

Further Information Response ABP-309121-21

Lyrenacarriga Wind Farm
Further Information





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INTRODUCTION

MKO have been instructed by our clients Curns Energy Ltd., (the Applicant) to prepare this report in response to the request for further information issued by An Bord Pleanála under ABP-309121-21 on the 8th of April 2022. The request for further information is being made in relation to the proposal for a wind farm development located at Lyrenacarriga, County Waterford and Lyremountain, County Cork.

The development description as per the public notices is as follows:

- i. Construction of up to 17 No. wind turbines with a maximum overall blade tip height of up to 150 metres;*
- ii. 1 no. Meteorological Mast with a maximum height of up to 112 metres;*
- iii. Construction of 1 no. staff welfare and storage facility including wastewater holding tank;*
- iv. 1 no. permanent 110 kV electrical substation with 2 no. control buildings with welfare facilities, 10 no. battery containers, battery switchgear building, all associated electrical plant and equipment, security fencing, all associated underground cabling, wastewater holding tank and all ancillary works;*
- v. Underground cabling connecting the turbines to the proposed substation and connection from the proposed substation to the national grid via a 110 kV loop in connection.*
- vi. Upgrade of existing tracks, roads and provision of new site access roads and hardstand areas;*
- vii. Construction of an access track in the townlands of Breeda and Rearour South to facilitate turbine delivery;*
- viii. Junction improvement works in the townland of Killea to facilitate turbine delivery;*
- ix. 3 no. borrow pits;*
- x. 2 no. temporary construction compounds;*
- xi. Site Drainage;*
- xii. Forestry Felling;*
- xiii. Signage; and*
- xiv. All associated site development works*

A 10-year planning permission and 30-year operational life is being sought and an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) were prepared for the project to accompany the planning application.

The planning application was lodged with An Bord Pleanála on the 8th of January 2021 where it was assigned the case reference ABP-309121-21. On the 8th of April 2022 An Bord Pleanála issued a request in accordance with Section 37F(1) of the Planning and Development Act 2000 (as amended) which sought further information on 10 items. Section 2 of this report presents our response to the individual further information items, while also taking the opportunity to respond to matters raised in Third-Party submissions to the application.

In addition, it is highlighted to the Board that Section 3 of this Response document addresses the potential for the relocation of Turbine 5 (T5), following the project team becoming aware of grants of planning permission being issued for two dwellings in the vicinity of the wind farm since the planning application was originally lodged with the Board in January 2021. For clarity, please note that the detail and responses set out here at Sections 1 and 2 relate to the Proposed Development as set out in the original documentation. The potential relocation of T5 is very short distance, 165 metres to the east of the current Turbine 5, and so Section 3 addresses the environmental effects of such a move considering each of the disciplines within the EIAR and considering the NIS.

In addition to those persons who contributed to the original Environmental Impact Assessment Report (EIAR) lodged, the following have contributed to this response to Further Information.

Table 1-1: Project Team

Company	Name	Qualification	Experience	Contributing Section
AWN Consulting Ltd	Mike Simms	BE, MEngSc, MIOA	Senior Acoustic Consultant with 16 years' experience in the field of environmental acoustics, in particular using computer-based noise modelling for environmental noise assessments.	Noise
MKO	Meabhann Crowe	BA, MScURP, MRTPI	Project Planner with MKO, having joined in 2018.	All
	Mary Kelleher	BSc. Env, M Plan	Planner with MKO, having joined in 2022	All
	Niamh McHugh	BSc, Env	Environmental Scientist with MKO, having joined in 2021.	Shadow Flicker
	Jack Workman	MSc, TMLI	Environmental Scientist with MKO, having joined in February 2020.	Landscape & Visual
	Jack Smith	BCL, ML, MSc.	Environmental Scientist with MKO, having joined in 2021	Landscape & Visual
	Padraig Desmond	BSc, QCIEEM	Ecologist with MKO, having joined in 2021.	Ecology
	Ellen Costello	MSc., BSc	Environmental Scientist with MKO having joined in November 2019.	Shadow Flicker
	Killian McGovern	BSc, Env	Environmental Scientist with MKO, having joined in 2020	Ecology

2.

FURTHER INFORMATION RESPONSES

2.1

Further Information Item No.1 – Wording

Details of Proposed Turbines

“It is noted that the development description as set out in the statutory notices refers to a maximum overall blade tip height of 150 metres. To enable the Board to determine the application please confirm the nature and extent of the development for which permission is sought, by reference to plans and particulars which describe the works to which the application relates in compliance with the relevant provisions of the Planning and Development Regulations 2001 as amended.

If the development for which permission is sought incorporates a range of options please indicate clearly in the application documentation the details of all such options and confirm that each option has been full assessed with the application documentation including within the Environmental Impact Assessment Report and Natura Impact Statement.”

2.1.1

Item No.1 Response

The development description as set out in the statutory notices refers to a maximum overall blade tip height of 150 metres. Wind turbine generator technology will ensure that the wind turbine model selected for the Proposed Development, will have an operational lifespan greater than the 30-year operational life that is being sought as part of this application.

For the purposes of this EIAR, various types and sizes of wind turbines within the 150-metre tip height envelope have been selected and considered in the relevant sections of the EIAR to assess the likely effects of the Proposed Development on the environment. Turbine design parameters of blade length, hub height and tip height have a bearing on the assessment of shadow flicker, noise, visual impact, traffic and transport and ecology (specifically birds). In each EIAR section that requires the consideration of turbine parameters as part of the impact assessment, turbine design parameters have been used reflect the most relevant parameter for each assessment in the impact assessment are specified.

Within the EIAR the following scenarios were used across the different disciplines:

Table 2-1: Turbine Ranges

Discipline	Turbine Hub Height (metres)	Turbine Rotor (Metres)	Blade Length (Metres)
Shadow Flicker	83.5	133	66.5
Collision Risk (Ornithology)	83.5	133	66.5
Noise ¹	91	n/a	n/a
ZTV/Photomontages	93.5	113	56.5
Traffic		133	66.5

Consequently, in responding to the Further Information request and taking into account the Derryadd Judgments (Sweetman v the Board & Ors [2021] IEHC 390 and [2021] IEHC 662), a refined turbine range has now been established for the Proposed Development as follows:

¹ For the avoidance of doubt noise assessment updated for a range of hub height options (refer to AWN Technical note enclosed)

- 17 No. wind turbines with an overall ground-to-blade tip height of 150 metres, a blade length in the range of 66.5 metres maximum to 56.5 metres minimum, and a hub height in the range of 83.5 metres minimum to 93.5 metres maximum.

Table 2-2 below illustrates these minimum and maximum ranges which could occur within the overall turbine tip height of 150 metres to tip.

Table 2-2: Turbine Ranges (m)

	Minimum	Maximum	Range
Tip Height	150	150	-
Blade Length	56.5	66.5	10
Rotor Diameter	113	133	20
Hub Height	83.5	93.5	10

It is confirmed that **all scenarios within the limited range of flexibility set out above (the “Turbine Range”)** have been fully assessed within the application documentation including within the Environmental Impact Assessment Report and Natura Impact Statement as lodged.

It is also confirmed that the meteorological mast proposed, which had a given dimension of ‘up to 112 metres’ has been refined to 112 metres only, thus providing further clarity on the matter.

Modern wind turbine generators being installed in Ireland today typically have an output of between 3.0 and 5.2 Megawatts (MW) with increases in efficiency and output predicted to continue into the coming decade. For the purposes of this EIAR it is assumed that the wind turbine model installed as part of the proposed wind farm development will have an output of between 3.5 and 5.0 MW. Therefore, based on 17 No. wind turbines, the wind farm will have a total output between 60 MW and 85 MW.

Chapter 4 of the Environmental Impact Assessment Report (EIAR) as lodged provides full detail of the turbine type proposed. The proposed wind turbines will have a tip height of up to 150 metres. Within this size envelope, various configurations of hub height, rotor diameter and ground to blade tip height may be used. The exact make and model of the turbine will be dictated by a competitive tender process, but it will not exceed a tip height of up to 150 metres. Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics, with only minor cosmetic differences separating one from another. The wind turbines that will be installed on the site will be conventional three-blade turbines, that will be geared to ensure the rotors of all turbines rotate in the same direction at all times. The turbines will be grey matte in colour.

Derryadd Judgment

In the High Court judgment in relation to Derryadd Wind Farm (delivered by Justice Humphreys, 16th June 2021)², in relation to a proposed Strategic Infrastructure Wind Farm Development, the High Court found that the “Plans and Particulars” that were submitted with the application documentation were not sufficient in that they allowed too much flexibility, and that the Board erred in including a condition stating:

“... the wind turbines will have maximum tip height of 185 metres. Final details of the turbine design, hub height, tip height and blade length complying with the maximum limit and within the range set out in the application documentation, along with details of colouring shall be submitted to and agreed in writing with the planning authority prior to the commencement of development,”

At the core of the issue considered in the judgement were the following issues:

² 2021 IEHC 390 [20202No. 557JR] P. Sweetman v An Bord Pleanála

- The application did not give precise details of the design of the structures but only “typical” arrangements;
- The application did not specify dimensions for the structures, only maximum dimensions; and
- The application did not specify the exact location of all the structures and foundations.

The approach adopted in the Derryadd application is common for wind farm developments, as due to the nature of the applications, application process and permission durations (preparation of an application can take in excess of 2 years of monitoring and surveying, the application process can also in itself take 2 years, and the duration of the consent is normally 10 years) developers must allow and design insofar as practicable for turbines that will be available at the time of construction. The Derryadd judgment acknowledges that there can be some degree of flexibility in relation to plans and particulars of planning applications, (albeit fundamentally in the Derryadd situation the court concluded that there was too much flexibility), at paragraph 56 of the judgement the following is stated:

“The regulations require “plans” and “particulars”, meaning reasonably (although not necessarily absolutely) precise particulars. I say not necessarily absolutely precise particulars in that in practical terms there may be modest variation between the plans submitted and the structures constructed. Thus we have the concept. Created by the courts for the purpose of s.160 of the 2000 Act, of the “material” deviation from the permission, which implies a core of materiality and a periphery of detail; dovetailing with the doctrine permitting points of detail and limited flexibilities to be provided in conditions, and with the doctrine that permits ‘parameters relating to the construction phase’ to be determined later.”

The Judge concludes on this matter as follows:

“...there is a fundamental difference in principle between, for example, providing a reasonably modest margin of appreciation (Hamilton C.J.’s ‘certain limited degree of flexibility’) around details of design, dimensions or location to the millimetre, such that it can be said that no real planning issue is thereby created by reference to which someone could reasonably object, and a situation where as here no specific dimensions are provided other than a maximum, and no specific designs are provided other than what is typical. A scale that is open at one end is not a scale that has a ‘certain limited degree of flexibility’.” [emphasis added by author]

The judge also acknowledges the previous judgement of Haughton J. in *Alen-Buckley v. An Bord Pleanála* [2017] IEHC 541, [2017] 9 JIC 2602, which confirmed that it is appropriate for the site notice for a wind farm development to describe only the most important physical feature of the turbines i.e. their overall height.

Hardstands:

The application details as submitted do include a typical detail of a wind turbine elevation and hardstand areas. The hardstand area is provided as a typical detail on drawing no. 170749-36 as included with the planning application as lodged and provided for information purposes to show the extent of area and specific measurements of dimensions for the various components of the hardstands. The overarching layout plans and specific turbine drawings submitted as part of the application documentation (drawings 170749-01 – 170749-38), however, are entirely accurate and show (with grid references) the actual locations that each of the proposed turbines are to be erected, together with the extent of the proposed associated hardstand areas.

Foundations:

The application details as submitted illustrated typical foundation detail. As set out in Chapter 4, each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level. The size of the foundation will be dictated by the turbine manufacturer, and the final turbine selection will be the subject of a competitive tender process. The maximum horizontal and vertical extent of the turbine foundation will be 20m (minimum of 18m) and 3.8m (minimum of 3.2m) respectively.

Turbine Configuration:

In relation to the typical turbine elevation provided it is acknowledged that this is a generic drawing (ref: 170749-37 and 170749-38) with only the overall tip-height articulated in a dimension. As noted in the EIAR (refer to section 4.3.1.2 of Chapter 4) and indeed on the drawings (note 2), this was deemed appropriate as the final turbine type to be erected on site has not and cannot be set out at this stage, and instead will be dictated by a competitive tender process. The final turbine type can only be selected once it is known when the Proposed Development is to be brought forward (i.e. post consent) and the available turbine types appropriate for the site are made known by the various manufacturers at that time as part of the competitive tendering process. Notwithstanding this, however, in order to provide further clarity on this issue, and in acknowledgement of the Derryadd judgment please find attached in **Appendix 1** of this report drawing 170749e-05FI which illustrates the Turbine Range proposed. An additional drawing, 170749e-06 FI now enclosed, shows turbine elevations and plans for individual minimum and maximum configurations (refer to Table 1 above), namely 83.5 meter hub, 66.5 meter blade, 93.5 meter hub, 56.5 meter blade and 91.5m hub and 58.5m blade. The added dimensions clearly articulate the range of turbine parameters assessed within the EIAR and NIS and accordingly specify the range of alternative turbine configurations (hub height, blade length, and tip height) within the Turbine Range. In the interests of clarity and as set out earlier these are set out below:

- Turbine tip height – 150 metres
- Hub Height – Maximum height 93.5 metres, Minimum height 83.5 metres
- Blade Length: - Maximum length 66.5 metres, Minimum length 56.5 metres.

Within the EIAR, the assessments relate to a spectrum of scenarios allowed for relative to each discipline, for example turbine delivery discussed in Chapter 14: Material Assets considers the longest blade as this is the largest component to deliver, similarly the longest blade is used for collision risk monitoring (Chapter 8: Birds) and the shadow flicker assessment (Chapter 6: Shadow Flicker), while the highest hub height is used for Landscape and Visual Impact Assessment (LVIA) purposes (Chapter 12: Landscape and Visual).

The range of turbine configurations under consideration is quite limited, with the hub height and blade length varying by 10 metres, and all variations remaining within the overall 150m turbine tip height parameter.

Accordingly, within the proposed configuration, the following assessments have been carried out as part of this Further Information response:

Table 2-3: EIAR Assessment (Turbine Scenarios)

Discipline	Comment	Turbine Hub Height (Metres)	Turbine Rotor (Metres)
Shadow Flicker	In addition to the shadow flicker assessment undertaken in the EIAR as lodged, two additional shadow flicker models have been run to show the results on receptors for the turbine ranges proposed, all of which are within the 150 metre to tip envelope.	83.5	113
		93.5	133
Landscape	Updated photomontages (13 no.) to take account of the potential lower hub and larger rotor diameter configuration. Additional viewpoints are included in the photomontage booklet submitted as part of this FI – refer to Section 2.6.	83.5	133
Noise	Updated noise model run to account of a potential hub height of 93.5 meters.	93.5	-
Ornithology	Rotor size is the critical element in terms of collision risk.		133

In relation to ornithology, it is important to note that in undertaking the collision risk analysis a precautionary approach was taken, whereby the maximum turbine dimensions were assessed in the analysis. The maximum turbine dimensions are the most relevant for the ornithological impact assessment given the larger the rotor swept area the greater the risk window for a bird in flight. As outlined in Table 2-1 of Appendix 8-6 of the EIAR, the assumed turbine (Nordex N133) has a rotor diameter of 133m which corresponds with the maximum rotor diameter proposed. The rotor diameter and the selected hub height influences the maximum and minimum swept height of the turbine. Therefore based on the proposed turbine range the minimum tip height would be 17m (i.e. the minimum ground clearance) and the maximum tip height would be 150m. Flight activity information (vantage point survey data) was collected in the following height bands of : 0-20m, 20-140m and 140-175m. As the turbine range (17-150m) overlaps with all three of these height bands all three height bands were included in the collision risk analysis (as per Section 2 of Appendix 8-6 of the EIAR). This is truly a precautionary approach and ensured all scenarios within the Turbine Range were assessed in the analysis, as all the recorded flight activity data (0-20m, 20-140m and 140-175m) is included in the analysis. This precautionary approach ensured all scenarios within the Turbine Range were assessed and meant that the maximum likely collision risk regardless of the actual turbine selected within the Turbine Range is as reported in Table 3-7 of Appendix 8-6 of the EIAR.

