

KWF Grid Connection EIA Report 2023

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Chapter 4: Alternatives Considered

EIA Coordinator:



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No appendices in Chapter 4

Glossary of General Terms

<u>Term</u>	<u>Definition</u>
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
Operational Woodhouse Substation	Woodhouse Substation at Keereen Upper is an operational electrical substation including electrical plant and control building, forming part of the national electricity system.
Operational Woodhouse Windfarm	Woodhouse Windfarm is an operational windfarm, located adjacent and connected to Woodhouse Substation. Woodhouse Windfarm comprises 8 wind turbines, 1 meteorological mast and ancillary site works.

4. Alternatives Considered

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4.1 Introduction

Annex IV (2) of the EIA Directive requires;

“A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.”

4.2 Methodology

Using the IMPERIA methodology¹, a comparison of the relevant environmental effects of the reasonable alternatives relevant to the project i.e alternative grid connection route/location; alternative cabling technology; and alternative materials/component haul routes, was carried out.

4.3 Reference Documents

RES-E Directive 2001/77/EC <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32001L0077>

The Impacts of Increased Levels of Wind Penetration on the Irish Electricity Systems
https://www.cru.ie/document_group/ce-er-ofreg-wind-study-report/

Connection Offer Policy and Process Paper COPP (ESBN/Eirgrid May 2011)
https://www.esbnetworks.ie/docs/default-source/publications/connection-offer-policy-and-process-paper.pdf?sfvrsn=a05c33f0_4

Eirgrid GRID25 <https://www.eirgridgroup.com/site-files/library/EirGrid/EirGrid-GRID25.pdf>

Gate 3 Grid Connection Group Processing Approach – An Analysis (John Leahy May 2010)
<https://arrow.dit.ie/cgi/viewcontent.cgi?article=1001&context=engscheledismsc>

Government of Ireland Climate Action Plan 2021 [gov.ie](http://www.gov.ie) - [Climate Action Plan 2021 \(www.gov.ie\)](http://www.gov.ie)

4.4 Alternative Grid Connection Location Point

The relatively slow progress of the Knocknamona Windfarm project through the Planning Process is relevant to the consideration of alternative grid connection points because the passage of time resulted in new options becoming available.

¹ The Imperia methodology is described in Chapter 2: EIA Process: Section 2.6.

Table 4-1 Planning Progress for the whole Knocknamona Windfarm project

Date	Milestone
Knocknamona Windfarm Application lodged July 2014	Planning application lodged with Waterford County Council for Knocknamona Windfarm. Planning Ref. 14/600109.
Knocknamona Windfarm Granted Planning December 2016	On appeal, an Bord Pleanála grants Planning for Knocknamona Windfarm comprising 8 No. wind turbines, electrical substation and ancillary works. Reference PL93.244006. The Grid Connection element was not part of the Windfarm application but a grid connection option was evaluated in the Knocknamona Windfarm Revised EIS (2015) wherein the environmental effects of a grid connection method to Dungarvan Substation (which was the connection point specified in the Knocknamona Windfarm Gate 3 Grid Connection Agreement) were examined in order to facilitate the cumulative assessment of the effects of the Knocknamona Windfarm project by the competent authority.
KWF Grid Connection 2019	Waterford City & County Council grants planning in December 2019 for the grid connection element of Knocknamona Windfarm (WCCC File Ref. 19/369) using a different grid connection point and route to that described in the Knocknamona Windfarm Revised EIS 2015. LA grant upheld on appeal by An Bord Pleanála in February 2021 (Reference ABP 306497-20). The Board's grant was quashed by the High Court in February 2023 due to internal Board procedural issues before the court hearing (Proceedings titled Reynolds & Ors v An Bord Pleanála High Court Record Number 2021 302 JR). As a consequence Knocknamona Windfarm Limited must now apply for the KWF Grid Connection anew. The proposed development - KWF Grid Connection 2023, is the same as that proposed in 2019.
Proposed Larger Turbines Granted Planning September 2022	On appeal, an Bord Pleanála grants Planning Permission for amendments to the turbine size at Knocknamona Windfarm. Reference ABP-314219-22.
Junction & Bend Widening Works Granted Planning December 2022	Waterford City & County Council grants Planning for Junction & Bend Widening Works to facilitate turbine component access through the windfarm site entrance at Knocknaglogh Lower. Grant upheld on appeal Reference ABP-314219-22

4.4.1 Effects of the Passage of Time

The grid connection method and route for Knocknamona Windfarm, which was examined in the Knocknamona Windfarm Revised EIS 2015, was a connection point to Dungarvan Substation, 8.5km to the northeast of Knocknamona Substation which would require a grid connection route of at least 11.5km mainly along the public road network. However, since the Knocknamona Windfarm 2015 EIS was produced, a possible new grid connection point, at Woodhouse Substation, was commissioned by the system operator, ESB Networks/Eirgrid for Woodhouse Windfarm. The grid connection point at Woodhouse Substation is just

c.2km west of Knocknamona Windfarm. This presented a new possible alternative grid connection location option for Knocknamona Windfarm.

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4.4.2 Higher Level Plans for Grid Connections

The consideration of alternatives for the grid connection location was carried out in the context of the Higher-Level Plans, which have been produced by the national electricity System Operator and the Government pursuant to the RES Directive (Directive 2001/77/EC) for promoting renewable energy use in electricity generation.

4.4.2.1 RES-E on the Irish Electricity Grid

Acronyms used in this section	
RES-E	Renewable Energy Sources of Electricity
CER	Commission for Energy Regulation (now CRU – Commission for the Regulation of Utilities)
SO	System Operator, operator of the electricity system
TSO	Transmission System Operator – Eirgrid, operator of the transmission system between generator plants
DSO	Distribution System Operator – ESB Networks, operator of distribution system to end customer
Node	Grid connection point on the national electricity system

The RES Directive states;

This means that grid access must be provided at a reasonable and transparent price in relation to the development of renewable electricity generation. It also means that Member States are required to put in place measures to facilitate grid access, for renewable electricity.

The distribution and trading of electricity in Ireland is a ‘Whole Island’ system. In order to implement the RES Directive, the Utility Regulators - CER (Rep. of Ireland) and the Office for the Regulation of Electricity and Gas (N. Ireland) commissioned a study to explore the effects of increasing levels of wind energy generation on the combined electricity systems of the whole island. This study was completed in 2003. This was followed by further studies by the Utility Regulators and the electricity System Operators on the technical aspects of large amounts of wind generation on the grid; the grid connections for this new generation type and the requirements for a new Wind Grid Code.

