (m)	OD level	Water depth	<b>Samples / Tests</b>		
				Type	Depth	Result
Organic soil	0.30					
SILTSTONE till with some clay content	0.60					
End of trial pit at hard SILTSTONE bedrock						
<b>Remarks:</b> Siltstone bedrock is hard No groundwater encountered in excavation						

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**Trial pit at T04**



## Trial Pit Log

<b>Project:</b>	Wind Farm Development	<b>Trial Pit ID</b>		T06		
<b>Location:</b>	Knocknamona, Dungarvan, County Waterford	<b>ING Coordinates</b>		E: 215648	N: 91228	
<b>Client:</b>	Ecopower Developments Limited	<b>Elevation (mOD):</b>		Z: 175		
<b>Date:</b>	04 November 2013	<b>Logged by:</b>		Sean Doyle		
<b>Strata Description</b>	Depth (m)	OD level	Water depth	<b>Samples / Tests</b>		
				Type	Depth	Result
Organic soil	0.20					
Soft brown loose CLAY	0.60					
Soft grey/brown slightly stony CLAY	1.40					
End of trial pit at fine-grained white SANDSTONE bedrock						
<b>Remarks:</b> No groundwater encountered in the excavation						

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Trial pit at T06

## Trial Pit Log

<b>Project:</b>	Wind Farm Development	<b>Trial Pit ID</b>		T07		
<b>Location:</b>	Knocknamona, Dungarvan, County Waterford	<b>ING Coordinates</b>		E: 216089	N: 91650	
<b>Client:</b>	Ecopower Developments Limited	<b>Elevation (mOD):</b>		Z: 197		
<b>Date:</b>	04 November 2013	<b>Logged by:</b>		Sean Doyle		
<b>Strata Description</b>	Depth (m)	OD level	Water depth	<b>Samples / Tests</b>		
				Type	Depth	Result
Organic soil	0.20					
Soft brown loose CLAY	0.60					
Soft grey/brown slightly stony CLAY	1.70					
End of trial pit at fine-grained white SANDSTONE bedrock						
<b>Remarks:</b> No groundwater encountered in the excavation						

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**Trial pit at T07**



## Trial Pit Log

<b>Project:</b>	Wind Farm Development	<b>Trial Pit ID</b>		T08		
<b>Location:</b>	Knocknamona, Dungarvan, County Waterford	<b>ING Coordinates</b>		E: 215325	N: 90736	
<b>Client:</b>	Ecopower Developments Limited	<b>Elevation (mOD):</b>		Z: 152		
<b>Date:</b>	04 November 2013	<b>Logged by:</b>		Sean Doyle		
<b>Strata Description</b>	Depth (m)	OD level	Water depth	<b>Samples / Tests</b>		
				Type	Depth	Result
Organic soil	0.20					
Soft brown loose CLAY	0.60					
Soft grey/brown slightly stony CLAY	1.80					
End of trial pit at SANDSTONE bedrock						
<b>Remarks:</b> No groundwater encountered in the excavation						

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**Trial pit at T08**

## Trial Pit Log

<b>Project:</b>	Wind Farm Development	<b>Trial Pit ID</b>		TT10		
<b>Location:</b>	Knocknamona, Dungarvan, County Waterford	<b>ING Coordinates</b>		E: 215582	N: 90280	
<b>Client:</b>	Ecopower Developments Limited	<b>Elevation (mOD):</b>		Z: 134		
<b>Date:</b>	04 November 2013	<b>Logged by:</b>		Sean Doyle		
<b>Strata Description</b>	Depth (m)	OD level	Water depth	<b>Samples / Tests</b>		
				Type	Depth	Result
Organic soil	0.10					
Soft grey/brown CLAY with some sub-angular limestone Cobbles and occasional shale cobbles.	1.70					
End of trial pit at fine-grained white SANDSTONE bedrock						
<b>Remarks:</b> No groundwater encountered in the excavation						

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**Trial pit at T10**



## Trial Pit Log

<b>Project:</b>	Wind Farm Development	<b>Trial Pit ID</b>					TT11
<b>Location:</b>	Knocknamona, Dungarvan, County Waterford	<b>ING Coordinates</b>			E: 215071	N: 90146	
<b>Client:</b>	Ecopower Developments Limited	<b>Elevation (mOD):</b>			Z: 142		
<b>Date:</b>	04 November 2013	<b>Logged by:</b>			Sean Doyle		
<b>Strata Description</b>		<b>Depth (m)</b>	<b>OD level</b>	<b>Water depth</b>	<b>Samples / Tests</b>		
					<b>Type</b>	<b>Depth</b>	<b>Result</b>
Organic soil		0.10					
Soft grey/brown CLAY with rounded cobbles		1.70					
End of trial pit at SANDSTONE bedrock							
<b>Remarks:</b> No groundwater encountered in the excavation							

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**Trial pit at T11**



## Trial Pit Log

<b>Project:</b>	Wind Farm Development	<b>Trial Pit ID</b>		Sub-station		
<b>Location:</b>	Knocknamona, Dungarvan, County Waterford	<b>ING Coordinates</b>		E: 216456	N: 91204	
<b>Client:</b>	Ecopower Developments Limited	<b>Elevation (mOD):</b>		Z: 174		
<b>Date:</b>	04 November 2013	<b>Logged by:</b>		Sean Doyle		
<b>Strata Description</b>		Depth (m)	OD level	Water depth	<b>Samples / Tests</b>	
					Type	Depth
Organic soil		0.10				
Soft brown CLAY with some gravel content		1.50				
Soft grey CLAY with occasional rounded cobbles		3.00				
End of trial pit at hard SILTSTONE bedrock						
<b>Remarks:</b> Groundwater infiltration at a depth of 2.50m filling the excavation quickly.						



**Trial pit at Sub-station**

## Trial Pit Log

<b>Project:</b>	Wind Farm Development	<b>Trial Pit ID</b>			Borrow Pit 1		
<b>Location:</b>	Knocknamona, Dungarvan, County Waterford	<b>ING Coordinates</b>			E: 217281 N: 90790		
<b>Client:</b>	Ecopower Developments Limited	<b>Elevation (mOD):</b>			Z:		
<b>Date:</b>	04 November 2013	<b>Logged by:</b>			Sean Doyle		
<b>Strata Description</b>	Depth (m)	OD level	Water depth	<b>Samples / Tests</b>			
				Type	Depth	Result	
Organic soil	0.30						
Soft brown loose CLAY with some angular cobbles	1.50						
End of trial pit at SANDSTONE bedrock							
<b>Remarks:</b>							

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**Trial pit at Borrow Pit 1**



## Trial Pit Log

<b>Project:</b>	Wind Farm Development	<b>Trial Pit ID</b>			Borrow Pit 2		
<b>Location:</b>	Knocknamona, Dungarvan, County Waterford	<b>ING Coordinates</b>			E:	216056	
<b>Client:</b>	Ecopower Developments Limited	<b>Elevation (mOD):</b>			N:	91325	
<b>Date:</b>	04 November 2013	<b>Logged by:</b>			Z:		
<b>Strata Description</b>		Depth (m)	OD level	Water depth	<b>Samples /Tests</b>		
					Type	Depth	Result
Organic soil		0.30					
Soft brown loose CLAY with some angular cobbles		0.50					
End of trial pit at SANDSTONE bedrock							
<b>Remarks:</b>							

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**Trial pit at Borrow Pit 2**

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