Finally, in relation to drawings lodged with the planning application we note that the proposed met mast element of the Proposed Development is described as “*with a maximum height of up to 112 metres*”, refer to drawing ref: 170749-34 included with the application pack. In this regard, it is confirmed that the met mast will be 112 metres in height and in this regard a revised version of the met mast drawing (drawing 170749e – 04FI) is included here at Appendix 1.

Accordingly, the application documentation submitted as detailed above provides the necessary specifications, detailed location of infrastructure as well as the lower and upper range of all the turbine parameters proposed, which provides for the “certain degree of flexibility” permissible as articulated in the Derryadd Judgement.

In the event of favourable consideration of the planning application it is acknowledged and fully supported that An Bord Pleanála may specify the range and detail the parameters of the tip heights, blade lengths and hub heights as part of an appropriate condition. It is noted that the Board have previously adopted this approach, for example in the case of the Curraglass renewable energy development (ABP ref: PL88.308244), granted by An Bord Pleanála on the 28th of January 2022. Planning Condition no. 6 attached to that permission stated:

The following design requirements shall be complied with:

- a) *The hub height shall be within the range of 103.5 metres to 120 metres, and the blade length shall be in the range of 58.5 metres to 75 metres. The overall tip height shall be in the range of 175 metres to 178.5 metres and the height of the permanent meteorological mast shall be within the range of 100 metres to 112 metres. Details of the turbine design, hub height, blade length, tip height, and meteorological mast complying with these limits, shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development. The wind turbines, including tower and blades, shall be finished externally in a light grey colour.*
...”

2.2 Further Information Item No.2 – Wording

Biodiversity

“Submissions received from the Development Applications Unit of the Department, from the Ecology Unit of Cork County Council and the Heritage Officer of Waterford County Council in relation to Biodiversity.

In Particular you are requested to address the following:

- a) *The potential impact of the proposal on the aquatic environment and associated fauna of the Tourig River particularly at those sections of the river associated with crossing points.*
- b) *You are requested to provide further information in relation to the presence of Giant Hogweed within the site (Section 7.5.2.7 EIAR) in relation to the location of same and an assessment of the likely impacts and side effects of the spread of this species been provided. Measures which may be required to control/eradicate the species should be specified.*
- c) *Further detail is required in respect of the detailed design of the settlement pond structures*
- d) *You are requested to respond to concerns expressed in respect of the geochemistry of the borrow pit near the entrance, especially in relation to pyrite and/or marcasite and risk of acid drainage.*
- e) *You are requested to review and address the in-combination collision risk for golden plover for all wind turbines in the range (12km) of this species from the Blackwater Estuary SPA.*
- f) *Concern has been expressed that the hedgerow in proximity to turbine 16 remains within 50m buffer zone for bats with the potential for increased mortality rates for bats at this location. Please address.”*

2.2.1 Item No.2 Response

2.2.1.1 Item 2(a)

Chapter 7 of the EIAR submitted as part of the application addresses the likely significant effects alone and cumulatively that the Proposed Development may have on the biodiversity, flora and fauna of the receiving environment and sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified.

Ecological baseline surveys, including bat surveys, were conducted by experienced members of MKO’s ecology team as documented in Section 7.3.1 of the EIAR. The methodology undertaken is described in section 7.4 of the EIAR which included Ecological Baseline Studies, Scoping and consultation, field surveys and dedicated habitat and vegetation composition surveys (including invasive species), terrestrial fauna surveys and aquatic surveys.

In addition to the information contained in Chapter 7, MKO’s Ecology team have carried out survey work to address concerns raised in this Further Information request. This response is detailed in two reports - FI Ecology Report and a Stream Characterisation and Otter Survey – enclosed here at **Appendix 3**. These are summarised below.

Additional surveys were carried out at the nine existing water crossings proposed for upgrade and four proposed new water crossings associated with the wind farm access roads, the collector cable route, and the turbine delivery route. Previous surveys were carried out downstream of the Proposed Development site by MKO in 2019. These included three locations on the Glendine stream and one location on the Gortnafira stream. The locations of the previous surveys and the thirteen water crossings are shown in Figures 4-4 and 7-3 of the EIAR. Stream characterization surveys included kick sampling, habitat classification (Fossitt, 2000), stream morphology and assessments of submerged, emergent, and riparian macrophytes. The Stream Characterization report enclosed as part of this FI response details the results of the additional surveys and provides the background information that further supports the conclusions of the EIAR. The report also provides an up-to-date base line against which any potential effects on the aquatic environment can be monitored and details the results of the additional field surveys including the faunal surveys, characterization of the watercourses and

associated biological water quality assessments. It classifies the habitats at each survey station (or water crossing) as per ‘*A guide to the habitats of Ireland*’ (Fossitt, 2000) and assigns them Q-Values. Maps of the proposed water crossings and survey stations are provided in Section 1 of the Stream Characterisation report. The otter and other faunal surveys carried out at each survey station are detailed in the report which can be summarized as:

“Though suitable habitat for otter was identified and spraint recorded, no indications of breeding otter, or other protected species, were recorded. All watercourses associated with the Proposed Development are tributaries of the River Blackwater. These include the Tourig, the Glendine, and the Gortinafira. No Inland Fisheries Ireland records were available for these watercourses. “

Water crossing no. 9 relates to an existing culverted water crossing of the Glennagloagh stream for the L7809 road. This discharges into the Tourig stream approximately 625 metres downstream. Section 5.2.9 of the stream characterisation enclosed with this response provides more detail on this. Water crossing no. 10 relates to a proposed crossing of the Tourig stream. Section 5.2.10 of the stream characterisation report provides more detail on this. Following the additional survey work undertaken, it is ultimately concluded that

“Water crossings of the Tourig stream and its tributaries in the southwestern section of the proposed development site were typical headwater streams i.e., typically shallow on steep gradients with variable flow. All but one water crossing in this area had sufficient water to take kick samples, and yielded Q scores from Q3-4 to Q4. The water crossings within the overall proposed development site include nine existing water crossings proposed for upgrade and four proposed new water crossings.

As per the Ecological Impact Assessment within the Biodiversity Chapter of the EIAR (section 7.6), there is potential for the proposed water crossing works to result in significant effects on aquatic habitats and their associated fauna as a result of deterioration in water quality via the runoff of pollutants. Following additional survey work enclosed with this response which supports the finding of Section 7.6.4.1.1 of the EIAR, following the implementation of mitigation, there will be no significant effect on aquatic habitats or species of the Tourig stream as a result of the Proposed Development at any geographic scale.

2.2.1.2 Item 2(b)

Multi-disciplinary ecological walkover surveys were undertaken in accordance with National Roads Authority (NRA) Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes (NRA, 2009) on the 7th and 8th of July 2022. This survey provided baseline data on the ecology of the study area and assessed whether further, more detailed habitat or species-specific ecological surveys were required. The multi-disciplinary ecological walkover survey comprehensively covered the entire study area. This is detailed in Section 1.2 of the FI Ecology Report.

During the multidisciplinary surveys, a search for giant hogweed (*Heracleum mantegassianum*), a species listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2011), was also conducted. This survey was conducted within the species flowering period of July, for ease of identification.

Survey effort included a comprehensive walkover of the Proposed Development site. The aim of the effort was to ground truth its presence within the site, as stated in the submitted EIAR at *Table 7-1: Key Ecological Receptors identified during the assessment*, Section 7.5.2.7. The inclusion of Giant hogweed as being recorded within the EIAR study boundary was included in error. The survey undertaken to inform this FI response concluded that no Giant hogweed, or any indications of this species, was recorded within the site.

However, taking an extremely precautionary approach, should planning permission be granted a pre-commencement invasive species survey will be carried out within the site to confirm that no giant hogweed has established since survey.

2.2.1.3 Item 2 (c)

The potential impacts of the Proposed Development on water aspects (hydrology, hydrogeology and water natural resources) was assessed by Hydro-Environmental Services (HES). This response submission was prepared by David Broderick and Michael Gill. David and Michael prepared the Land Soil and Geology and Water Chapters of the submitted EIAR, and their qualifications and experience are already presented in the EIAR. This assessment is described in detail in Chapter 10 of the EIAR. A dedicated response by HES addressing this Further Information item is submitted here at **Appendix 2** (here after referred to as ‘FI HES Response’). A brief summary is provided here in relation to this item.

A detailed design of the settlement ponds is provided in Drawing no. P1453-0-0121-A1-D501-00A (Appendix 4-5 of the EIAR, and within the overall drawings package), which includes detail as to dimensions, make up and filter detail. For ease however, the response prepared by HES sets out the pond detail as shown on the associated drawing. The design process followed for the settlement ponds is outlined in “*Environmental Management Guidelines - Environmental Management in the Extractive Industry*” (EPA, 2006).

It is acknowledged that an error existed in the submitted information in relation to detail A1 on drawing no. P1453-0-0121-A1-D501-00A, whereby the referend design table was omitted in error. That table is now included in the HES Response and associated updated drawing No: P1453-0-0922-A1-D501-00B as Table A: Example Settlement Pond Sizes. For ease, Table A is copied below:

Table 2-4: Table A: Example Settlement Pond Sizes

Return Period	100-year	Catchment Size (m ²)		
		500	1,000	2,000
6hr retention for Coarse Silt		2.8 x 9 x 1	4 x 13 x 1	5.7 x 18 x 1
11hr retention for Medium Silt		3.2 x 10 x 1	4.5 x 14 x 1	6.4 x 20 x 1m
24hr retention for Medium Silt		3.5 x 11 x 1	5 x 16 x 1	7 x 22 x 1
Settlement Pond Size:		W[m] x L[m] x D[m]	W[m] x L[m] x D[m]	W[m] x L[m] x D[m]

The design process to size the settlement ponds is described in Section 2.2 of the FI HES Response and summarised here:

- Proposed Development footprint is divided up into drainage catchments (based on topography, outfall locations, catchment size);
- Stormwater runoff rates which are based on the 100-year return period rainfall event are calculated and these flows are used to design settlement pond sizes for each drainage catchment;
- Retention times are based Stoke’s Law (particle settling velocity);
- The settlement ponds for access roads and hardstand surfaces are designed for a 11hr retention time used to settle out medium silt (EPA, 2006); and,
- Borrow pit/ repository areas settlement ponds have been designed to allow a 24hr retention time as per EPA guidance (2006), which is the highest level of protection recommended by the EPA with regard to retention time.

Typical settlement pond calculations for a borrow pit and turbine base/hardstand are attached as **Appendix I** of the FI HES Response.

With regards to settlement pond designs and water quality protection, the FI HES Response refers to settlement pond details which are provided in the EIAR(Appendix 4-5).

- Settlement pond details were provided in the submitted EIAR drawings at Appendix 4-5 and within the application drawing pack as noted above.

- The design of settlement ponds is a well-established science and is detailed in the *Environmental Management Guidelines - Environmental Management in the Extractive Industry* (Non-Scheduled Minerals guidance document published by the Environmental Protection Agency (EPA, 2006).
- HES have outlined the design process for each required settlement pond.
- HES have provided example calculations for various elements of the proposed Wind Farm, and for various catchment sizes These example calculations will be applied across the site.
- Settlement ponds are not a stand-alone element of the water quality protection mitigation outlined in the EIAR.
- Water quality protection will occur as part of a treatment train of mitigation, including source controls, in-line controls, treatment controls (including settlement ponds), and outfall controls. This suite of water quality protection controls will be applied in series to ensure the protection of downstream watercourses.
- To illustrate this point the technical note includes process flow diagrams showing each element of the proposed drainage systems. These process flow diagrams are attached in **Appendix II** of the FI HES Response.

It is therefore concluded that the information provided within the EIAR accompanying the planning application, as supplemented and augmented by this FI response, provides full and sufficient detail of the design of the settlement pond structures proposed.

2.2.1.4 Item 2(d)

Hydro Environmental Services (HES) have provided a detailed response to this Further Information point at section 2.4 of their dedicated response ('FI HES Response'), enclosed here at **Appendix 2**. HES completed a detailed review of available geological and geochemical information in respect of acid mine drainage and the referenced minerals. The FI Response concludes that the Proposed Development will not result in significant impacts on downstream water quality from the Proposed Development. The research and thorough investigation HES have carried out on the matter (detailed in Section 2.4 of the FI HES Response) has indicated that acid mine drainage is not an anticipated or documented risk in the area of the Proposed Development.

2.2.1.5 Item 2(e)

This Further Information item 2(e) is addressed in full within the FI Ecology Report (section 1.4) enclosed here at **Appendix 3**. It is noted that the wording of the Development Application Unit (DAU) submission is very similar to this FI item therefore to avoid duplication these overlapping topics are both addressed in this section of the report. The DAU wording is as follows:

"In-combination collision risk for golden plover, for all wind-turbines in the range (12km) of this species from the Blackwater Estuary SPA."

The response to this issue has been prepared by Senior Ornithologist, Mr. Pdraig Cregg (BSc., MSc.) of the MKO Ornithology team who prepared the Ornithology Sections of the EIAR.

Chapter 8 of the EIAR as submitted with the application addressed likely significant effects that all elements of the Proposed Development may have on avian receptors. Particular attention was paid to species of ornithological importance which include species with national and international protection under the Wildlife Acts 1979-2012 (as amended) and the EU Birds Directive 2009/147/EC among other relevant legislation. Where potential effects are identified, mitigation is described and residual impacts on avian receptors are assessed. Technical Appendices 8-1 to 8-5 of the EIAR contain data from surveys undertaken including full details of survey times, weather conditions and all relevant information together with the bird records. Collision Risk Assessment is contained in Appendix 8-6 along with details of the bird monitoring program in Appendix 8-7.

2.2.1.5.1 Golden Plover Cumulative Collision Risk

It is noted that an impact assessment of cumulative effects including collision risk³ is provided in Section 8.13 of the EIAR as submitted. Section 8.13.2 of the EIAR states that no potentially significant cumulative habitat loss, disturbance displacement or collision risk effects on any of the Key Ornithological Receptors (KORs) has been identified with regard to the development proposal. For a list of all KORs please refer to Section 8.6 of the EIAR.