In 2004, the TSO/Eirgrid and the DSO/ESBN published their proposal for a Group Processing Approach (GPA) for Renewable Energy Grid Connections. This involved organising renewable energy grid connection applications into Groups based on geographical location and Sub-Groups based on a particular electricity system Node. The TSO then studied the groups from a technical capacity perspective. Both SOs (Eirgrid and ESBN) then identified the connection method for each grid application within the Group/Sub-Group. The SOs issued grid connection offers in batches or Gates for individual Nodes. Gate 1 offers to renewable projects, commenced in December 2004. These were followed by Gate 2 and Gate 3, all under the legal framework of regular CER Directives.

In 2008, Eirgrid published its long-term grid development strategy, GRID25. This strategy was based on a robust and stringent analysis of the long term needs of electricity users nationwide and includes solutions to deliver high quality, secure and economic power supplies in line with best international practice. GRID25 provides a scale to the necessary infrastructure required on a national and regional level and demonstrates the feasibility of at least 40% renewable electricity (RES-E) in our system by 2020. GRID25 provides an outline design for how the transmission network will be developed to meet this renewable energy challenge. Also in 2008, the Government announced an increase to the renewable generation target for 2020, from 33% to 40% of electricity consumption. The CER's response was to increase the capacity offered under Gate 3 to 3900MW.

The Gate 3 Grid Connection Offer Process commenced in December 2008.

4.4.2.2 Modifications to a Gate 3 Grid Connection Agreement

It was anticipated in the Eirgrid/ESBN's Connection Offer Policy and Process Paper (COPP, May 2011) that on occasion an alternative connection method to that offered by the SO, may be requested by a holder of a grid connection under the Group Processing Approach, this was in recognition of the extended length that it can take to achieve planning permission and the changes that can occur to a proposal during the planning process.

It states in the COPP that the SO is open to accommodating Modifications to the Grid Connection Agreement, where feasible and within certain strict criteria. All requests for modification made to the SO will be assessed in accordance with the appropriate technical standards, policy requirements and impacts on the electrical system and/or other users of the electrical system.

It must be consistent with the long-term development of the system including, but not limited to:

- Not adversely impacting upon the ability of the SOs to obtain necessary planning consents for other system developments in either the short or medium term.
- Not adversely affecting scarce station, or line routing capacity for potential future system development to the benefit of all customers.
- Not likely to lead to higher charges for the other projects in the group. In the event that the change proposed might lead to a delay in connection of the other projects in the group, any projects affected must advise their agreement to the change, in writing.
- Not likely to increase costs for the End User.
- Not resulting in a change of the designated connection point on the meshed transmission system originally chosen by the SO. (regional node change)
- The project will be liable for any additional cost to the system operator associated with its connection method;

A Modification request to the SO is not always granted because it may not fall within the strict criteria prescribed. Also a change in Connection Node requires agreement from all the other projects in the Group/Sub-Group for the Node. Modifications are more likely to be granted if the Applicant is the only generator in a particular group.

A request for a Modification to the grid connection method i.e. overhead line to underground cable can also be made. This is usually granted, subject to the prescribed criteria.

4.4.2.3 Timelines for Modification Requests

Requests for a Modification of a Grid Connection Agreement are treated as new applications and are governed by the same indicative timelines. Therefore requests should be processed within 90 business days of the application being finalised, but in reality a Grant or Refusal of a Modification Request can take a lot longer depending on the complexity of the sub-group and the nature of the technical and system planning effects.

4.4.2.4 Knocknamona Windfarm in the Gate 3 Process

In 2009, Ecopower Developments was assigned 34MW of wind energy capacity on the Dungarvan Node, at the ESB substation in Killadangan, Dungarvan under the Gate 3 Grid Connection process. The connection to be made from the windfarm substation to the Dungarvan Substation by underground cable (Gate 3 Ref. DG95 Knocknamona Windfarm Grid Connection Agreement No. 6002469533).

4.4.3 Consideration of Alternative Grid Connection Point for Knocknamona Windfarm

In summary, the Grid Connection Node assigned to any windfarm connecting to the National Grid is decided by the System Operator within higher level plans i.e. Eirgrid's GRID25 and Connection Offer Policy and Process Paper COPP policy documents. Although a modification to the grid connection point can be requested from the System Operator, the criteria applying to any changes are strictly limited. A request can be granted or refused and the modification process can be lengthy and onerous. Therefore consideration of an alternative grid connection point would generally not be a 'reasonable alternative*' (*Annex IV (2) of the EIA Directive).

However, an alternative grid connection point for Knocknamona Windfarm can be reasonably considered because of two specific characteristics of the KWF Grid Connection;

1. Knocknamona Windfarm Grid Connection is the only Group Processing Approach (GPA) project connecting into the Dungarvan Substation under Gate 3 – it does not have any other parties in the Sub-Group. Therefore many of the restrictions set out above and in the Eirgrid/ESBN Policy Paper COPP do not apply.
2. Whilst Knocknamona Windfarm was going through the planning process, Woodhouse Windfarm and Woodhouse Substation were constructed and commissioned. This created a new Grid Connection Node on the Eirgrid electricity system, just 2km to the west of Knocknamona Windfarm which was not available at the time that the 34MW of capacity was originally allocated to Knocknamona under Gate 3.

In May 2017, Ecopower Developments contacted ESB Networks, who are the operators of Woodhouse Substation, to ascertain if there was spare electrical capacity at the newly commissioned and operational Woodhouse Substation that could accommodate the electricity to be produced from Knocknamona Windfarm and if there was room at the substation to accommodate the extra equipment required. ESB Networks in consultation with Eirgrid, confirmed that there was adequate spare capacity and space to accommodate a grid connection from Knocknamona Windfarm.

Therefore, Ecopower carried out technical and environmental exploratory investigations on a possible grid connection method and route from Knocknamona Windfarm to Woodhouse Substation. These investigations informed the consideration of alternative grid connection method evaluation.