Notwithstanding the above, and as it has been requested by An Bord Pleanála, a further review has been undertaken of available information to address the potential for in-combination collision risk to result in significant effects acting on golden plover within a 12km radius of the Blackwater Estuary SPA. A review of the Planning Register for Cork and Waterford County Council shows that there have been several planning applications lodged within the vicinity of the EIAR study area. Many of the existing/Proposed Developments within the EIAR study area relate to one-off housing or are agricultural in nature. Owing to the scale, and primarily the nature of these developments, significant cumulative collision risk impacts are not predicted. There are several planning applications for wind farm development and associated infrastructure within 12km of the Blackwater Estuary SPA. Other wind farm developments have the potential to give rise to cumulative collision risk effects. Further details on these applications are available below.

There are three other wind farm developments within a 12km radius of the Blackwater Estuary SPA: two in Co. Waterford (Woodhouse Wind Farm and Knocknamona Wind Farm) and one in Co. Cork (Knocknagappagh Wind Farm)

➤ Woodhouse Wind Farm (existing)

Woodhouse is c. 8km from the Blackwater Estuary SPA. This wind farm consists of eight turbines in two parts, one with five turbines and one with three turbines. The EIS was consulted to determine cumulative impacts from the Proposed Development site. The EIS reported no golden plover activity at the site⁴. The EIS concluded that, given the low ecological interests at the site, *“impacts on the ecology by the proposed development will not be significant”*.

No significant residual effects on avian receptors were identified.

In addition, no operational phase bird monitoring was conditioned with any of the granted permissions for this development.

➤ Knocknamona Wind Farm (consented)

The consented Knocknamona Wind Farm is c. 6.5km from the Blackwater Estuary SPA. The most recent bird survey information that is available is included in the EIAR for the amendments to Knocknamona Windfarm previously authorised under An Bord Pleanála Ref No. PL93.244006 (Status: Refused 14/01/2021 Appealed 15/06/2021 Ref No. PL 93.309412 and consented 28/09/2022). The EIAR was consulted to determine cumulative impacts from the Proposed Development site. The EIAR⁵ reported the following concerning golden plover activity:

There is only two flight observations of this species [golden plover] in the vicinity of the wind farm site. The results of surveys for the area indicate that golden plover do not rely on the wind farm site and surrounding area, are not resident or regularly occurring in the area and that the potential for interactions between the proposed larger turbines and golden plover will be negligible. Based on the negligible potential for interactions between the proposed larger turbines, potential significant impacts to golden plover can be ruled out and therefore this species is not identified as a key sensitive receptor and is not considered further in the assessment.

³ All scenarios within the Turbine Range have been assessed in the assessment of the potential for the proposed development to result in significant collision risk. For further discussion please refer to Section 2.1.1 of the Further Information Response submitted.

⁴ <https://www.eplanning.ie/WaterfordCCC/AppFileRefDetails/041788/0>

⁵ <https://www.eplanning.ie/WaterfordCCC/AppFileRefDetails/20845/0>

No significant residual effects on avian receptors were identified.

In addition, no operational phase bird monitoring was conditioned with any of the granted permissions for this development.

➤ Knocknagappagh Wind Farm (planning permission expired)

Knocknagappagh is c. 5km from the Blackwater Estuary SPA however, the planning permission has since expired and the development was not built. The proposed development consisted of a wind farm that includes two no. 1 MW wind turbines. Operational phase bird monitoring was conditioned with the granted permission for this development.

This development cannot, therefore, contribute to any cumulative effects.

Having reviewed the best available information, a golden plover (collision risk) cumulative impact assessment was undertaken; this is set out below.

2.2.1.5.2 Cumulative Impact Assessment – Golden Plover Collision Risk

The impact assessment set out below in Table 2-5 further corroborates the conclusions that are presented in Section 8.13.2 of the EIAR.

Table 2-5: Assessment of cumulative collision risk on golden plover

KOR	Evaluation of Cumulative Impacts	Determination
Golden Plover	<p>It is noted that in and of itself the Proposed Development is not predicted to result in significant collision risk effects acting on golden plover. An impact assessment is provided in Section 8.8.3.1 of the EIAR. As was stated in the EIAR and reiterated here, the predicted collision risk is deemed <i>insignificant</i> in the context of the local, county and national population. The local population, for which no significant collision risk effects were predicted, included the golden plover present in the Blackwater Estuary SPA. This prediction that golden plover collisions are likely to be very rare events is further corroborated by the literature.</p> <p>Collision risk for waders is generally low due to a relatively low cursory flight path, coupled with high flight manoeuvrability (McGuinness et.al 2015). A review of pan-European collision assessments revealed much lower golden plover collision records than other species, though this was not controlled for survey effort or corpse recovery rates (Hötker et al. 2006).</p> <p>The potential for other developments to have resulted in significant cumulative or in combination effects when assessed alongside the Proposed Development was considered. No significant impacts on this species were identified for wind farms within a 12km radius of the Blackwater Estuary SPA. For example, throughout the surveys for the Knocknamona Wind Farm (Ref No. PL 93.309412), there were only two observations of this species. While it is acknowledged that the duration of the flights is a factor in estimating collision risk, two flights total is highly unlikely to give rise to a significant collision risk estimate. Such a low rate of occurrence is not predicted to give rise to significant cumulative collision risk.</p> <p>Taking into consideration the reported effects at other wind farms and the predicted effects of the Proposed Development, no significant residual additive, antagonistic or synergistic collision risk effects have been identified.</p>	Significant cumulative impacts are not predicted.

Summary Conclusion

Following the clarification and explanation provided above, it is clearly demonstrated that the issues raised have been comprehensively addressed and that the information presented is adequate and that no deficiencies in information remain. Furthermore, it has been demonstrated that the Proposed Development will not significantly impact golden plover populations of importance in the area.

2.2.1.5.3 Public and Statutory Consultee Submissions

The applicant has reviewed all submissions that have been lodged by third parties and the various statutory consultees. Following this review, it is considered that the initial application documentation combined with this response to the Further Information request issued by the Board comprehensively deals with any issues raised. In the interests of completion and clarity, however, the applicant is taking this opportunity to provide further discussion and detail in relation to the items that have been raised in the submissions. As was suggested by An Bord Pleanála the submissions have been addressed by topic.

Bird Monitoring

Cork County Council were largely satisfied that the Proposed Development would not give rise to significant impacts on the local avian community, however, recommend an adaptive approach to the monitoring proposed in the EIAR. The wording was as follows:

The Heritage Unit of Cork County Council is largely happy that the proposal does not represent a significant threat to protected or qualifying avian species of nearby Special Protection Areas...However, it is considered necessary that the pre and post construction monitoring proposed within the EIAR be conducted and should circumstances change as to the usage of the site either as breeding habitat, foraging habitat or a migration route for avian species listed as qualifying interests of the nearby SPAs or listed under Annex I of the birds Directive, which could result in significant effects on their populations, then a fluid approach be taken as to avoid any such impacts e.g. ceasing of specific turbine operation during certain seasons.

It is noted that a comprehensive suite of commencement/pre-construction and operational phase monitoring is already proposed in Section 8.11 of the EIAR as submitted. In summary, the following is proposed:

- Pre-commencement surveys will be undertaken prior to the initiation of works at the wind farm. The verification survey will include a thorough walkover survey to a 500m radius of the development footprint and/or all works areas. If winter roost sites or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter season or breeding season (respectively) of the construction phase. If it is found to be active during the construction phase no works shall be undertaken within a 500m buffer (Forestry Commission Scotland, 2006; Ruddock & Whitfield, 2007) in line with best practice. No works shall be permitted within the buffer until it can be demonstrated that the roost or nest is no longer occupied.
- In line with best practice measures, a detailed post-construction Bird Monitoring Programme has been prepared for the operational phase of the Proposed Development, please refer to EIAR Appendix 8-7 for further details. The programme of works will monitor parameters associated with a collision, displacement/barrier effects and habituation during the lifetime of the project. Surveys are proposed to be scheduled to coincide with Years 1, 2, 3, 5, 10 & 15 of the lifetime of the wind farm. Monitoring measures are based on guidelines issued by the Scottish Natural Heritage (SNH, 2009).

The proposed programme of monitoring was not proposed in response to any identified significant effect but rather as a best practice measure (SNH, 2009). The monitoring is comprehensive and considered entirely adequate in this regard. The results of this monitoring will be reported to the Planning Authority following each monitoring year and will include recommendations that may inform additional mitigation or adaptation if required.

Adaptive management is an iterative process whereby the results of previous monitoring are analysed to inform future monitoring or mitigation as relevant. As the Bird Monitoring Programme is considered entirely adequate as currently submitted, no change will be proposed unless there is a significant change in the use of the site by the local avian community. Similarly, no requirement for additional mitigation is anticipated. However, if following monitoring, bird usage on the site changes and the potential for negative effects is identified, adaptive mitigation will be employed to avoid any potential for significant effects on avian receptors.

Whooper Swan

Concerns are raised related to the potential for the Proposed Development to significantly impact whooper swans. For example, one such submission stated:

The wind farm project site is located between the flight paths of Blackwater Callows SPA and Blackwater Estuary SPA, and wind turbines form a collision risk for multiple SCIs of these European sites.

There is a potential risk that the flight of the whooper swans would bring the whooper swans within the vicinity of the wind farm turbines and imminent threat of loss and collision with turbine blades.

A regularly used whooper swan commuting corridor as described was not identified during surveys. As is noted in Section 8.4.2 of the EIAR, whooper swans were only recorded once during vantage point surveys. Furthermore, there were no observations of whooper swan during dusk hen harrier winter roost surveys, this is of note given whooper swans are known to commute to roost sites at dusk. There were no other observations within 4.5km of the wind farm site throughout a comprehensive suite of surveys (please see Section 8.2.4 of the EIAR for survey details). There were 23 observations of whooper swan recorded during dedicated waterfowl surveys, all of which were more than 4.5km from the Proposed Development site (please see EIAR Appendix 8-3, Table 5). Flock sizes range from five to 209 birds.

Notwithstanding the above, it is acknowledged that the Proposed Development is located approximately between the Blackwater Callows SPA and Blackwater Estuary SPA and if whooper swans were to travel between these two sites there would be the potential to collide with the proposed turbines in absence of avoidance behaviour. However, following two full years of survey in strict accordance with SNH 2017, this species was only recorded on one occasion.

It is noted in the literature (SNH, 2018⁶) whooper swans show a very high rate of turbine avoidance (99.5% avoidance). That is to say, a whooper swan flying towards a wind farm will avoid a collision 99.5% of the time (SNH, 2018). In the present theoretical scenario, the birds will detect and manoeuvre around the turbines 99.5% of the time on route to/from the Blackwater Callows SPA and Blackwater Estuary SPA.

In the absence of evidence of a regularly used whooper swan commuting corridor that crosses the site and the high rate of turbine avoidance demonstrated by this species and the infrequent occurrence of the species, significant collision risk is unlikely.

In addition, it is noted that an impact assessment of cumulative effects including collision risk is provided in Section 8.13 of the EIAR as submitted. Section 8.13.2 of the EIAR states that no potentially significant cumulative habitat loss, disturbance displacement or collision risk effects on any of the KORs has been identified with regard to the development proposal. In the specific case of whooper swan, there was only a single (90-second flight) observation of this species at the Proposed Development throughout two years of surveying. As a result of such a low rate of occurrence, no pathway to significant effects was identified. Please see Section 8.6 of the EIAR for further discussion. It is reasonable to conclude that such minimal impacts could not give rise to significant cumulative effects.

⁶ Scottish Natural Heritage (2018) Avoidance rates for the onshore SNH wind farm collision risk model.

Furthermore, while no significant effect has been identified, in line with best practice and following a precautionary approach, a comprehensive programme of operational phase surveys is proposed in the EIAR to monitor for interactions between the Proposed Development and the local avian community. Please refer to EIAR Appendix 8-7 for further details. The programme of works will monitor parameters associated with collision risk, displacement/barrier effects and habituation during the lifetime of the project. The results of this monitoring will be reported to the Planning Authority following each monitoring year and will include recommendations that may inform additional mitigation if required.

Snipe

Concerns are raised in relation to impacts on snipe. It is noted in Section 8.8.3.9 of the EIAR that an impact assessment is undertaken for snipe for which no significant effects were identified. It is noted that the majority of the Proposed Development site is located in commercial forestry. A habitat not favoured by this species.

Barn Owl

Several submissions discuss the potential occurrence of barn owl locally. However, following two full years of survey in strict accordance with SNH 2017, this species was not recorded.

Black-tailed Godwit Collision Risk

Concerns were raised in relation to black-tailed godwit collision risk.

As detailed in Section 8.4.14 of the EIAR, numerous species were recorded at wetlands, at distances up to ten kilometres from the wind farm, but never on or near the Proposed Development site. This is likely due to a lack of suitable waterfowl habitat onsite. These species included bar-tailed godwit, black-tailed godwit, brent goose, curlew, dunlin, little egret, redshank, ringed plover, shelduck, shoveler and wigeon. The dominant habitat type within the Proposed Development site is conifer plantation. This habitat does not provide suitable foraging or roosting habitat for any of the species listed above and would therefore not be expected to attract them to the Proposed Development area. Consequently, it is unsurprising that none of these species were observed flying over the Proposed Development site during the extensive two-year survey effort.

Significant collision risk is therefore not predicted for black-tailed godwit nor any of the other wetland species that were not recorded on or near the Proposed Development.

2.2.1.5.4 Derryadd Decision

In undertaking the collision risk analysis a precautionary approach was taken, whereby the maximum turbine dimensions were assessed in the analysis. The maximum turbine dimensions are the most relevant for the ornithological impact assessment given the larger the rotor swept area the greater the risk window for a bird in flight. As outlined in Table 2-1 of Appendix 8-6 of the EIAR, the assumed turbine (Nordex N133) has a rotor diameter of 133m which corresponds with the maximum rotor diameter proposed. The rotor diameter and the selected hub height will influence the maximum and minimum swept height of the turbine. Therefore based on the proposed turbine range the minimum tip height would be 17m (i.e. the minimum ground clearance) and the maximum tip height would be 150m. Flight activity information (vantage point survey data) was collected in the following height bands of 0-20m, 20-140m and 140-175m. As the turbine range (17-150m) overlaps with all three of these height bands all three height bands were included in the collision risk analysis (as per Section 2 of Appendix 8-6 of the EIAR). This is truly a precautionary approach and ensured all scenarios within the Turbine Range were assessed in the analysis, as all the recorded flight activity data (0-20m, 20-140m and 140-175m) is included in the analysis. This precautionary approach ensured all scenarios within the Turbine Range were assessed and meant that the maximum likely collision risk regardless of the actual turbine selected within the Turbine Range is as reported in Table 3-7 of Appendix 8-6 of the EIAR. Potential impacts that could arise from the Proposed Development during the construction, operational and decommissioning phase are applicable to all turbines within the ranges set out.

2.2.1.6 Item 2(f)

In relation to the potential for bat mortality resulting from the retention of a hedgerow located proximate to Turbine 16, the FI Ecology Report submitted as part of this FI Response at **Appendix 3** details the additional site visit undertaken (Section 1.5). Turbine 16 is located in the western envelope of turbines at the Proposed Development (Figure 6-1 of the Bat Survey Report that accompanies the EIAR at Appendix 7-2 and provided again below at Figure 2-1). There is approximately 80.2m of hedgerow located to the east of this turbine that falls within the 50m felling buffer of the blade width. This hedgerow is not proposed to be felled as it runs along the site boundary. It is the opinion of MKO that it would be premature to remove this section of hedgerow, based on the potential for its retention to result in bat fatalities. An image of this section of hedgerow is provided in Figure 2-1 below and its location in relation to T16 is shown in Figure 6-1 of the EIAR bat survey (provided below at Figure 2-2).



Figure 2-1 Hedgerow habitat adjacent to the proposed Turbine 16, south aspect



Figure 2-2 Proposed Monitoring Hedgerow at T16 (Fig 6-1 ELAR Chapter 6)

In the event that the Board intend to grant planning permission, but the approach set out above is considered unsatisfactory, the treeline can be removed prior to works commencing on site. This will result in the need to amend Section 7.6.4 of the impact assessment of the EIAR to account for the additional loss of treeline habitat and mitigations required to achieve no net loss of such habitat. Should this option be progressed, necessary amendments to Section 7.6.4 of the EIAR are detailed in Section 1.5 of the FI Ecology Report enclosed at **Appendix 3** for the Boards consideration.

Further Information Item No.3 – Wording

Noise

- a) *“Submissions received including the report from the Planning Authority (Cork County Council) and a number of reports authored by Acoustic/Related Consultants/Experts which critically assess the information provided in Chapter 13 of the EIAR and related appendices. You are requested to review the submissions and respond/clarify accordingly”*
- b) *“Your Attention is drawn to the Draft Revised Wind Energy Development Guidelines 2019 and in particular reference within Chapter 2 (Section 2.4.5.3.1) of the EIAR whereby it is stated that the design of the Proposed Development has been developed with the provisions of the draft guidelines in mind. Please expand.”*

Item No.3 Response

AWN Consulting Ltd (AWN) prepared a Noise and Vibration assessment as outlined in Chapter 13 of the EIAR submitted as part of this planning application. The assessment carried out as part of the submitted EIAR is considered robust, however, in response to the request for Further Information, appropriate clarifications and further comment are presented in AWN’s Technical Note submitted as part of this FI Response in order to clarify and expand on previous statements within the EIAR (refer to AWN Technical Note included here at **Appendix 4**). The response is set out as follows:

FI Item 3(a)

- a) The submissions received in relation to noise from Cork County Council and other submissions are responded to under a number of headings in Section 3 of the AWN Document, summarised below in Section 2.12.1.1.1. Further individual responses to public submissions are detailed in Section 3 of the AWN FI Report and summarised in Section 2.12.1.1.1 of this document.

FI Item 3(b)

- b) In relation to Item b) of the FI request which requested the applicant to expand on information contained within the EIAR, please refer to section 13.4.2.1.4 of the EIAR as lodged which provides further detail on this matter. For ease, relevant extracts of the EIAR are set out below:

“In December 2019, the Draft Revised Wind Energy Development Guidelines December 2019 were published for consultation and therefore have yet to be finalised. Therefore, in line with best practice, the assessment presented in the EIAR is based on the current guidance outlined in Section 5.6 of the Wind Energy Development Guidelines for Planning Authorities.”

As part of the public consultation of the Draft Guidelines, several concerns relating to the proposed approach of the Draft Revised Wind Energy Development Guidelines (DRWEDG19) have been expressed by various parties. Specific concerns expressed by a cross party group of interested professionals can be reviewed at:

<https://www.ioa.org.uk/wind-energy-development-guidelines-wedg-consultation-irish-department-housing-planning-community-and>

The following statement is of note from the above submission:

“a number of acousticians working in the field have raised serious concerns over the significant number of technical errors, ambiguities and inconsistencies in the content of the draft WEDG and these were highlighted during the consultation process by a group of acousticians”

As technical experts cognizant of the concerns expressed in relation to the Draft Guidelines, it is AWN's opinion that the DRWEDG19 document does not outline a best practice approach in terms of the assessment of wind turbine noise. Therefore, in line with best practice, which includes ESTU and IOA methodologies as described in Section 13.4.2.1 of the EIAR, the assessment presented in the EIAR is based on the current best practice guidance outlined in Section 5.6 of the Wind Energy Development Guidelines for Planning Authorities, 2006 (WEDG06) which are, in an expert opinion, still best practice in terms of the assessment of wind turbine noise.

The original ETSU-R-97 concepts, on which both the WEDG06 and DRWEDG19 are based underwent a thorough standardisation and modernisation in 2013 with the Institute of Acoustics publication of the A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise (IOAGPG) including 6 Supplementary Guidance Notes, all of which bring together the combined experience of acoustic consultants in the UK and Ireland in the application of these methods. Numerous improvements in the accuracy and robustness are described, including the treatment of wind shear and the general adaptation to larger wind turbines which have been followed and applied in full as part of the EIAR. The assessment in the EIAR is therefore in full accordance with the latest best-practice methods. If updated Wind Energy Guidelines are published during the application process for the Proposed Development it is anticipated that any relevant changes affecting the noise limits will be addressed through an appropriate planning condition, or where a supplementary assessment is necessary, through provision of additional information.

AWN note that the turbine model assessed in Chapter 13 of the EIAR was the Nordex N117 3.6 MW. Additional candidate turbine models have been assessed by AWN and submitted as part of this FI Response at **Appendix 4**. The result of this modelling and an assessment is presented in Section 2 of the AWN report.

It is highlighted to the Board that the potential impacts which could arise from the Proposed Development during the construction and decommissioning phases relate to increases in noise due to activities relating directly to those phases as set out in Chapter 13 of the EIAR. There will be no change to the potential impacts or predicted effects irrespective of which turbine configuration is selected within the turbine range discussed at FI Item 1. The potential impacts that could arise from the Proposed Development during the operational phase relate to increases in noise caused by the operational wind turbines. The noise assessment contained in the EIAR considered a hub height of 91m. The range now being considered includes hub heights ranging from 83.5m to 93.5m, which is reflected in the AWN Technical Note presented in **Appendix 4** of this FI response document. AWN have considered predicted noise levels for a series of turbine models within a hub height range of 93.5m which represents the tallest hub height in the turbine range (see Section 2 of AWN Technical Note). There were no predicted exceedances of the operational noise criteria curves for any of the turbine models considered in the assessment. The mitigation proposed at Sections 13.6.2.7-13.6.2.9 and 13.6.3.5 – 13.6.4.1 of Chapter 13 of the EIAR will be implemented as required across the wind farm. This will ensure the operational wind farm noise levels remain within the best practice criteria curves recommended in 'Wind Energy Development Guidelines for Planning Authorities 2006' in all cases.

The range of turbine models considered in the AWN Technical Note represent suitable turbine types for the Proposed Development. If alternative turbine models within the specified ranges are considered for the Proposed Development the noise emissions will comply with the noise criteria and/or the relevant operational criteria associated with the grant of planning. As is standard for all projects, suitable curtailment strategies will be designed and implemented for the procured turbines to ensure compliance with the relevant noise criteria, should detailed assessment conclude that this is necessary.

Further Information Item No.4 – Wording

Shadow Flicker

“Your attention is drawn to the Draft Revised Wind Energy Development Guidelines 2019 and in particular to reference within Chapter 2 (Section 2.4.5.3.1) of the EIAR whereby it is stated that the design of the Proposed Development has been developed with the provisions of the draft guidelines in mind. Please expand in respect of shadow flicker.”

2.4.1 Item No.4 Response

Section 2.4.5.3.1 of Chapter 2 of the EIAR as lodged summarises the Draft Wind Energy Guidelines (December 2019) and in relation to the Proposed Development states:

“The design of the proposed project has taken account of the “preferred draft approach” as articulated by the Department in June 2017, and accordingly, has been developed with the provisions of the 2019 Draft guidelines in mind. At time of writing the Draft Guidelines are not yet in force, the relevant guidelines remain those published in 2006, and accordingly the provisions of the draft version have been considered but could not be used to inform the decision process, given that they may be subject to further change on foot of completion of the consultation process.

Notwithstanding this, however, due to the timelines associated with the planning process for renewable energy projects it is possible that a version of the Draft Revised Guidelines will be finalised during the consideration period for the current proposed development. The proposed development will adhere to the relevant noise and shadow flicker standards. The noise section demonstrates that the proposed development will not have an adverse impact on sensitive properties and shadow flicker is an entirely controllable phenomenon that will be managed to ensure relevant guidelines can be satisfied.”

Chapter 3 of the EIAR, Consideration of Reasonable Alternatives, illustrates those environmental effects – including shadow flicker – formed an intrinsic part of the design of the Proposed Development. In addition, the constraints and facilitators mapping as detailed in Section 3.6.1 of the EIAR specifically references the adopted and draft Wind Energy Guidelines. Following the mapping of the facilitators and all known constraints and the emergence of a preliminary wind farm layout, detailed site investigations and assessments were carried out by the project team. During site investigations, where specific areas were deemed as being unsuitable for the siting of turbines or associated infrastructure, alternative locations were proposed and assessed, taking into account the areas that were already ruled out of consideration. The proposed turbine layout was also informed by wind data and the results of noise and shadow flicker modelling as they became available.

Shadow flicker is assessed at Chapter 6 of the EIAR lodged. Shadow flicker has the potential to impact only at the operational stage of the wind farm. The maximum potential rotor diameter of the proposed turbines is 133 metres therefore a study area of 1,330 metres (i.e. 10x 133m rotor diameter) was chosen. Shadow flicker occurs only under certain, combined circumstances. Where shadow flicker does occur, it is generally short-lived. The Department of the Environment, Heritage and Local Government (DoEHLG) guidelines state that careful site selection, design and planning, and good use of relevant software can help avoid the possibility of shadow flicker in the first instance, all of which have been employed at the site of the Proposed Development. Proper siting of wind turbines is key to reducing or eliminating shadow flicker. The occurrence of shadow flicker can be precisely predicted using specialist computer software programmes specifically developed for the wind energy industry, such as WindFarm (ReSoft) or WindFarmer (DNV.GL) or AWS OpenWind.

The output from the calculations is analysed to identify and assess potential shadow flicker impacts. Wind turbines, like other tall structures, can cast long shadows when the sun is low in the sky. In order to ensure the full extent of the moving shadow which would be created by the turbine range is considered in the assessment as follows:

- Planning permission is being sought for a turbine size envelope with a maximum tip height of up to 150 metres. For the purposes of this assessment, the maximum potential rotor diameter of 133 metres has been used to model shadow flicker in order to assess the worst-case scenario.
- Assuming a 133-metre rotor diameter and a total turbine tip height of 150 metres, the modelled turbine therefore has a hub height of 83.5 metres. This was the original shadow flicker model run in the EIAR as lodged. As noted in Table 2-3 earlier, a hub height of 93.5 metres has also been run as part of this FI response. The findings of the shadow flicker re-run for the minimum hub height (83.5m) and the maximum hub height (93.5m) are presented in **Appendix 8** of this FI response. The minimum hub height leads to a total of 41 no. dwellings experiencing daily shadow flicker exceedances while the maximum hub height leads to a total of 63 no. dwellings experiencing daily shadow flicker exceedances. The model results assume worst-case conditions, including
 - 100% sunshine during all daylight hours throughout the year,
 - An absence of any screening (vegetation or other buildings),
 - That the sun is behind the turbine blades,
 - That the turbine blades are facing the property, and
 - That the turbine blades are moving.
- While these dimensions have been used for the purposes of the assessment prepared, the actual turbine to be installed on the site will be the subject of a competitive tender process, and could include turbines of a different rotor diameter and hub height configuration (within the 150-metre tip height envelope) than considered as part of this assessment.
- Regardless of the make or model of the turbine eventually selected for installation on site, it will have a maximum tip height of up to 150 metres and the potential shadow flicker impact it will give rise to will be no more than that predicted in this assessment. With the benefit of the mitigation measures outlined in the EIAR, any turbine to be installed onsite will be able to comply with the DoEHLG 2006 guidelines thresholds of 30 minutes per day or 30 hours per year, or with the revised guidelines requiring zero shadow flicker if required, through the use of turbine control software.

The Draft 2019 Guidelines recommend local planning authorities and/or An Bord Pleanála impose conditions to ensure that:

*“**no** existing dwelling or other affected property will experience shadow flicker as a result of the wind energy development subject of the planning application and the wind energy development shall be installed and operated in accordance with the shadow flicker study submitted to accompany the planning application, including any mitigation measures required.”* [emphasis added]

The assessment contained in the EIAR as lodged is based on compliance with the current DoEHLG Guidelines limit (30 hours *per* year or 30 minutes per day). If the final adopted revised Wind Energy Guidelines specify zero shadow flicker to occur at dwellings, the Proposed Development will be capable of meeting this requirement via direct turbine control measures and the other mitigation measures set out in Section 6.4.3 of Chapter 6 of the EIAR as lodged. The wind turbines will be installed with the SCADA system which can meet the requirements of the 2006 Guidelines or any future requirements should they be adopted prior to a decision being made on this application. This remains the case for the minimum and maximum hub heights (83.5 and 93.5m respectively) as set out in **Appendix 8**.

Further Information Item No.5 – Wording

Landscape

Visual Impact on Receptors

- (a) *“You are requested to provide a number of additional photomontages from viewpoints which represent the local community and from a location to the east of the development which represents potential impact on the wider landscape along the Blackwater River particularly in the vicinity of structures of national heritage importance. A photomontage to the south of Tallow along R627 should also be provided. A thorough viewpoint assessment of the additional viewpoints is also required.*
- (b) *You are requested to review the photomontages undertaken and submitted by a number of the observers and provide a viewpoint assessment for each.*
- (c) *You are requested to review and respond to the concerns raised by the Planning Authorities in relation to landscape and visual impact”.*

2.5.1 Item No.5 Response

Chapter 12 of the EIAR addresses the potential landscape and visual impacts of the Proposed Development on receptors identified through the process of LVIA. In response to the request for Further Information related to LVIA, additional photomontages, and commentary have been prepared by MKO to specifically address matters raised in this FI request. The documents forming **Appendix 5** of this FI response document in relation to landscape and visual are:

- FI LVIA report
- Volume 2 – FI Photomontage Booklet
- Appendix 1 - Photomontage Assessment Tables
- Appendix 2 - 3rd Party Photomontage Critique
- Appendix 3 - 3rd Party Photomontage Assessment Tables

These photomontages contained in ‘Volume 2 – Photomontage Booklet’ should be read in conjunction with the ‘FI LVIA Report’. Landscape Assessments of the additional Viewpoints are provided in Appendix 1 of the FI LVIA Report.

The LVIA response to this Further Information request are summarised below.

2.5.1.1 Item 5 (a)

In specific response to FI Item 5(a) additional photomontages have been prepared which represent viewpoints from the perspective of the local Community, the wider landscape along the Blackwater River and the R627 Regional Road South of Tallow. The discussions contained in the FI LVIA report should be read in conjunction the FI Photomontage Booklet and the Photomontage Assessment Tables enclosed here at Appendix 5.

The following paragraphs provide a summary discussion of the visual impact on the noted receptors.