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4.4.3.1 Description of Alternative Grid Connection Routes for Knocknamona Windfarm capacity

The 2 No. alternative grid connection Routes considered were

- **Grid Connection to Dungarvan Substation;** Underground cable between the Knocknamona Windfarm Substation and the ESB Networks Substation at Killadangan on the Dungarvan/Cappoquin Road (N72), 8.5km to the northeast of Knocknamona Windfarm Substation. Two routes were examined - Route A c.14km in length, with the first part of the route along existing forestry roadways and tracks and the remainder along the public roads (12km) and Route B c.11.5km in length, this route runs along a mix of existing forestry roadways and tracks, public roads (8km) and open farmland. One of these routes, or a combination of both, are suitable for the underground cable connection from the Windfarm Substation, to the Dungarvan Substation at Killadangan.
- **Grid Connection to Woodhouse Substation;** Underground cable between the Knocknamona Windfarm Substation and the newly built Eirgrid (Woodhouse) substation at Keereen Upper 2km to the west of Knocknamona Substation. The underground electrical cabling would be c2km in length. The cabling would start at Knocknamona Substation and would be routed through lands comprising; felled forestry (footprint of the authorised Knocknamona Windfarm Substation); forestry road; small area of scrub; farm track crossing; Public Road L6074 crossing; Woodhouse Windfarm roads; grassland; and finishing in Woodhouse Substation compound.

Relevant Figure (at the end of this chapter)

Figure 4.1: Alternative Grid Connection Points and Cable Routes Considered

4.4.4 Comparison of the Environmental Effects of the Alternative Routes

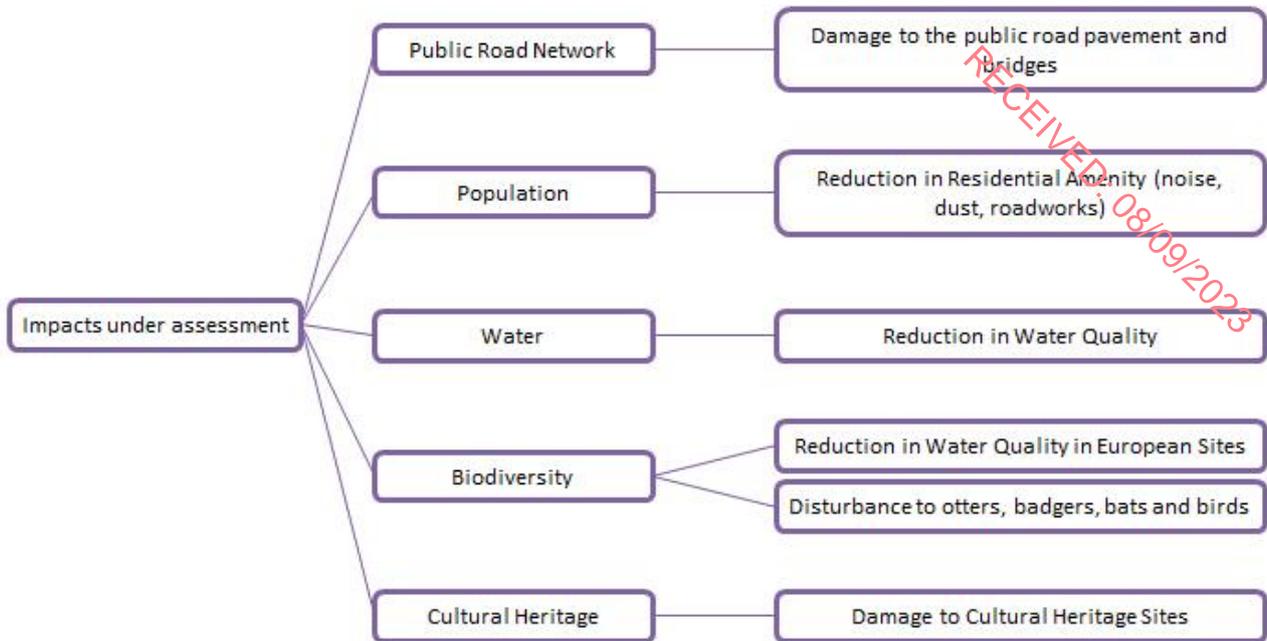
4.4.4.1 Sources of Information

This comparison exercise was informed by the following assessments & surveys;

- Grid Connection to Dungarvan Substation: Revised EIS (2015) for Knocknamona Windfarm in which alternative routes for an underground cable to connect Knocknamona Windfarm to Dungarvan Substation were assessed. Additional biodiversity surveys were carried by Inis Environmental Consultant in 2017 and 2018.
- Grid Connection to Woodhouse Substation: 2017/2018 and 2022/2023 site visits and desktop studies by the EIA Co-ordinator, field surveys by Archaeological Management Solutions and Inis Environmental Consultants, to gather information on the baseline environment for an alternative grid connection point at Woodhouse Substation.

4.4.4.2 Potential Impacts of the two Grid Connection Routes

There are alternative grid connection points at Dungarvan Substation or at Woodhouse Substation. Where there is potential for more significant impact on an environmental factor topic, the two points were compared for environmental effects. The environmental factor topics assessed and the impacts with potential for significant effect are set out in the Impact Tree below;



4.4.4.3 Comparison of the Environmental Effects on the Topics Chosen

A comparison of environmental impacts of the two alternative grid connection routes i.e. Connection to Dungarvan Substation or Connection to Woodhouse Substation, is presented in the table below.

Table 4-2: Comparison of the Environmental Effects of Two Alternative Grid Connection Routes

IMPACT	GRID CONNECTION TO DUNGARVAN SUBSTATION	GRID CONNECTION TO WOODHOUSE SUBSTATION
<p>Damage to the public road pavement and bridges</p>	<p>Brief Description: There are two candidate route corridors for the connection to Dungarvan Substation - Route A or Route B. Route A is approximately 14km in length, with 12km along the public roads. Route B is approximately 11.5km in length with 8km along the public road. Public Roads involved include the Local Road Network, Regional Road (R672) and National Route (N72). Works will involve seven bridge crossings for each candidate route. The grid connection cabling for both routes will require the excavation of trenches approximately 0.6m wide by 1.2m deep in public road pavements. Excavations will also be required for joint bays at various points along the route.</p> <p>Slight negative effects are predicted because, although following completion of construction of the cabling, the roads and bridges will be fully reinstated according to road opening licence conditions, nevertheless the works will utilise the public road network and seven bridge crossings. Both Route candidates (A & B) utilise the N72 (Tii) and Regional Roads and Local Roads (Waterford County Council), works on which are subject to road opening licensing and licence conditions. These roads have a moderate societal value due to road category (particularly the regional, national) and are moderately vulnerable to change due to extent of local usage and connectivity between population centres. The works for either cable Route A or B will be low intensity because the road surface itself is stable and can be fully reinstated; it will have a moderate spatial extent, utilising the public road for either 12km (Route A) or 8km (Route B). Works will be of low duration, lasting c.18 weeks in total but much shorter periods in any one place because works will progress in a linear manner along the route with temporary reinstatement of the road after each section of cabling is completed and permanent reinstatement on completion.</p> <p>Magnitude of change: low Sensitivity of the receptor: moderate <i>Evaluation by: Denis Moriarty the Kerries Civil Engineers Revised KWF EIS 2015; & P Kenealy EIA Report 2023 Co-ordinator</i></p>	<p>Brief Description: This route would utilise the Public Road at just one cable crossing, which is under the road structure using directional drilling to cross the Local Road L6074 at Keecreen Upper townland (100m from Woodhouse Substation). There are existing farm/windfarm/substation entrance gates on either side of the chosen crossing point. The road is extremely lightly trafficked and there are no underground services or water supply services at the crossing point.</p> <p>Neutral negative Effects are predicted because the total cabling works required on a public road consists of directional drill, under the Local Road L6074 which has existing farm/windfarm/substation gates on either side of the crossing points. The road is extremely lightly trafficked and there are no existing underground services or water supply services at the crossing point. This road has low societal value due to road category and extremely low usage. The road has low vulnerability to change because of the stability of road environment, low traffic usage and the absence of road works.</p> <p>Magnitude of change: low Sensitivity of the receptor: low <i>Evaluation by: R Geary TLI Group & P Kenealy EIA Report 2023 Co-ordinator</i></p>