2.5.1.1.1 Local Community

A number of additional photomontages were captured to further assess the visual effects of the Proposed Development on the Local Community. The discussion in relation to the potential impact on residential amenity is set out in detail in section 1.2.1 of the FI LVIA Report. The additional viewpoints were identified where there were open views in the direction of the Proposed Development with a focus on locations requested by Waterford and Cork County Councils. The additional viewpoints chosen comprised of views from the east and south of the Eastern cluster and views from the west of the western cluster. As outlined in the FI LVIA Report, the impact on residential visual amenity is not considered to be Significant in relation to the Proposed Development. In general, the proposed turbines are well set-back from local residences and are compliant with

the minimum set-back distances from all residences in the local community (see Section 1.4.6 of the FI LVIA Report). Views towards the site from those residential receptors located closest to the Proposed Development are not of a high scenic value given that they are views towards large tracts of commercial forestry, often separated by topographical features, such as valleys, slopes, or hills. In the event of the felling of any sections of this forestry, there may potentially be views from residential receptors discussed here although it is noted that the landscape will remain that of a commercial forestry site and that any views will not have a Significant impact on residential visual amenity.

2.5.1.1.2 Wider Landscape along the Blackwater River

Several photomontages have been produced to represent the impact on the wider landscape along the Blackwater River in the vicinity of important national heritage structures, and these are included in the Photomontage Booklet. The Zone of Theoretical Visibility mapping exercise (Figure 1-5) illustrates how the geographical characteristic of this landscape visually separates the Proposed Development from valuable landscape receptors and valuable scenic amenity in the Blackwater Valley. The map illustrates the portion of the Blackwater Valley which has no theoretical visibility and is a useful tool for showing locations or areas where there is theoretical visibility and require further investigation on the ground.

The structures assessed following identification in the zone of theoretical visibility are Camphire House and Castle, the 17th Century House at Headborough as well as Kilmore House. The potential impact of the Proposed Development on the wider landscape of the Blackwater River is also assessed. Figure 1-3 and Figure 1-4 of the LVIA report illustrate the scenic amenity of the landscapes attributed to the river itself and the surrounding lowlands. The report illustrates that the visibility of the Proposed Development is greatly constrained from these areas, with turbines limited to the backgrounds of view where visibility does occur (Figure 1-4). The report demonstrates that the development does not interfere with the primary scenic view of the river valleys and cultural heritage sites and is well suited in relation to potential impacts on the “*wider landscape of the Blackwater Valley*”.

Please refer to Section 1.2.2 of the FI LVIA Report for a further discussion on the visibility of the Proposed Development on identified cultural heritage receptors which concludes that there are no significant residual or landscape effects arising at these locations as a result of the Proposed Development.

Section 1.2.3 includes a discussion on the Wider landscape of the Blackwater Valley. There are 8 photomontages included from locations on the eastern side of the Blackwater and the Northern Side of the River Bride. These photomontages show that there is minimal interference with the scenic amenity of the landscape and that the layout of the Proposed Development is coherent and appropriately sited in relation to the landscape area. In essence the addition of the Proposed Development does not substantially detract from the scenic amenity of the area and does not affect the fundamental sensitivities of the landscape in view. The Proposed Development is often substantially screened by the intervening topography and commercial forestry of the Proposed Development site itself, and there are large parts of the Blackwater Valley where there is no visibility of the Proposed Development. It is noted that in the viewpoint assessment tables contained in Appendix 1, there are no Significant residual visual effects deemed to arise, with an ‘Imperceptible’ effect deemed to arise at Viewpoint 38, a ‘Not Significant’ effect deemed to arise at Viewpoints 27, 22, 20, 21, ‘Slight’ at Viewpoints 23, 25, and 26. These demonstrate that the Proposed Development is effectively absorbed and sited within this landscape.

2.5.1.1.3 R627 Regional Road South of Tallow

It is noted, in relation to the visual impact assessment for the R627 Regional Road that Section 12.8.3.3.3 of the EIAR details that this road was included in the route screening assessment undertaken and it can be seen from Figure 12-13 of the EIAR that there is primarily intermittent screening present along the road in the direction of the Proposed Development. This road was re-visited again during a site visit conducted on 17th June 2022 and similar levels of screening were observed with limited open views towards the Proposed Development.

Viewpoint 28 (shows a view from a location along the R627 where it intersects with the L7804 local road. This Photomontage shows an open view towards the Proposed Development from the road. As detailed in the viewpoint assessment table for Viewpoint 28 (contained in Appendix 1), Significant residual visual effects will not arise, and the Proposed Development appears to be well absorbed within the landscape from this viewpoint.

2.5.1.2 Item 5(b)

2.5.1.3 Review of Third-Party Photomontages

Section 1.3 of the FI LVIA Report addresses Third Party photomontages submitted to the application. Each are reviewed in full with an individual assessment table completed for each viewpoint included. MKO as competent experts in the field, note that these third-party photomontages were submitted without a comprehensive visual assessment. In addition, a detailed critique and explanation of the issues related to the third-party photomontages is presented the FI LIVA Response (refer to **Appendix 5**)

It is respectfully submitted that the photomontages presented by third parties are not an accurate depiction of the Proposed Development, with serious flaws in relation to the placement of turbines within the views shown. The third-party photomontages are inaccurate. Notwithstanding, for the purposes of this FI response and to remove any remaining doubt, the photomontages have been assessed **as if they were accurate**. Following this assessment, it is concluded that no Significant Residual Effects are deemed to arise.

The findings of the thorough and robust LVIA within the EIAR as lodged was that the visual effects are ‘Slight’ for the 20km study area. This remains valid as further demonstrated by the response to this FI item.

2.5.1.4 Item 5(c)

The FI LVIA Report prepared as part of this FI response comprehensively addresses submissions of Cork County Council and Waterford County Council. These are summarised below.

2.5.1.4.1 Cork County Council

Cork County Council raised concerns relating to landscape character types as discussed in Chapter 12 of the EIAR. These concerns are addressed in detail with the FI LVIA Report setting out the comprehensiveness of Chapter 12. It is submitted that the EIAR fully considered the landscape character types set out in the relevant guidance, including the guidance on siting and design contained therein, contrary to the submission of Cork County Council, which appears to have overlooked this section. It is respectfully suggested that the Council has not fully considered the extensive assessment of landscape character presented in the main body of the EIAR as well as in Appendix 12-2 which clearly demonstrate that the effects on landscape character were fully considered in the original EIAR.

Section 1.4.1.1. of the FI LVIA Report addresses a concern of Cork County Council in relation to the Zone of Theoretical Visibility Mapping. The FI includes a 35km ZTV (Figure 1-12) but notes that, in accordance with the Wind Energy Guidelines (2006 DoEHLG) and Draft Wind Energy Guidelines (2019 DoHPLG) a ZTV radius of 20km is adequate for blade tip in excess of 100m (as is the case here). It is thus submitted that the 20km ZTV used in the landscape and visual chapter of the EIAR is sufficient in the context of the Proposed Development. It is noted in this regard that views of the Proposed Turbines from locations outside of 20km from the Proposed Development are unlikely to be substantial, with the turbines appearing smaller the further from the Proposed Development that they are viewed and are highly unlikely to result in significant landscape and visual effects. Additionally, it is concluded that the Council’s concerns regarding the ZTV have already been addressed within Chapter 12 of the EIAR, which follows the guidance quoted by the Council themselves, and that any potential significant landscape and visual effects have been comprehensively assessed (including through the use of a Photomontage – Viewpoint 1).

2.5.1.4.2 Impact on Scenic Route S45

Notwithstanding the acknowledgement by Cork County Council that a detailed consideration of the impacts along Scenic Route S45 is contained within Chapter 12 of the LVIA, the Council raised concerns relating to the visual sensitivity afforded to the receptor at Viewpoint 7.

The viewpoint assessment conducted in Chapter 12 of the EIAR and in Appendix 12-3 are inter-related and it is clear from Chapter 12 that the suggested sensitivity (by virtue of its designation as a scenic route) of this part of SR45 was incorporated into the overall assessment of the route. Section 12.9.3 of the EIAR states:

“Views from this route were found to be limited by topography and screening, except for in the stretch of this route furthest away from the turbines where the long-distance views were in the opposite direction to that of the turbines. Furthermore, the nature of the views, across agricultural fields, are widely available around this area and not unique. Viewpoints were attempted to various locations along the scenic route, but due to limited visibility only one was selected. At this viewpoint, Viewpoint 7, which is located between the two turbine groups on a scenic route and only 0.67 kilometres from the nearest turbine, the visual effects are considered ‘Slight’, due to extensive screening of much of the turbines”.

An additional viewpoint (no. 45) and visual assessment has been included in this FI, and it is concluded that Significant visual effects will not arise.

2.5.1.4.3 Impact on Scenic Route S47

Concerns raised by Cork County Council relating to Viewpoint 9 submitted in Chapter 12 of the EIAR are discussed in Section 1.4.3 of the FI LVIA Report. Viewpoint 9 is the view from Cork Scenic Route S47 on L-3819-65 local road in the townland of Ballypherode.

The report concludes that the appearance of the Proposed Development from a distance of 15km as illustrated in Viewpoint 9 is acceptable. It notes that, as although the Proposed Development is one windfarm, the landscape character type as per the Wind Energy Development Guidelines (2006, DoEHLG) and the Draft Revised Wind Energy Development Guidelines (2019, DoHPLG), visibility of two or more windfarms is usually acceptable and as such the appearance of the Proposed Development from this viewpoint as separated does not raise concern.

In relation to the spatial extent of the Proposed Development, the FI LVIA Report notes that Appendix 12-3 of the EIAR contains a detailed viewpoint assessment which states that *“The spatial extent within this view of the proposed wind farm is very limited due to the great distance.”* A Not Significant residual visual effect was deemed to arise at this Viewpoint, and it is submitted that all of the concerns raised by Cork County Council in relation to the visual impact on the scenic route represented by this viewpoint are included and incorporated into the assessment that was conducted and which arrived at this conclusion, which is fully detailed within Appendix 12-3 of the EIAR, as noted.

2.5.1.4.4 Impact on Scenic Route S6

Cork County Council raised concerns regarding the spatial extent of the turbines when viewed from Viewpoint 13. The viewpoint assessment table for Viewpoint 13 as outlined in Appendix 12-3 of the EIAR contains a detailed assessment of this viewpoint. Within this table it is stated that *“The spatial extent of the proposed wind farm in the view is minor, due to distance.”* It is also stated that the landscape within this view is an *“Expansive landscape able to absorb the Proposed Development .”* Both of these points are reiterated in relation to the concerns of Cork County Council regarding this Viewpoint, quoted above. It is further noted that a residual visual effect of Slight was deemed to arise at this Viewpoint as a conclusion of the assessment which is fully detailed within Appendix 12-3 (of the EIAR), as noted.

In terms of the form of the eastern cluster, it is submitted that the turbines of this cluster are actually relatively evenly spaced and are effectively absorbed within the view shown from this location, considering the scale of the

expansive view available, and again is in line with the guidelines (Wind Energy Development Guidelines (2006, DoEHLG) and the Draft Revised Wind Energy Development Guidelines (2019, DoHPLG)) for ‘Hilly and Flat Farmland’.

2.5.1.4.5 Additional Visual Impacts to be Considered

Cork County Council raised concerns relating to views from vantage points namely views from the L7806 and the R627. These are assessed in Section 1.4.5 of the FI LVIA Report. The report notes the detailed scoping exercise, desk study and baseline study which were carried out as part of the Landscape and Visual Assessment in Chapter 12 of the EIAR. The exercise was undertaken with the aim of assessing the likely significant effects of the Proposed Development and provides a level of detail which is reasonably required to assess the likely significant effects and as such the baseline study considers the overall LVIA study area and if viewpoints were not chosen as specific viewpoints themselves it was due the determination that significant landscape or visual impacts were unlikely to arise. However, for the avoidance of doubt as to the significance of visual effects on these receptors, both the R627 regional road and L7806 local road are discussed further as part of this FI response and a photomontage was produced from locations along the R627 regional road. The L7806 local road was revisited during a site visit conducted on the 17th June 2022 and a number of images are included in the FI response to explain the likely visibility of the Proposed Development from this road. It is ultimately concluded that the Proposed Development does not cause a Significant visual effect to arise on the fundamental sensitivities of the landscape in view from the L7806 and will not cause a significant effect to arise in relation to visual receptors overall in relation to the R627.

2.5.1.4.6 Impacts on Visual Amenity of Residential Properties

In relation to concerns of Cork County Council regarding visual impact on properties to the west of the western portion of the Proposed Development and to the south of the eastern portion of the Proposed Development, Section 1.4.6 of the FI LVIA Report reiterates that potential for impact on sensitive residential receptors has been kept to the fore throughout the iterative design process adopted for the Proposed Development and has been considered in full within the EIAR. The Draft Revised Wind Energy Development Guidelines (2019, DoHPLG) contain Specific Planning Policy Requirements (SPPRs). As illustrated in Figure 1-15 of the FI LVIA Report, the Proposed Development is compliant with the 4 times tip height set-back distance prescribed by the Draft Revised Wind Energy Development Guidelines (2019, DoHPLG). Further discussion related to visual effects on residential receptors are considered outside of this requirement, as discussed in some detail within Section 12.8.3.5 of the EIAR (which discusses the visual effects on residential properties between the two clusters of wind turbines) as well through the use of various other photomontage viewpoints throughout the LVIA study area and discussion of visual effects within Sections 12.8.3.3.3 of the EIAR. An assessment of the visual effects of the proposed turbines was undertaken from the 15 viewpoint locations and assessed in terms of the sensitivity of the visual receptors along with the magnitude of change as recommended in the GLVIA (2013) guidelines (Figure below). This, in conjunction with a detailed review of the photomontages themselves and the ZTV maps, informed the visual effects assessment included in the EIAR. Additionally, the effects on residential visual amenity for the local community is addressed in detail in Section 1.2.1 of the FI LVIA Report which concluded that the Proposed Development would not cause a significant effect in relation to residential amenity.

Section 1.4.6 of the FI LVIA responds in detail to a number of points made by Cork County Council in relation to the methodology of LVIA. The report details scoping, and desk studies carried out and discusses the level of detail provided in the EIAR and additional FI Landscape Report. It is noted that it is not possible to represent every single visual receptor identified in the study area with an individual photomontage and thus emphasis is put on receptors with the potential to experience likely significant effects. In relation to *“residential properties either to the west of the western clusters or those properties to the south of the eastern cluster”*, it is submitted that **it is not the case** that the visual impact on these properties was not considered in the original EIAR. The focus of the EIAR was on those residential properties with potential views of turbines in multiple direction as these were more likely to experience significant visual effects (although as noted in Section 12.8.3.5 of the EIAR, this is not the case). It is noted that there are a range of Viewpoints originally captured in close proximity to the Proposed Development (five in total, from multiple perspectives). However, to ensure that the Council’s concerns are fully addressed in relation to residential visual amenity a number of additional photomontages

were prepared from *“those residential properties either to the west of the western clusters or those properties to the south of the eastern cluster.”*

The effects on residential visual amenity for the local community is addressed in some detail above in Section 1.1 of the FI LVIA Report. This includes discussion of photomontages prepared from residential properties to the west of the western clusters and to the south of the eastern cluster. The discussion above is not repeated here however, it is noted that no Significant residual visual effects are deemed to arise at these locations and that the concerns raised by the Council in relation to these are fully addressed in Section 1.1 and within the photomontage assessment tables included in Appendix 1 accompanying the FI LVIA.

2.5.1.4.7 Submissions of Waterford County Council

Waterford County Council has made a number of comments relating to the landscape and visual impact of the Proposed Development. None of the comments of Waterford County Council regarding the photomontages produced as part of the EIAR call into question the thorough impact assessment completed for each viewpoint. It is reiterated in this regard that these photomontages were assessed in substantial detail in Appendix 12-3 of the EIAR and no Significant residual visual effects were deemed to arise. It is submitted that none of the comments made by Waterford County Council in relation to these viewpoints suggest or imply that Significant visual effects arise. It is also submitted that the landscape of the Proposed Development site is entirely suitable for a wind energy development (as suggested by the designation of this area as a ‘Preferred Area’ in the Waterford County Development Plan 2011-2017 and is capable of visually accommodating a wind farm of this scale.

Wind Energy Strategy

Waterford County Council’s submission raised concerns in relation of the ability of the Proposed Development Site to *“visually accommodate”* the proposed turbines. Discussion relating to this issue is found in Section 1.4.7.7 of the FI LVIA Report. The proposed turbines are subject to extensive discussion in a number of sections within the EIAR (see Section 12.8.3.1, Section 12.8.3.2, Section 12.8.3.3, and Section 12.8 generally, as well as Appendix 12-2 which contains a comprehensive assessment of effects on landscape character within the LVIA Study Area). Again it is noted that the Proposed Development site is suitable for Wind Energy Development as designated as a ‘Preferred Area’ in the Waterford County Development Plan 2011-2017, Waterford Renewable Energy Strategy 2016-2030 and Waterford City and County Development Plan 2022-2028. Preferred areas are: *‘Areas which are suitable and should generally be considered for permission unless local circumstances dictate otherwise’*.

Settlements

Waterford County Council raises concerns related to the potential visual impact on settlements. A number of additional photomontages have been prepared to supplement the original EIAR. It is concluded in the FI LVIA Report Section 1.4.7.2 that there are no Significant visual effects that arise in relation to the Proposed Development. Further discussion in the FI LVIA Report addresses separation distances of residential dwellings identified by the Local Authority (illustrated in Figure 1-16). It is submitted that the concern highlighted by Waterford County Council in relation to houses located approximately 700m from the nearest turbine (although it is noted that these are compliant with the minimum recommended separation distances), that both houses number 2 and 3 are located in locations where there are substantial levels of screening provided by the commercial forestry present on site and located in the intervening space between these receptors and the nearest turbines. It is submitted that this screening will limit visibility of the proposed turbines and provide a degree of separation such that the Proposed Development **will not** have a *“visually overbearing impact.”* Additionally, Visual effects in relation to the overall residential visual amenity of the local community are comprehensively addressed above in Section 1.1 of the FI LVIA Report and in Chapter 12 of the original EIAR.

Range of Turbine Dimensions Assessed

The dimensions presented below are the range of hub height, blade length and overall tip height assessed within differing chapters of this EIAR and constitute a ‘reasonably limited range’:

- Turbine Tip Height – 150m
- Hub Height – Maximum height 93.5m, Minimum height 83.5m
- Blade Length – Maximum length 66.5m, Minimum length 56.5m

As outlined further below, the entire range of turbines was fully assessed using a number of photomontages comparing an alternative turbine configuration. Irrespective of which combination of hub height and blade length within the range outlined above is installed on site, the significance of residual landscape and visual effects will not be altered. Regardless of whichever configuration of turbine components is installed, the Tip Height of the turbines will be 150m. A blade length of 56.5m and a hub height of 93.5m was considered throughout the original EIAR assessment and is a representative illustration of the Proposed Development on the basis of professional judgement and on consideration of the range of turbines which could be installed. This combination of blade length and hub height (Maximum Hub Height and Minimum Blade Length, 150m Tip Height) has been identified as the most representative for assessment, on the basis that the greatest extent of the entire turbine structure (blades and tower) would potentially be visible from the viewpoints assessed in the EIAR. This turbine configuration (blade length of 56.5m and a hub height of 93.5m) of the reasonably limited range is termed as the ‘Highest Hub and Shortest Blade’:

- **Highest Hub and Shortest Blade** – All 15 No. Viewpoints.
 - Maximum Tip Height – 150 metres
 - Maximum Hub Height – 93.5 metres
 - Minimum Blade Length – 56.5 metres

Irrespective of which combination of hub height and blade length within the range outlined above is installed on site, the significance of residual landscape and visual effects will not be altered. However, for the avoidance of doubt, an alternative turbine configuration of the longest blade and lowest hub is presented for three selected viewpoints included in the photomontage booklet accompanying this document, this configuration is termed ‘Lowest Hub and Longest Blade’. The viewpoints selected are representative of short-range views (viewpoint 16 <1.5 km from the Proposed Development), and medium-range views (viewpoints 20, and 26 <6km from the Proposed Development). The photomontage assessment tables for these viewpoints contained in the LVIA FI response at **Appendix 1** includes a comment addressing the alternative turbine configurations and confirm that the turbine configuration ultimately installed on site will not alter the assessment of residual visual effects. The following summarises the ‘Lowest Hub and Longest Blade’ configuration that is presented:

- **Lowest hub and Longest Blade** – 3 Photomontage Viewpoints
 - Maximum Tip Height – 150m
 - Minimum Hub Height – 83.5 metres
 - Maximum Blade Length – 66.5 metres

Irrespective of which combination of hub height and blade length within the range outlined in this application is installed on site, the significance of residual landscape and visual effects will not be altered as set out in Table 12-21 of the original EIAR.

Further Information Item No.6 – Wording

Cultural Heritage

Historic Houses and Landscapes within Blackwater Valley

“You are requested to review the potential impact of the proposed development on the setting of historic houses/castles and demesnes along the Blackwater River Valley from Villierstown to Youghal Bridge on both banks of the River”.

2.6.1 Item No.6 Response

Tobar Archaeological Services were engaged by the applicant to prepare Chapter 14 of the EIAR submitted as part of this application. Tobar Archaeology have prepared a dedicated response to the Further Information request – refer to Tobar Archaeology and Cultural Heritage Report enclosed here at **Appendix 6**. The report addresses FI item No. 6 as well as Local Authority submissions and Third-Party concerns. The report is summarised below. Tobar Archaeological Services prepared Chapter 14 of the EIAR, Archaeology and Cultural Heritage.

Section 1.1 of the FI Tobar Archaeology and Cultural Heritage Report (‘the Report’) addresses FI Item No 6 as well as the Third-Party Submission from Eachtra Archaeology Projects. The response addresses Houses, Castles and Demesnes along the Blackwater Valley, the majority of which are outside the 5km study areas as defined in Chapter 14 of the EIAR. The report notes that the Blackwater River Valley from Villierstown to Youghal Bridge is topographically lower than the surrounding landscape and this is the nature of such river valleys. Accordingly, the majority of the area, including the river and lands to the east and west of same are located outside the zone of theoretical visibility. In other words, the zone of theoretical visibility shows that there is no visibility of any turbines from the majority of the areas of concern along the valley. The response addresses specific concerns included in Third Party submissions. As outlined in Table 1: *Houses, Castles and Demesnes along the Blackwater Valley* of the Report, three structures are within the Zone of Theoretical visibility of a number of proposed Turbines, namely Camphire House and Castle, 17th Century House at Headborough and D’loughtane House. These Structures were also assessed in the FI LVIA Report as prepared by MKO.

The impact of these structures is summarised below:

- **Camphire House and castle:** There is likely limited to no views of the proposed turbines. In this regard visual effects on setting will be imperceptible. This is also assessed in Section 1.2.2 of the FI LVIA Report and in Figures 1-3 to 1-6 of the same report.
- **17th century house at Headborough :** There will be limited to no views of the proposed turbines. In this regard visual effects on setting will be imperceptible. This is also assessed in Section 1.2.2 of the LVIA Report document and on Figures 1-3 to 1-6 of the same report.
- **D’Loughtane House:** The results of a photomontage study shows that 11 turbines will be partially visible (approximately from mid shaft to blade tip) with only the blade tips of the remainder visible. At the distance of 6.4km to the nearest turbine (T6), this effect is considered to be not significant (An effect which causes noticeable changes in the character of the environment but without significant consequences), as per the EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports, (2022). The photomontage is represented in the Appendix 2 of the FI LVIA Report 2, PM23 and further addressed in the LVIA response document Section 1.2.2.2.

Concerns regarding Houses, Demesnes and general built heritage along the Bride River Valley from Tallow to the Confluence with the Blackwater are addressed in Section 1.1.1.5 of the Report. Table 2 of the Report sets out the Houses, Castles and Demesnes Along the Bride River Valley that are addressed in the report as summarised below:

- **Lisfiny House and Demesne:** At the distance of 6.2km to the nearest turbine (T12), the overall significance of effects are considered to be not significant (An effect which causes noticeable changes in

the character of the environment but without significant consequences). A change to the views from the monument are acknowledged but without significant or adverse consequences

- **Kilmore House:** The site of the house itself is not accessible to the public and access could not be obtained during the site visit. Similar to the above, this site is located on the edge of the ZTV and therefore visibility is limited even where there is open visibility in the direction of the Proposed Development. There will be limited to no visibility of the Proposed Development from this site, as a result of screening from the vegetation (deciduous woodland) and the fact that there is already likely limited visibility indicated on the ZTV. The overall effects will therefore be imperceptible. This structure is also discussed further in Section 1.2.2 of the FI LVIA Report.
- **Ballynaraha Castle:** Since the ZTV shows theoretical visibility of between 12 and 17 turbines, a photomontage was prepared in order to ascertain what, if any, visibility is possible and the degree of visibility from the monument. Photomontage no 24 is presented in the FI LVIA Report and addressed in Section 1.2.2.2 of the FI LVIA Report (refer to **Appendix 5** here). The photomontage shows that turbine 6 will be visible at a distance of 6.7km. At the distance of 6.7km to the nearest turbine (T1), the overall significance of effects are considered to be imperceptible to not significant since a large tract of woodland and hedgerow has effectively screened the remainder of the turbines.

In conclusion, the Report states:

“In response to the FI and the concerns raised in some submissions, photomontages were carried out from a number of structures and are presented in the FI LVIA Report which should be read in conjunction with this document. It is considered that all concerns regarding the assessment process and the results of same as reached in Chapter 14 of the EIAR are addressed here and that the mitigation measures outlined in the Chapter are appropriate for the amelioration of any potential impacts identified”.

2.7 Further Information Item No.7 – Wording

Land Use

Equine Industry

“It is stated at section 5.2.7.1 of the EIAR that all facilities within 10km of the Proposed Development have been included in the assessment. However, Table 5-7 outlines the stud farms/equestrian facilities within 5km of a turbine location, two of which are more than 5000m (5km) of a turbine location.

- (a) Please provide a table outlining all facilities assessed within a 10km of the distance to the nearest turbine.*
- (b) You are also requested to review and respond to the matters raised in the observations received by An Bord Pleanála in respect of the potential impact on the equine industry.”*

2.7.1 Item No.7 Response

This response has been prepared to address items (a) and (b) on the Equine Industry as referenced in the An Bord Pleanála (ABP) Further Information request.

Item A

In relation to item (a) of the FI there was a typographical error in the title of Table 5-7 of Section 5.2.7.1 of the EIAR as lodged. The table title has been amended to include all stud farms and equestrian facilities located within **10km** of the Proposed Development and which have been included in the assessment as per the EIAR as lodged. The closest stud farm/equestrian facility is located approximately 1,000 metres from the nearest proposed turbine location. The stud farms/equestrian facility and distances are shown in Table 2-6.

Table 2-6 Stud Farms/Equestrian Facilities within 10km of a Turbine Location

Facility	Distance to nearest Turbine (m)
The Old Road Stud, Tallow, Co. Waterford	1,000
Bridge Stud, Tallow, Co. Waterford	6,000
The Beeches Stud, Knocknamuck, Tallow, Co. Waterford	7,600

The opportunity to clarify this issue is welcomed and it is regretted if this typographical error has given rise to any confusion.

Item B

In relation to the matters raised in observations received by An Board Pleanála, claims are made in a number of these submission in respect of equine facilities and proximity to the application site. In the absence of policy or guidance on what constitutes an equine facility, the approach taken in the EIAR to identify stud farms and equestrian facilities within 10km of the proposed development is considered reasonable. A desk study search of stud farm/equestrian facilities within 10km of the site was undertaken by MKO. The following available sources were consulted:

- Irish Thoroughbred Marketing <https://itm.ie/Breeding/Farms>;
- Digital map search
- Irish Racing <https://irishracing.com/studfarms>

Further to item (b), it is reiterated that as noted in Section 5.2.7.1 of the EIAR, there have been no peer-reviewed studies carried out in Ireland on the impacts of wind farms on the equine industry. It is acknowledged that several public submissions raise concerns regarding potential impacts on the equine industry. There is no reference to wind turbine effects on bloodstock activity in the Windfarm Planning Guidelines (2006)

or Draft Windfarm Planning Guidelines (2018). There is no published research which specifically relates to the effect of wind turbines on horses or horse activity. The Marshall Day Acoustics (2014) study 'Summary of research of noise effects on Animals' specifically assesses the impacts that varying levels of noise have on horses. Outlined below are the conclusions of the Marshall Day study (2014) for different behavioural settings:

- **Horses in stables** - *"A case study by Huybregts from Marshall Day Acoustics observes that horses in stables exposed to LAeq, 15min of 54-70dB generally show little response to music noise unless the noise is particularly impulsive... Huybregts (2008)"*
- **Breeding mares** - *"Le Blanc et al (1991) found that birth success of pregnant mares was not affected by F-14 jet aircraft noise. While the 'fright-flight' reaction was initially observed, the mares did adapt to the noise"*
- **Racehorses** - *"Race horses are known for being high-strung. However, Marshall Day Acoustics have observed horses grazing in paddocks directly under the main approach path of the Christchurch International Airport where noise levels are in excess of 90 dB (LAmax) during an aircraft flyover, Although these horses are arguably 'used to' the noise, there was generally little recognition by them of an aircraft passing, let alone any sign of disturbance. This tends to support the conclusions by Le Blanc et al (1991)."*

Furthermore, the Marshall Day (2014) study finds that horses exhibit adaptation, acclimation and habituation after repeated exposure to noise and visual stimuli and suggests that noise has minimal effects on animals;

"once animals become habituated to noise, especially when it is steady and associated with clearly non-threatening activity, they suffer very little adverse response."

It is noted that in a previous case before the Board, PL16.221313 (Mayo County Council PL Ref. 00/1954 and 06/2476) the issue of the interaction between horses and the proposed wind farm which is on an estate which operates an equestrian centre was raised. The Inspectors report (Section 10.8) did not consider the issue of interaction between horses and turbine developments an issue.