IMPACT	GRID CONNECTION TO DUNGARVAN SUBSTATION	GRID CONNECTION TO WOODHOUSE SUBSTATION
<p>Reduction in Residential Amenity during construction (noise, dust, roadworks)</p>	<p>Brief description: There are circa.150 noise sensitive receptors (dwellings) within 80m of the grid connection works, including all parts of Route A and Route B. The existing noise environment consists mainly of traffic noise on the public road network.</p> <p>Slight negative impact is predicted at the circa. 150 dwellings within 80m of the cabling works. The construction of the grid connection cabling (including trench excavation and backfill), will elevate noise and dust levels and involve traffic delays at road works, in the immediate vicinity of the works. The key traffic impact to residents will include single lane closures for the wider roads and road closures for narrower roads, where traffic can be diverted around the works, retaining local access. Minor delays will be experienced throughout the works with all routes remaining within capacity. Existing regulations and guidance will govern working hours and Traffic Management Measures, which will be carried out in accordance with the Road Opening Licence Conditions. The construction of linear infrastructure such as underground grid infrastructure, is such that it moves along quickly and plant and machinery do not remain in the one location for long periods of time. The works will take approximately 18 weeks to construct. It is predicted that construction phase noise and dust will be short and temporary and will not extend 1 to 2 days at any one dwelling.</p> <p>Magnitude of change: low Sensitivity of the receptor: moderate</p> <p><i>Evaluation by: Malachy Walsh & Partners Revised KWF EIS 2015; & P Kenealy EIA Report 2023 Co-ordinator</i></p>	<p>Brief Description: There are no dwellings within 80m. The nearest dwelling is 330m from the grid connection works.</p> <p>Imperceptible negative effects is predicted because the nearest dwelling is 330m distant. There are no works to Local Roads and no road closures. The local roads are extremely lightly trafficked. Most of the route is under existing forestry tracks and existing windfarm roads which are not sensitive or vulnerable to changes. Installation of underground cabling and ancillary works would be for a short duration of circa. eight weeks over a circa.2km linear route. Because the nearest house is 330m from the construction works area, noise and dust from the works would have no impact on this house. Directional drilling under the public road will not cause disruption to local access.</p> <p>Magnitude of change: low Sensitivity of the receptor: low</p> <p><i>Evaluation by: P Kenealy EIA Report 2023 Co-ordinator</i></p>

IMPACT	GRID CONNECTION TO DUNGARVAN SUBSTATION	GRID CONNECTION TO WOODHOUSE SUBSTATION
Reduction in Water Quality	<p>Brief Description: Works involve either 6 bridge crossings and one directional drill crossing under the Brickey River for Route A; or 6 bridge crossings and one directional drill under the River Colligan for Route B. All the watercourse crossings involve the River Brickey, River Colligan and tributaries of these rivers.</p> <p>Moderate negative impact is predicted. With the exception of the directional drilling sites (one directional drill for each Route), all watercourse crossings can be made within the existing bridge road surface because there is sufficient depth of covering to accommodate the cabling. Rivers have high societal value and sensitivity. Physiochemical effects to water quality could result from the increase in suspended solids from construction site runoff at the bridge crossings and/or from pollutants such as hydrocarbons and chemicals at a directional drill site. All watercrossings whether within bridge structures or under the river bed by directional drilling will be carried out using Standard Construction Methodologies.</p> <p>Magnitude of change: low Sensitivity of the receptor: high</p> <p><i>Evaluation by: HES Consultants Revised KWF EIS 2015; & P Kenealy EIA Report 2023 Co-ordinator</i></p>	<p>Brief Description: There are no watercourse crossings (streams or drains) required, and in addition there are no manmade drains of any significance in the development area.</p> <p>Imperceptible impact is predicted because the nearest surface water body from the construction works area is Mountodell Stream (formally Roaring Water) at 280m distant (River Brickey Catchment) and there is no direct hydrological connectivity between this waterbody and the works. Local River Waterbodies are considered not sensitive to the cabling route works due to separation distance and scale/nature of the works.</p> <p>Magnitude of change: no impact Sensitivity of the receptor: Moderate</p> <p><i>Evaluation by: Inis Environmental Consultants & P Kenealy EIA Report 2023 Co-ordinator</i></p>