In addition, on another occasion in relation to concerns that a proposed wind farm development in Co. Kildare (ABP-300746-18) would have a potentially significant adverse on the equine industry, the Board found that:

"The Board noted the Inspector's recommendation to refuse permission on the grounds that the proposed development would have a potentially significant adverse effect on the equine industry – mainly through reputational damage. While this industry is undoubtedly of major significance in the economy of County Kildare the Board disagreed with the Inspector's view and noted the lack of any specific evidence that wind turbines pose a threat to the welfare of horses and declined to cite the matter as a reason for refusal of permission"

In the absence of national policy or guidance in relation to the development of wind farms near stud farms/equestrian centres, MKO have reviewed the British Horse Society's 'Advice on Wind Turbines and Horses – Guidance for Planners and Developers'. The British Horse Society policy statement states the following in relating to the siting of wind turbines in the vicinity of equine businesses:

The BHS strongly recommends that the views and concerns of local equestrians should be recognised and taken into account when determining separation distances and that normally a minimum separation distance of 200m or three times blade tip height (whichever is greater) will be required between a turbine and any route used by horses or a business with horses.

This minimum separation distance may not be appropriate in all situations. Every site should be considered independently.... The BHS is aware that every site is different and a blanket policy to cover all situations may be excessively restrictive for some sites."

Working on the assumption that every occupied dwelling owns a horse or horses as a worst case scenario, and on a precautionary basis, the closest dwelling is located approximately 700 metres from the nearest proposed turbine location. The British Horse Society recommends a minimum separation distance of 200 metres or three

times blade tip height whichever is greater. At a blade to tip height of 150 m and using a separation distance of 3 x times tip height, the current proposal would therefore require a distance of 450m to be achieved. The proposed turbines, at 700m are therefore located at a distance of just over 1.5 times the recommended distance between a turbine and any business with horses.

On the basis of the above, it is considered that the impacts of the Proposed Development on the equine industry have been assessed in full within the EIAR and the conclusions as set out in the EIAR are valid and no impacts on the equine industry from the Proposed Development are predicted.

Further Information Item No.8 – Wording

Roads and Entrances

- (a) *“You are requested to respond to the Report of the Senior Executive Engineer particularly as it related to concerns that the bearing capacity and condition of approx. 6.1km section of L-7806 proposed as access route/haul route has not been adequately considered”.*
- (b) *Traffic and Transportation Department of Cork County Council*
- i. *“It is stated that detailed site investigations will need to be carried out to establish the quantity of site won material that will be available during construction, as the information will be required to adequately establish the accuracy of the HGV movements provided in the EIAR.*
 - ii. *Table 15-7 (Chapter 15 of the EIAR) proposes a worst-case scenario whereby a ‘portion’ of crushed rock will need to be imported onto the site however, it is unclear what portion this is or how it has been calculated”.*

2.8.1 Item No.8 Response

The applicant engaged Traffic and Transport Consultant Alan Lipscombe to prepare Chapter 15 of the EIAR submitted with this application. Alan Lipscombe has again been engaged to address additional information requested related to traffic and transport.

2.8.1.1 Item 8 (a)

In relation to the L-7806, the Board should be advised that this road, where a point of access is proposed, has been assessed in the EIAR at Chapter 15: Material Assets.

In relation to the strength and condition of the L-7806 leading to access junction B, in the event that the Proposed Development is granted planning permission the Applicant will commit to undertaking a pre-commencement strength and condition survey on sections of the L-7806, to be agreed with Cork County Council. Subsequent to the findings of the assessment the applicant will engage with Cork County Council to discuss if road strengthening works are required, the extent of the works, and an appropriate level of contribution.

As set out in Section 15.1.10.6 of the EIAR, it is proposed that a before and after condition survey will be undertaken on the R634, L-7806 and L-2003 in the proximity of the Proposed Development access junctions. Based on the findings of the assessment the applicant will engage with Cork County Council to agree the extent of any repairs required and the appropriate level of development contribution required.

2.8.1.2 Item 8(b)

The EIAR submitted with this application carried out trip generation analysis in relation to construction traffic (Chapter 15 Section 15.1.4). The analysis assessed the potential volumes of construction traffic which could be generated as a result of the Proposed Development. The analysis used projections based on typical wind farm construction projects, a predicted construction year of 2024 and an annual growth rate of background traffic 1.17%.

2.8.1.2.1 Item 8(b)(i)

The EIAR submitted with this application carried out trip generation analysis in relation to construction traffic (Chapter 15 Section 15.1.4). The analysis assessed the potential volumes of construction traffic which could be generated as a result of the Proposed Development. The analysis used projections based on typical wind farm construction projects, a predicted construction year of 2024 and an annual growth rate of background traffic

1.17% and the volume of material required from the on-site borrow pits to carry out the development (Section 9.4 Table 9-6 of Chapter 9 of the EIAR as submitted).

The traffic movement figures presented in the EIAR at Chapter 15 Section 15.1.4.1.1 are robust as an estimation of predicted vehicular movements.

2.8.1.2.2 **Item 8(b)(ii)**

Table 15-7 (Chapter 15) of the EIAR sets out the total vehicular movements estimated to be required for site preparation and ground works during the construction phase of the Proposed Development. The volumes of crushed rock required for the Proposed Development are described in Section 9.4 and Table 9-5 in Chapter 9 of the EIAR. The estimated volumes of crushed rock required for construction of the Proposed Development is 146,060m³ of rock. The volumes of rock available onsite (site won) in the 3 no. borrow pits proposed is estimated at 148,000m³ as described in Table 9-6 (Chapter 9) of the EIAR. It is not estimated that crushed rock will have to be imported onsite, however as part of the assessment of likely impacts on traffic as a result of the Proposed Development, the trip generation estimation as set out in Chapter 15 considered a contingency where 20-25% of the crushed rock would have to be imported on site, this would account for 2,763 truckloads as estimated in the EIAR.

2.9 Further Information Item No.9 – Wording

Other Matters - Air

“You are requested to clarify if is proposed or if any background dust monitoring has been conducted in the vicinity of the Proposed Development ”.

2.9.1 Item No.9 Response

Background dust monitoring has not been carried out in the vicinity of the Proposed Development. As the development is not of a category that typically gives rise to dust once operational (e.g quarrying operations), and no such development already exists in the vicinity of the Proposed Development site, it is held there is no scientific environmental rationale for carrying out any such monitoring.

Chapter 11 of the EIAR as lodged states:

“The primary land-uses within and in the vicinity of the site comprises forestry, agriculture and low-density residential development. Due to the non-industrial nature of the Proposed Development and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for this EIAR. It is expected that air quality in the existing environment is good, since there are no major sources of air pollution (e.g. heavy industry) in the vicinity of the site.”

Consideration and assessment of dust emissions during the construction, operational and decommissioning phase of the proposal are set out at Section 11.2.4 of the EIAR.

2.10

Further Information Item No. 9 - Wording

Other Matters - Alternatives

“Section 3.4 of the EIAR addresses alternative renewable energy technologies and it is stated that:

In this instance, the proposed wind energy development requires 45.6 hectares of commercial forestry to be permanently felled. A solar PV array of the scale necessary to provide the same electricity output would require the permanent felling of a significantly larger area of commercial forestry.

Please provide details as to the larger area referenced”.

2.10.1

Item No.9a Response

Chapter 3 of the EIAR assesses reasonable alternatives to the proposed development in terms of project design, technology, location, size and scale as required by Annex IV(2) of the EIA Directive (as amended). The EIAR as submitted considered alternatives under a number of headings including ‘Alternative Technologies’ which considered Solar technology as a reasonable alternative source of renewable energy (Section 3.4). The land area within the footprint of the Proposed Development comprises of existing coniferous forestry and agriculture. In the consideration of alternatives, it is noted that as part of the development, due to the existing land use, that it would be necessary to permanently fell 45.6ha of forestry. Chapter 1 Section 1.3 of the EIAR notes that the total site area is 733ha and the permanent footprint of the Proposed Development is approximately 23.3 ha or approximately 3%.

The implications of development of a solar project of similar capacity on the site would require a total area of c. 210ha of solar photovoltaic panels. This assumes an 11% capacity factor of solar technology. While it is not possible to compare directly the amount of forestry which would need to be permanently felled to facilitate c. 210ha of solar PV panels (this would be informed by detailed site assessment at a project design stage), solar panels would cover approximately 28.65% of the total site area.

Further Information Item No. 9- Wording

Other Matters - Cumulative Impacts

Section 2.7 of the EIAR refers to other windfarms within 20km radius of the subject site and refers the reader to Section 2.5.2 of the planning history and to Table 2-1 and 2-2 and Figure 2-2. While the permitted windfarms referenced in County Waterford are shown of Figure 2-2, those referenced as permitted in County Cork (Knocknagappagh & Crocane) are not shown on Figure 2-2.

- You are requested to address this omission.
- You are also requested to provide details of the consents i.e. extant/under construction/complete and this distance from the subject site.

Item No.9b Response

The planning history section of Chapter 2 of the EIAR, set out in tabular format at Tables 2-1 and 2-2 of the EIAR as submitted has been updated where necessary. These have been updated per the FI request and are presented as revised Tables below. It is highlighted to the Board that the Knocknagappagh Wind Farm was never constructed and Crocane is outside of the 20km LVIA Study Area for cumulative landscape and visual effects. Figure 2-2 has been updated been updated and is enclosed here at **Appendix 7**.

Table 2-7 Wind Farm Planning Applications: Co. Waterford

Planning Ref. No.	Description	Decision	Distance	Status
Barranafaddock Wind Farm				
04/1559	12 wind turbines (80 m hub height and 80 m blade diameter), a 40m high wind measuring anemometer pole, a 110 kV sub-station including control building, and all associated works.	Granted by Waterford County Council (WCC) 22/06/2005 Granted by An Bord Pleanála (ref: Ref: 24.213290) 22/11/2005	18.5km	Operational
10/371	5-year extension of duration of PD 04/1559.	Granted by WCC 29/11/2010		
11/400	Permission for a modification to the permitted Barranafaddock Wind Farm (Planning Ref. 04/1559 & An Bord Pleanála reference number PL 24.213290). The modifications include a proposed increase in turbine hub height (to 80m) of three of the permitted eleven turbines, an increase in rotor diameter of all turbines to 90m (from 80m) and the micro-siting of ten of the permitted turbines.	Granted by WCC 04/01/2012		
13/465	Proposed amendments to Planning Condition No. 3 of planning reference PD: 13/32 (Extension to Barranafaddock Wind Farm) and Planning Condition No. 2 of planning reference PD: 11/400 (Modifications to Barranafaddock Wind Farm) which relate to the operational period of the permitted wind farm.	Granted by WCC 13/01/2014		

Planning Ref. No.	Description	Decision	Distance	Status
Woodhouse Wind Farm				
04/1788	Eight wind turbines, access tracks, a fenced Switchyard comprising single-story Control Building and Substation and anemometer mast.	Granted by WCC 25/04/2005	15km	Operational
10/45	Minor modifications to a previously approved wind farm development comprising eight wind turbines (Reg Ref: 04/1788) The modifications include an increase in permitted tower height (70m to 80m) and blade length (42m to 45/46m) minor re-alignments of internal access tracks: relocation of four.	Granted by WCC 18/05/2010		
10/175	Extension of Duration for Wind farm comprising eight wind turbines (04/1788).	Granted by WCC 08/07/2010		
Knocknamona Wind Farm				
14/600109	12 no. wind turbines, overall height of up to 126.6 metres, 1 no. meteorological mast up to 80 metres in height and all ancillary site works.	Refused by WCC Granted by An Bord Pleanála (ref: PL93.244006) 14/12/2016	17km	Not commenced
20/845	Amendment to Pl. 14/600109	Refused by WCC 16/01/2021 Appealed to An Bord Pleanála (PL93.309412) 10/02/2021		Grant with Conditions 28/09/2022
Knocknalougha				
00/615	Wind Farm (12 wind turbines) towers not exceeding 60m. in height, rotor diameter not exceeding 62m, and all and ancillary works.	Granted by WCC Refused by An Bord Pleanála (ref: PL24.12272017/07/2001)		
03/1204	Erection of a wind farm comprising 7 wind turbines with towers up to 46m in height and rotor diameter up to 62m and ancillary equipment for electricity generation including substation control building and monitoring mast.	Granted by WCC Refused by An Bord Pleanála (ref: PL24.206203) 23/09/2004		

2.11.1.1 County Cork

Table 2.8 below lists the existing and permitted wind farms located in Co. Cork within 20-kilometre radius of the Proposed Development site. The locations of the wind farms are also shown in Figure 2-2 in **Appendix 7** of this FI response, for ease.

Table 2.8 Wind Farm Planning Applications: Co. Cork

Planning Ref	Description	Decision	Distance	Status
Ardglass Wind Farm				

Planning Ref	Description	Decision	Distance	Status
15/6587	Seven wind turbines with a maximum ground to blade tip height of up to 140m, and associated all ancillary infrastructure.	Granted by CCC Refused by An Bord Pleanála (ref: PL04.246824) 28/06/2016		Refused
Knocknagappagh				
02/4588	Development of a wind farm include 2 no. 1 MW wind turbines, 1 no. 40m wind monitoring mast, control house and service roadways.	Granted by CCC 09/12/2003	2.2km	Permission expired
08/9956	Extensio of Duration - Completion of wind farm development to include 2 no. 1 MW wind turbines, 1 no. 40m wind monitoring mast, control house and service roadways granted under pl.reg.no.02/4588	Granted by CCC 19/03/2009		Permission expired (17/01/2012)
Crocane				
02/4699	Development of 2 no. 1 MW wind turbines, service roadways and control house in Crocane.	Granted by CCC 15/12/2003	23.22km	Operational
08/9780	Extension of Duration - Completion of 2 no. 1 MW wind turbines, service roadways and control house granted under Pl. Req. No. 02/4699 (new permission to expire on 22/01/2012).	Granted by CCC 10/03/2009		

Further Information Item No. 10- Wording

Submissions and Observations

“Please respond to the matters raised in the submissions and observations received by the Board from the members of the public and prescribed bodies and to the matters raised in the report received from the Planning Authorities, where not specifically addressed in the matters raised in the further information above.

Given the large numbers of observations received and the commonality of many issues you are advised to address the matters arising by topic”.

2.12.1 Item No. 10 Response

2.12.1.1 Local Authority Submissions - Cork County Council

This FI response includes specific responses by consultants to this planning application engaged by the applicant. Responses to submissions made by Cork County Council are detailed below. The following documents were reviewed with regard to the submission by Cork County Council:

- Planning Authority Report submission (Chief Executive’s);
- Report of Area Engineer (Internal);
- Report of Heritage Officer (Internal); and,
- Report of Senior Executive Scientist (Internal).

Hydrology, Drainage and Water Quality

Hydro Environmental Services responded to issues relating to Hydrology, Drainage and water quality raised by Cork County Council. Please refer to the response provided at Item 2 and in contained in **Appendix 2** of this FI response document.

Noise

AWN have addressed below and in **Appendix 4** of this FI response document issues raised by Cork County Council. The relevant comments are set out and targeted responses presented below.

“The Wind Energy Guidelines outline that a maximum increase in sound of 5 dB above background noise levels in very quiet [sic] areas will unduly restrict wind energy development. The Guidelines recommend that in very quiet [sic] areas, i.e. where the background noise level, is less than 30 dB that the wind energy development noise is limited to a range of 35 – 40 dB. The applicant has applied the upper 40 dB(A) limit for the applicable Noise assessment set out in the EIAR. This should be further clarified and the rationale explained.”