IMPACT	GRID CONNECTION TO DUNGARVAN SUBSTATION	GRID CONNECTION TO WOODHOUSE SUBSTATION
<p>Reduction in Water Quality in European Sites</p>	<p>Brief Description: The grid connection route to Dungarvan Substation does not occur within the boundaries of any European Site. The closest European Site to the works is the Dungarvan Harbour SPA. This SPA is located approximately 300m to the south east of the ESNB substation at Killadangan (the grid connection Node). Both Route A and Route B are hydrologically connected to the SPA and cross the Colligan River and the Brickey River upstream of Dungarvan Harbour SPA (whether by bridge crossing or directional drill crossing).</p> <p>Slight negative impact is predicted. European sites are highly regulated and have high societal value. The grid connection cabling works require bridge crossing/directional drilling works in order to cross the Brickey River and the Colligan River which may lead to the indirect release of sediment/contaminants into these watercourses which ultimately discharge to Dungarvan Harbour SPA. However, the scale of the works required indicate that any such indirect impact will not be significant and is not likely to have a significant impact on the special conservation interests of Dungarvan Harbour SPA (15 waterbird species). There is potential for some impact on the water quality of the Colligan River (which is 300m from the SPA boundary) but these impacts will be minor and any consequent impacts on the water quality of Dungarvan Harbour SPA will be imperceptible. The magnitude of potential impact is less again in the Brickey sub-catchment taking account of distance upstream and carrying capacity.</p> <p>Magnitude of change: low Sensitivity of the receptor: moderate</p> <p><i>Evaluation by: Ecofact revised EIS 2015/AA Screening; and also Inis Environmental Consultants & P Kenealy EIA Report 2023 Co-ordinator</i></p>	<p>Brief Description: The grid connection route to Woodhouse Substation does not occur within the boundaries of any European Site. The closest European Site to the works is Blackwater River (Cork/Waterford) SAC is 2.9km to the northwest. This SAC is hydrologically connected to the work area, however no watercourse crossing works are required for the grid connection to Woodhouse.</p> <p>No impact predicted: There are no watercourses on the development site, and any construction run-off into watercourses can only be by overland flow. (The nearest watercourse to the Development is 280m, this is the Mountodell Stream in the River Brickey, Colligan-Mahon catchment, the nearest watercourse in the River Blackwater catchment is the Monageela Stream c.350m from grid connection works). Due to the absence of instream works or watercourse crossing works, the dilution factor, and the limited scale and extent of works, no significant impacts to water quality in downstream European Sites are likely to occur.</p> <p>Magnitude of change: no impact Sensitivity of the receptor: low</p> <p><i>Evaluated by Inis Environmental (AA Reporting 2023) & P Kenealy EIA Report 2023 Co-ordinator</i></p>

IMPACT	GRID CONNECTION TO DUNGARVAN SUBSTATION	GRID CONNECTION TO WOODHOUSE SUBSTATION
<p>Disturbance to Otters, Badgers, Bats and Birds</p>	<p>Brief Description: Two candidate route corridors for underground cabling to connect to Dungarvan substation were examined, Route A and Route B. Route A comprises 1.6km of cabling along existing forestry roadways and tracks and the remaining 12.4km along the public roads. Route B comprises 3.5km along a mix of existing forestry roadways and tracks, private laneways and open farmland with 8km along the public road. During 2018 surveys, otters were recorded at several watercourse crossing locations along these routes. In relation to bats, it is likely that bats use existing linear features such as roadside and field hedgerows which occur extensively along both route options to Dungarvan Substation. During 2018 surveys, several bridges had suitability for roosting bats, and due to the occurrence of mature deciduous trees, and the occurrence of buildings along the routes, it is likely that roosting bats will be present in close proximity (150m). Hedgerow, treelines, conifer plantation and mixed woodland occur adjacent to the works areas – these habitats are valuable to breeding birds. Dipper (birds) were also recorded at bridge crossing locations.</p> <p>Slight negative impact predicted. Works along the roads have the potential to disturb otters, roadside bats and birds. Works off-road have the potential to disturb mammals and birds in proximity to the works. The routes to Dungarvan, would require the potential felling of trees, the removal of short sections of hedgerow or treeline, and the clearance of conifer plantation – this loss of habitat (temporary and permanent) may contribute to impacts on the roosting habitats of bats, foraging habitat for bats, nesting and foraging habitats for birds and mammals. Given the evidence of otter recorded at bridge crossing locations in 2018, there is potential for disturbance effects to these mammals. Slight adverse short term impacts are also likely to bats and birds along the routes.</p> <p>Magnitude of change: low Sensitivity of the receptor: moderate</p> <p><i>Evaluation by: Malachy Walsh & Partners Revised KWF EIS 2015; and also Inis Environmental Consultants 2018 & P Kenealy EIA Report 2023 Co-ordinator</i></p>	<p>Brief Description: Works involve circa.2km of cabling comprising felled forestry (footprint of the authorised Knocknamona Windfarm Substation), forestry road; scrub; farm track crossing; Woodhouse Windfarm roads; Public Road L6074 crossing; grassland and will finish in Woodhouse Substation compound. There are no watercourses within the works area and no crossings or instream works are required. The nearest watercourse is the Mountodell Stream, c.280m from works. Bat surveys show usage of the forestry roads at Knocknamona by foraging bats, but that suitable roosting sites (such as trees or bridges or buildings) do not occur in close proximity (150m). Low numbers of bird species were recorded at the site during surveys.</p> <p>Imperceptible negative effects predicted. While the cabling works have the potential to disturb mammals and birds during construction, the potential for impacts is limited due to the low value of habitats along the route to mammals or birds, with construction works predominately located on built surfaces (existing forestry/windfarm access road and existing substation compound yard). The potential for impacts is further limited by the nature of the works on this route, where there is no requirement for watercourse crossing works, no requirement for felling of any trees or removal of hedgerow.</p> <p>Magnitude of change: low Sensitivity of the receptor: low</p> <p><i>Evaluation by: Inis Environmental Consultants & P Kenealy EIA Report 2023 Co-ordinator</i></p>

IMPACT	GRID CONNECTION TO DUNGARVAN SUBSTATION	GRID CONNECTION TO WOODHOUSE SUBSTATION
<p>Damage to Cultural Heritage Sites</p>	<p>Brief Description: Candidate Route B to Dungarvan Substation passes through the Zones of Constraint for a cluster of RMPs centred on a medieval castle and church complex in the townland of Knockmaon (Earthwork, Stray Find, Castle - Tower House, Church, Cross Inscribed Stone & Graveyard). Both Route A & Route B also cross eight bridges and the site of a former mill race. Neither the bridges nor the Mill Race are listed on the RMP, RPS or NIAH but do form part of the cultural heritage of the area. The routes pass within 100m of an additional 40 cultural heritage sites.</p> <p>Moderate negative Impact: There is potential for significant impacts to previously unrecorded subsurface archaeology in the area around the castle/church complex in Knockmaon. Impacts to bridges being crossed are also likely to occur. In addition, the density of archaeological sites gives rise to the possibility of an indirect impact on associated subsurface archaeology, which may be uncovered during groundworks for the construction of the grid route.</p> <p>Magnitude of change: moderate Sensitivity of the receptor: moderate</p> <p><i>Evaluated by: Kilkenny Archaeology Revised KWF EIS 2015; and also P Kenealy EIA Report 2023 Co-ordinator</i></p>	<p>Brief Description: The development is not located within a zone of notification of any RMP, the nearest RMP being a Ringfort (WA030-054) 100m to the west. There are no other previously recorded features of historic or cultural importance on or around the location of the development and no additional sites were noted in field survey.</p> <p>No Impact predicted: The development is not located within a zone of notification of any RMP and there are no other previously recorded features of historic or cultural importance on or around the location of the development and no additional sites were noted in field survey. The entire footprint of the development area has been subject to intensive agriculture and forestry plantation in the past, with works located on already excavated access roads or on previously disturbed forestry or agricultural ground. Therefore, because the ground has been excavated previously, it is unlikely that any fully intact remains of special archaeological significance will be uncovered during the construction works associated with this development.</p> <p>Magnitude of change: no impact Sensitivity of the receptor: low</p> <p><i>Evaluated by Archaeological Management Solutions & also P Kenealy EIA Report 2023 Co-ordinator</i></p>

4.4.5 Conclusion to Comparison of Alternative Grid Connection Routes

Table 4-3 Summary Classification of Impacts – Alternative Grid Connection Routes

Significance		Grid Connection to Dungarvan Substation	Grid Connection to Woodhouse Substation
Positive	Very high		
	High		
	Moderate		
	Low		
↕	No impact/ Neutral Impact		- Damage to the public road pavement and bridges - Reduction in Water Quality in European Sites - Damage to Cultural Heritage Sites
	Imperceptible		- Reduction in Water Quality - Reduction in Residential Amenity (noise, dust, roadworks) - Disturbance to otter, badger, bats and birds
Negative	Slight	- Damage to the public road pavement and bridges - Reduction in Residential Amenity (noise, dust, roadworks) - Reduction in Water Quality in European Sites - Disturbance to otter, badger, bats and birds	
	Moderate	- Reduction in Water Quality - Damage to Cultural Heritage Sites	
	High		
	Very high		

Neither the cabling route for the Grid Connection to Dungarvan Substation nor the route for the Grid Connection to Woodhouse Substation are likely to have significant environmental effects.

The results of the analysis of the environmental effects of the Grid Connection to Dungarvan Substation is Slight to Moderate negative Impact because of scale of works along the public road; number of houses in proximity to the works; impact pathways to European Sites; requirement for watercourse crossing works; works in close proximity to roadside hedgerows and field boundaries with some habitat loss occurring; and the proximity of watercourses and cultural heritage.

The Grid Connection to Woodhouse Substation is predicted as having No/Neutral Impact to Imperceptible negative Impact because of the smaller scale of works, no works on the public road, no houses in close proximity, no watercourse crossings, greater separation distance from European Sites; location of works in an already modified environment and absence of cultural heritage along the route to Woodhouse Substation.

Therefore the Grid Connection to Woodhouse Substation is the better alternative grid connection method and route when a comparison of environmental effects is considered.

Relevant Figure (at the end of this chapter)

Figure 4.1: Alternative Grid Connection Points and Cable Routes Considered

4.5 Alternative Grid Connection Technologies (underground v. overhead line)

The connection point thus decided, alternative technologies for the grid connection cable were considered. The alternatives considered were overhead line (OHL) or Underground Cable (UGC), to connect the authorised Knocknamona Windfarm substation to the existing Woodhouse Substation. Both the OHL and UGC options require excavations (either for trenching or pole sets) and both would be constructed in a relatively short length of time of one to two months. The primary discriminating characteristic between overhead line v. underground cable is visibility during the operational stage. Therefore the visual impact on the environmental topic Landscape, was compared for the two technologies.

4.5.1 Description of the two Alternatives

Overhead line (OHL) comprising 3 conductors (cables) strung between c. 19 single or double wooden pole-sets with stays attached to pole sets at any change of direction. The overhead line would be a new permanent built feature in the Landscape.

Underground cables (UGC), ducts and other apparatus installed in a trench. The underground cable placement would be completely reinstated and would have no above permanent ground features.

4.5.2 Description of the Landscape Setting

The landscape context is one of a plateau ridge with commercial forestry, Woodhouse Windfarm, Woodhouse Substation, and existing overhead lines visible. Knocknamona Windfarm (when constructed) will add to this existing infrastructure. A section of the long-distance Saint Declan's Way pilgrim route passes within 1.5km of the development site at its closest point. There is also a network of forest access roads, which are used informally by hill walkers and local residents. The development site is in the Drumhills area which is included as an area of High Sensitivity in Waterford City & County Development Plan 2022-2028; Appendix 8 Landscape and Seascape Character Assessment; TABLE A8.3 SENSITIVITY CLASSIFICATIONS AND AREAS.

4.5.3 Comparison of environmental effects on Landscape of OHL v. UGC

4.5.3.1 Landscape Effects of Overhead Line

The area is of **Moderate sensitivity** to the overhead line due to County Development Plan Landscape designations and the elevated position of the lands. However, the presence of a new overhead line would have a **low negative magnitude of change** to existing conditions due to the presence of other modifications to the ridge i.e commercial forest, existing windfarm, permitted windfarm and overhead line. The impact would therefore be **Slight Negative**.

4.5.3.2 Landscape Effects of Underground Cable

The area is of **Low sensitivity** to an underground cable due to the already modified nature of the receiving ground (existing forestry, windfarm tracks, existing substation compound). There would be a magnitude of **No Change** to the landscape because the cable trench would be fully reinstated on completion with no over ground expression of the development permanently visible on the landscape. The Impact would therefore be **No Impact**.

4.5.4 Conclusion to Comparison of Environmental Effects of Alternative Grid Technologies

Although the **overhead technology** is not predicted to have significant effects, it will be visible on the ridge with **Slight Negative** impacts on the Landscape, whereas the **underground technology** will have no permanent above ground features and therefore **No Impact**.

Underground Cabling technology was chosen as the preferred technology for the grid connection cable, when a comparison of environmental effect was considered.

4.6 Alternative Component Haul Route

In the Knocknamona Windfarm Revised EIS 2015, a turbine component haul route utilising the Knocknamona Windfarm main entrance gate and public roads to the east and southeast of the windfarm at Knocknaglogh Lower was examined for environmental effects. A planning application was made in May 2022 for Junction & Bend Widening Works at 3 No. locations on the public road between Pulla Crossroads on the N25 outside Dungarvan and Knocknamona Windfarm Entrance at Knocknaglogh Lower (part of this Haul Route) to facilitate component deliveries to Knocknamona Windfarm. These works were granted planning permission by Waterford County Council in July 2022 and the grant was upheld by An Bord Pleanála under Reference 314219, in December 2022.

In the intervening period since the assessment of the haul route option through Knocknamona Windfarm entrance at Knocknaglogh Lower townland in the windfarm Revised EIS 2015, Woodhouse Windfarm completed construction. The turbine components for Woodhouse Windfarm were delivered to site through the main Woodhouse Windfarm entrance at Woodhouse or Tinakilly townland.

In order to connect Knocknamona Windfarm Substation to Woodhouse Substation i.e. the purpose of the KWF Grid Connection, it is proposed that a section of the underground cable crosses under lands for circa.200m between the forestry road network at the Knocknamona Windfarm side to the Woodhouse Windfarm road network. Coillte (one of the landowners of this section of land) requires that this cabling is covered by a roadway, so that the cabling location is easily identified and protected from forestry management activities. This will result in the two windfarm road networks (Woodhouse and Knocknamona) being accessible to each other off-public road and presents an opportunity to consider an additional transport route for the turbine and electrical components to Knocknamona Windfarm, via Woodhouse Windfarm main entrance.

4.6.1 Description of the two Alternatives for Component Deliveries

- 1. Haul Route A through Knocknamona Windfarm Site Entrance at Knocknaglogh Lower on the L6077:**
The turbine components will most likely be delivered to Belview Port. The delivery vehicles comprising abnormal loads, would travel for a short distance on the N29 and then along the N25 to a point (Spring Roundabout) outside Dungarvan Town. The vehicles would continue on the N25 as far as Pulla Crossroads. Turning right at Pulla, the vehicles would travel along Local Roads – first west on the L2024, north on the L2022 and west again on the L6077, as far as the site entrance. Remedial works would be required to the local road sections between the N25 at Pulla to the site entrance, namely Local Roads L2024, L2022 and L6077. The works would comprise road/bend widening and temporary widening at

two junctions. There would also be temporary removal of signage along the N29 and N25, in particular at roundabouts. This haul route – to be called Haul Route A, was examined in the Knocknamona Windfarm Revised EIS 2015 as the haul route for construction materials e.g. aggregate, concrete and turbine components.

2. **Haul Route B through existing Woodhouse Windfarm Main Entrance Gate at Woodhouse or Tinakilly on the L60741:** From Belview Port, the component delivery vehicles, would travel for a short distance on the N29 and then along the N25 to the junction with the N72, north of Dungarvan at Knockboy, the same as for Haul Route A. The vehicles can then travel west along the N72 as far as the junction with the R671, turning left (south) onto the R671 and travelling on the R671 as far as the junction with the L6074, turning east. The vehicles would travel east on the L6074 and then the L60741, as far as the existing main Woodhouse Windfarm entrance. The turbine components can then be transported through Woodhouse Windfarm on the existing private windfarm roads, the vehicles can cross the new private link road and move on to the Knocknamona forestry private road network and then Knocknamona Windfarm private road network for delivery to the turbine construction sites. Temporary removal of signage would be required along the N29 and N25, in particular at roundabouts, but no widening or other remedial works are required to the public road network to transport component loads using this route. This is because the required works have already taken place in order to facilitate the delivery of turbine components to Woodhouse Windfarm. It is proposed to use this haul route – to be called Haul Route B, predominately for turbine component and grid connection electrical equipment deliveries.

Relevant Figure (at the end of this chapter)

Figure 4.2: *Alternative Turbine Components Haul Routes*

4.6.2 Comparison of environmental effects of Haul Routes A & B

4.6.2.1 Environmental Effects of Haul Route through Knocknamona Windfarm Site Entrance

The Local Roads requiring works namely the local road sections between the N25 at Pulla as far as Knocknamona Windfarm site entrance - L2024, L2022 and L6077 are currently used for forestry management traffic and are of sufficient strength to accommodate normal axel weights for concrete, aggregate and turbine component deliveries. However these roads have a **Moderate sensitivity** given that widening works are required to accommodate the turbine component deliveries. Therefore there would be some minor effects of dust, noise, traffic disruption and works near drainage. However, the scale and duration of the works are small and temporary and therefore of **low negative magnitude of change** to existing conditions. The impact would therefore be **Slight Negative**.

Evaluation Information Source: Knocknamona Revised EIS 2015: Chapter 7: Public Road Network.

4.6.2.2 Environmental Effects of Haul Route through Woodhouse Windfarm Main Entrance Gate

The Regional and Local roads to be used namely the R671, L6074 and L60741 have a **Low sensitivity** to turbine component traffic because no works will be required to these roads to facilitate passage of the component traffic and therefore there will be no effects of dust, noise or works near water or drainage due to road works. There will be minor traffic disruption during turbine component deliveries which are required to be organised with the Gardaí and the Local Authority and timed to cause minimal disruption. There will be a magnitude of

No Change to existing conditions due to absence of remedial works. The Impact would therefore be **No Impact**.

4.6.2.3 Conclusion to Comparison of Environmental Effects of Alternative Component Haul Route

Although the **Haul Route through Knocknamona Windfarm Site Entrance** is not predicted to have significant effects, it does require road works with **Slight Negative** impacts on the environment in order to deliver the turbine components, whereas the **Haul Route through Woodhouse Windfarm Main Entrance Gate** requires no road works for such deliveries and therefore will have **No Impact**.

The Haul Route through Knocknamona Windfarm site entrance will remain the route for construction materials and some turbine component deliveries for Knocknamona Windfarm. The Haul Route through Woodhouse Windfarm Main Entrance Gate was chosen as the predominant turbine component and grid connection electrical equipment haul route, when a comparison of environmental effect was carried out.

4.7 'Do-Nothing' Alternative

The 'do-nothing' alternative examines trends currently occurring in the environment and the effects caused by not proceeding with the development.

The subject application comprises the grid connection for Knocknamona Windfarm, therefore a secondary impact of the grid connection not being constructed would be that Knocknamona Windfarm may not be built with the following consequences;

- **Inaction in relation to climate change remediation.** The very high impact of Climate Change to biodiversity and to our human wellbeing, is reflected in the Irish Oireachtas declaring a climate and biodiversity emergency as far back as the 9th May 2019. Every unit (kWh) of electricity generated by renewable energy sources (RE-E) replaces a unit of electricity generated by fossil fuel sources and thereby offsets the pollution (expressed in CO₂e) that would be emitted by fossil fuel generation. Failure to reduce the emission of GHGs will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of pervasive and irreversible impacts for people and ecosystems.

The Government's Climate Action Plan 2021 puts in place a decarbonisation pathway to 2030, which would be consistent with the adoption of a net zero target in Ireland by 2050. The *raison d'être* of the Plan is to reduce harmful CO₂e emissions which are changing the planet's climate, by causing global temperatures to rise. Due to the acknowledged urgency of climate action, one of the key milestones of the Climate Action Plan is to increase reliance on renewables for the generation of electricity (RE-E) from 30% to 70% over the period 2021 to 2030, which will require the addition of 12,000MW of RE-E capacity.

In that context, the consequence of Knocknamona Windfarm not being constructed would be a **Significant lost opportunity** to contribute to Ireland's action on **Climate Change remediation**.

- There would be **no improvement to National balance of payments** through the substitution of an indigenous energy source (wind) for an imported energy source (fossil fuels) representing a lost opportunity cost to Material Assets.
- There will be no long-term economic gain locally from the operational Knocknamona Windfarm per;
 - Annual commercial rates payments of est. **€250,000 per annum** for the lifetime of the windfarm representing a **positive contribution to Material Assets**.
 - Annual community benefit payments of **€150,000 per annum** representing a **positive contribution to Population**.

- One team of wind turbine technicians in full time **employment** on the windfarm representing a **positive contribution to Population** in the wider region.

4.8 Summary Conclusion

On examining alternative grid connection routes, it was decided that **a route to the grid connection point at Woodhouse Substation**, has the lowest overall effects on the environment and therefore Woodhouse Substation was chosen as the grid connection point for Knocknamona Windfarm.

On examining alternative grid connection technologies, it was decided that an **underground cable connecting Knocknamona Windfarm to Woodhouse Substation** would have no visual impacts to the landscape and therefore was chosen as the grid connection cabling method.

On examination of alternative haul routes, it was decided that an alternative **haul route for turbine components using a route through the existing Woodhouse Windfarm main entrance and road network**, has no effects on the environment.

On comparing the effects on the environmental factors of the Do-Nothing alternative, it is apparent that **Doing Nothing is a significant opportunity lost to Ireland's efforts to combat Climate Change** and lost opportunity to improve national balance of payments and economic gain through commercial rates, community benefit payments and employment from an operational Knocknamona Windfarm.

Figure 4.1 - Alternative Grid Connection Points and Cable Routes Considered

- Legend:
- ★ Authorised Knocknamona Windfarm Substation
 - Existing Dungarvan Substation
 - Route A to Dungarvan Substation
 - Route B to Dungarvan Substation
 - Existing Woodhouse Substation
 - Route to Woodhouse Substation

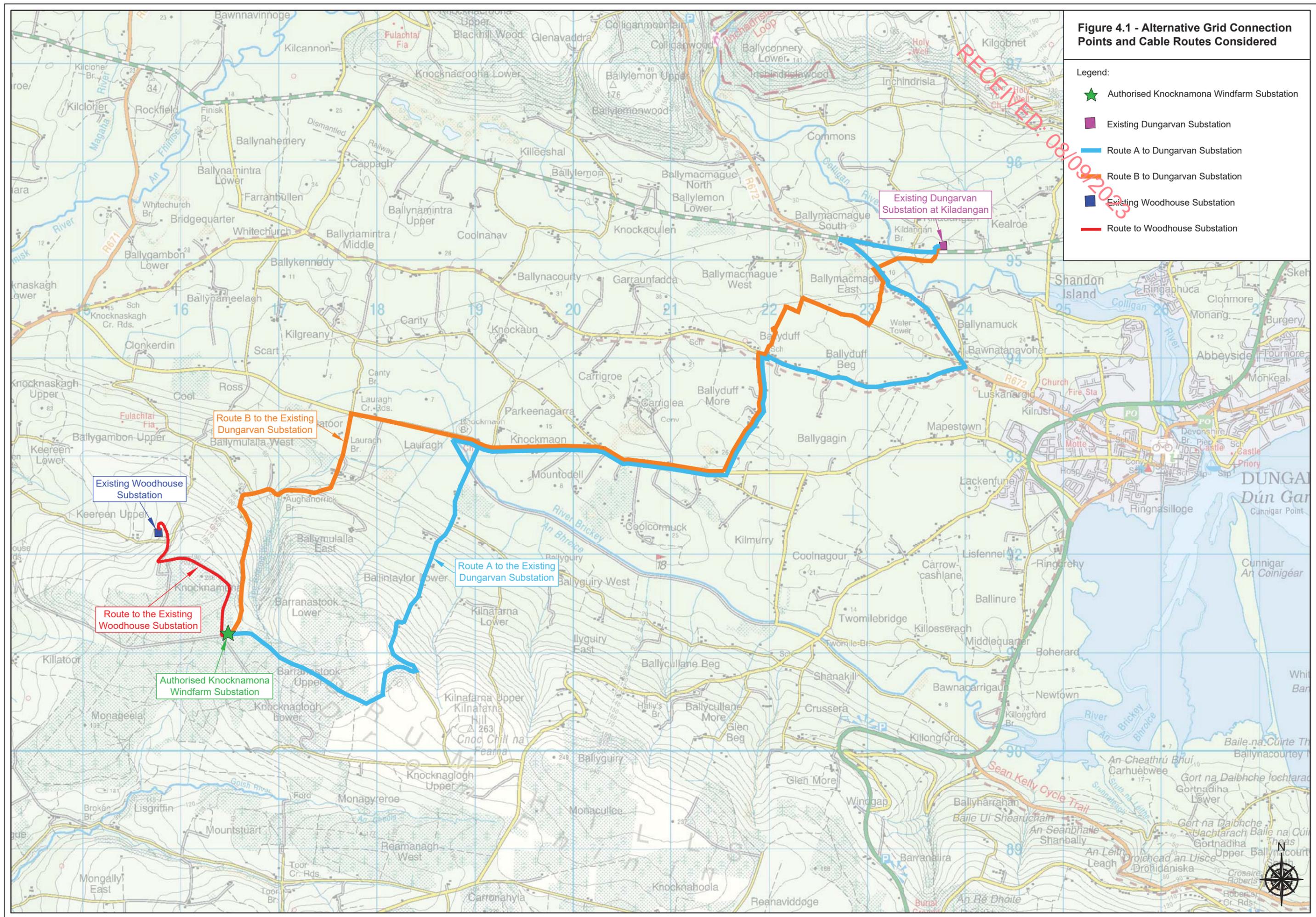


Figure 4.2 - Alternative Turbine Component Haul Routes

- Legend:
- ★ Authorised Knocknamona Windfarm Entrance
 - Authorised Turbine Component Haul Route through Knocknamona Windfarm Main Entrance at Knocknaglogh Lower
 - ★ Existing Woodhouse Windfarm Entrance
 - Turbine Component Haul Route through Woodhouse Windfarm Main Entrance
 - L6074 Public Road Identification Number