The applicable guidelines for the Proposed Development are presented in Section 13.4.2.1 of the EIAR. The WEDG06 states:

“However, in very quiet areas, the use of a margin of 5 dB(A) above background noise at nearby noise sensitive properties is not necessary to offer a reasonable degree of protection and may unduly restrict wind energy developments which should be recognised as having wider national and global benefits. Instead, in low noise environments where background noise is less than 30 dB(A), it is recommended that the daytime level of the $L_{A90, 10min}$ of the wind energy development be limited to an absolute level within the range of 35 – 40 dB(A).”

The selection of a lower threshold of 40 dB L_{A90} is fully in accordance with the applicable guidelines for the Proposed Development. A rationale for this justification is presented in Section 13.6.3.1 of the EIAR. Additional comments are presented below to support the justification for the lower threshold.

It is very common in Ireland for wind turbine developments of a similar scale and in a similar environment to be conditioned with lower threshold noise limit of 40 dB L_{A90}, in some cases 43 dB L_{A90} has been imposed. Examples of some wind farm developments that have been permitted by An Bord Pleanála with operational turbine noise limits conditioned with a lower threshold of 40 dB L_{A90} are given below.

- Coole Wind Farm (Planning Ref. ABP-300686-18).
- Derrinlough Wind Farm (Planning Ref. ABP-306706-20).
- Cloonreen Wind Farm (Planning Ref. ABP-308171-20) (43 dB L_{A90} lower threshold conditioned).
- Meenbog Wind Farm (Planning Ref. ABP Ref: PL14.303592).

It is noted that on page 114 of the Cork County Council Planning report the suggested planning condition for noise states a lower threshold of 40 dB L_{A90} in low noise environments where background noise is less than 30 dB(A).

Cork County Council also state:

“The respective number and distances of all noise sensitive receptors within 500m, 1000m, 1500m and 2000m of the turbines should be presented and quantified.”

Please refer to the enclosed map at **Appendix 9** which illustrates the number and distances of NSL’s as required.

Soils

Section 5.6 of the Cork County Council Report states:

“It is also not entirely clear if peat soils exist onsite and within the proposed works area, and if so issues in relation to peat stability would need to be addressed”.

Site walkovers were undertaken by both AGECE and Hydro Environmental Services (HES), as well as trial pit investigations undertaken HES. HES did not record any peat deposits across the site. While an organic topsoil was noted in areas, this is not considered to constitute a peat deposit due to its shallow nature (c. 0.3m in thickness). It is considered that there is a negligible risk of instability on the Lyrenacarriga site.

Ecology – Birds

FI Item 2(e) and section 2.12.1.7 of this FI response document contains full detail of responses to items raised in relation to ornithology. In relation to comments made by Cork County Council in relation to the application, it is noted that the Authority were largely satisfied that the Proposed Development would not give rise to significant impacts on the local avian community, however, recommend an adaptive approach to the monitoring proposed in the EIAR. The wording was as follows:

“The Heritage Unit of Cork County Council is largely happy that the proposal does not represent a significant threat to protected or qualifying avian species of nearby Special Protection Areas...However, it is considered necessary that the pre and post construction monitoring proposed within the EIAR be conducted and should circumstances change as to the usage of the site either as breeding habitat, foraging habitat or a migration route for avian species listed as qualifying interests of the nearby SPAs or listed under Annex I of the birds Directive, which could result in significant effects on their populations, then a fluid approach be taken as to avoid any such impacts e.g. ceasing of specific turbine operation during certain seasons”.

It is noted that a comprehensive suite of commencement/pre-construction and operational phase monitoring is already proposed in Section 8.11 of the EIAR as submitted. In summary, the following is proposed:

- Pre-commencement surveys will be undertaken prior to the initiation of works at the wind farm. The verification survey will include a thorough walkover survey to a 500m radius of the development footprint and/or all works areas, where access allows. If winter roost sites or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter season or breeding season (respectively) of the construction phase. If it is found to be active during the construction phase no works shall be undertaken within a 500m buffer (Forestry Commission Scotland, 2006; Ruddock & Whitfield, 2007) in line with best practice. No works shall be permitted within the buffer until it can be demonstrated that the roost or nest is no longer occupied.
- In line with best practice measures, a detailed post-construction Bird Monitoring Programme has been prepared for the operational phase of the Proposed Development, please refer to EIAR Appendix 8-7 for further details. The programme of works will monitor parameters associated with a collision, displacement/barrier effects and habituation during the lifetime of the project. Surveys are proposed to be scheduled to coincide with Years 1, 2, 3, 5, 10 & 15 of the lifetime of the wind farm. Monitoring measures are based on guidelines issued by the Scottish Natural Heritage (SNH, 2009).

The proposed programme of monitoring was not proposed in response to any identified significant effect but rather as a best practice measure (SNH, 2009). The monitoring is comprehensive and considered entirely adequate in this regard. The results of this monitoring will be reported to the Planning Authority following each monitoring year and will include recommendations that may inform additional mitigation or adaptation if required.

Adaptive management is an iterative process whereby the results of previous monitoring are analysed to inform future monitoring or mitigation as relevant. As the Bird Monitoring Programme is considered entirely adequate as currently submitted, no change will be proposed unless there is a significant change in the use of the site by the local avian community. Similarly, no requirement for additional mitigation is anticipated. However, if following monitoring, bird usage on the site changes and the potential for negative effects is identified, adaptive mitigation would be employed to avoid any potential for significant effects on avian receptors.

Traffic and Transport

- i. **Cork City Council have concerns about the strength and condition of the L-7806 leading to access junction B and request a special contribution to upgrade.**

Response:

In the event that the Proposed Development is granted planning permission the Applicant will commit to undertaking a pre-commencement strength and condition survey on sections of the L-7806 to be agreed with Cork County Council. Subsequent to the findings of the assessment the applicant will engage with Cork County Council to discuss if road strengthening works are required, the extent of the works, and an appropriate level of contribution.

- ii. **Information should be provided justifying 2 construction workers per car**

An outline Traffic Management Plan is provided as part of the CEMP included as Appendix 4-4 of the EIAR which will include a Travel Plan for construction workers. While the assessment presented in the EIAR assumed the worst case in that construction workers will drive to the site, the appointed construction company will be required to provide a travel plan for construction staff, which will include the identification of routes to / from the site and identification of an area for parking. For example, staff could be required to park remotely with a minibus service provided by the contractor used to access the site. Therefore, while 2 staff per car was assumed as a worst case for the purpose of the

assessment, the type and level of staff traffic generation will be agreed with the local authorities as part of the detailed Traffic Management Plan prior to construction.

iii **Further details of traffic generation during the construction of the grid connection is requested prior to construction**

Response:

The applicant is in agreement with the Local Authority that further details will be provided as part of the Traffic Management Plan and these details agreed with the local authorities prior to commencement of construction.

iv. **Details of Mitigation measures required on the TDR should be agreed with CCC**

Response:

These are presented in the EIAR Chapter 15 and will be agreed in detail prior to commencement of construction.

v. **The detailed Traffic Management Plan should be agreed with CCC.**

Response:

The applicant is in agreement with the Local Authority that a detailed Construction Traffic Management Plan will be agreed with Cork County Council and Waterford County Council prior to commencement of construction.

2.12.1.1.2 Local Authority Submissions - Waterford County Council

This FI response includes specific responses by consultants to this planning application engaged by the applicant. Responses to submissions made by Waterford County Council are detailed below. The following documents were reviewed with regard to the submission by Waterford County Council:

- Planning Authority Report submission (Chief Executive's);
- Heritage Officer (Internal);
- Conservation Officer (Internal);
- Environment Section (Internal); and,
- Water Services Section (Internal).

Hydrology, Drainage and Water Quality

Hydro Environmental Services reviewed the points raised by the Water Services Section of Waterford County Council. The points raised relate to concerns of impact on water quality as a result of clear felling of coniferous plantation (45.6 ha). The response by HES is detailed in section 3.2 of the HES Response enclosed with this response to a request for Further Information. The potential impacts and mitigation measures of deforestation proposed were fully considered in Section 10.5.2.1 of the EIAR as submitted with this application. One such mitigation measure outlined was the use of a filtration system such as 'Siltbuster' traps or equivalent. The Water Services Section recommended that the use of 'Siltbuster' technology is deployed if surface water leaving the site does not comply with <25mg/l TSS and pH 6-9. This recommendation is supported by Section 10.5.2.10 of the EIAR which outlines the routine for daily inspections:

"Daily inspections will be undertaken to assess the effectiveness of the water treatment trains and this will include a visual assessment of water quality and also portable probes for field hydrochemistry monitoring (turbidity, pH, electrical conductivity etc) will be used by the ECoW (Ecological Clerk of Works – see the CEMP in Appendix 4-4 for further details) to make on the spot checks. Corrective measures will be carried out as appropriate (i.e. silt build-up removal or replacement/upgrade works) in the event treatment is ineffective".

Cultural Heritage

Waterford County Council's Conservation Officer raised a number of concerns regarding the Built Heritage which are addressed in detail in the Archaeology and Cultural Heritage Report submitted as part of this FI Response (refer to **Appendix 6**).

Concerns relating to the visual impact on Built Heritage along the Blackwater and Bride Rivers and their settings, including Molana Abbey and Ballynatray House

As part of the report by Tobar Archaeology, this issue is addressed in section 1.2.1.3. As specified in the report and in Chapter 14 of the EIAR (Section 14.4.5.3), the Zone of Theoretical Visibility (ZTV) model, which was utilised in the LVIA chapter, was also used as part of the Cultural Heritage Assessment to ascertain what, if any, visibility would be possible from various cultural heritage assets. Detailed GIS analysis was undertaken to arrive at a number of conclusions regarding the effects on setting as a result of the proposed turbines. Molana Abbey and Ballynatray House (NIAH ref 22903718) in Ballynatray demesne were located within the 5km assessment zone and therefore included in the analysis. Both are located in an area of the ZTV that has no visibility of the proposed turbines. This is due to topography and the nature of river valleys which tend to be lower in the landscape and heavily tree covered. No impacts on the setting of these structures will occur.

Concerns regarding the 5km Distance and Methodology utilised in Chapter 14 of the EIAR

The Tobar Archaeology and Cultural Heritage Report enclosed with this FI response (**Appendix 6**) addresses the concerns regarding the 5km Distance and Methodology utilised in Chapter 14 of the EIAR. Concerns were raised regarding the 5km study area in Chapter 14 of the EIAR. Details regarding the methodology utilised are presented in Chapter 14, Section 14.2.5. There is no legislative distance or industry standard approach for the assessment of impacts on the setting of cultural heritage assets, more specifically, built heritage. All SMRs, RMPs, RPS, and NIAH structures within 5km of each turbine were included in the EIAR in order to assess potential effects on setting. This is based on professional judgement and experience. The majority of RPS structures which are also largely NIAH structures are located on private land to which the public have limited or no access. Their visitor numbers are confined mainly to the landowners therefore. National Monuments in State Care, however, have public access and have conceivably higher visitor numbers and therefore potential effects on setting on the latter are extended to 10km.

Concerns regarding lack of assessment of Built Heritage Protected Structures

With regard to the assessment of Built Heritage Protected Structures, the Tobar Archaeology and Cultural Heritage Report details the policy objectives of Waterford County Council's Development Plan with regard to Architectural Heritage. The report concludes that there are no instances where the Proposed Development contravenes the policies of the County Development Plans of Cork or Waterford in that neither a Protected Structure nor its associated curtilage will be impacted. Additionally, there are no instances where either the main building or associated curtilage or structures within the curtilage will be significantly or adversely impacted by the Proposed Development. The ability to see turbines from a structure does not necessarily indicate a significant or adverse effect.

With regard to the level detail of assessment carried out, the report re-iterates the acknowledgment in Chapter 14 of the EIAR that *"The Zone of Theoretical Visibility suggests that 13-17 turbines may be visible from the majority of locations where RMPs/RPS and NIAH structures are located within 5km from the proposed Turbines. This impact is considered to be slight/moderate. No RPS or NIAH is located in the immediate vicinity of any of the proposed turbines. All built heritage structures are situated at a remove from the proposed turbine locations. In the wider landscape setting, the ZTV (used in the LVIA Chapter 12) shows that there may be varying levels of visibility from the locations of the built heritage structures and some where there is no visibility, in particular from the south"*

Concerns regarding Houses, Demesnes and general built heritage along the Bride River Valley from Tallow to the confluence with the Blackwater

Section 1.2.1.5 of the Tobar Archaeology and Cultural Heritage Report details an assessment on built heritage structures along the Bride River Valley in the subject area. Lisfinny House, Kilmore House, Sapperton House and Ballynahara Castle are assessed and detailed in the report. Additional photomontages are presented in the FI LVIA information enclosed here at **Appendix 5** to support the assessment of the potential effects of the Proposed Development on the cultural heritage along the Bride River.

2.12.1.2 Statutory/Prescribed Bodies

2.12.1.2.1 Irish Water

Hydrology, Drainage and Water Quality

Hydro Environmental Services responded to issues relating to Hydrology, Drainage and water quality. The responses are detailed in Section 4.1.1 of the HES Report enclosed with this FI Response (**Appendix 2**).

2.12.1.2.2 National Parks and Wildlife Service

Hydrology, Drainage and Water Quality

Hydro Environmental Services responded to issues relating to Hydrology, Drainage and Water Quality. The responses are detailed in Section 4.2.1 of the HES Report enclosed with this FI Response (**Appendix 2**).

2.12.1.2.3 Inland Fisheries Ireland

Hydrology, Drainage and Water Quality

In their submission, Inland Fisheries Ireland (IFI), reiterated (similar to their scoping submission) and emphasised the mitigation required to protect water quality and the downstream aquatic environment. All of the matters raised are addressed through the comprehensive suite of mitigation outlined in the submitted EIAR.

2.12.1.2.4 Irish Aviation Authority

The Irish Aviation Authority requested that conditions related to aeronautical Obstacle warning light scheme and as-constructed coordinates are provided to them under planning condition, should planning permission be granted. The applicant confirms its agreement to such a condition.

2.12.1.3 Third-Party Submissions

This section deals with non-statutory third-party submissions. Due to large number of third-party submissions, which generally have recurring themes, the responses outlined below are grouped by matter of topic with a number of exceptions namely where submissions are responded to individually .

2.12.1.3.1 Equine

It is acknowledged that several third parties raise equine Section 2.7 addresses equine concerns raised.

2.12.1.3.2 Hydrology, Drainage and Water Quality

The third-party submissions relating to Hydrology, Drainage and Water Quality are addressed by Hydrological Environmental Services under the following headings:

- Private Well Supplies
- Youghal Public Water Supply
- Landfill Site “super dump” unsuitability

- Substation/Battery Storage Area & Environmental Risk
- Potential Effects on Water Framework Directive Status
- Potential Effects on Flood Risk

The response to those submissions is detailed in Section 5.3 of the HES FI Response enclosed here at **Appendix 2**. Third-party concerns relating to surface water quality, drinking water quality, groundwater well sources, and flood risk are addressed. All these third-party concerns are assessed in the submitted EIAR, and appropriate mitigation measures will be applied where required.

A submission by Ecohydrological Analysis Ltd enclosed in the submission by Paddy Massey and Michael and Gianni Alen Buckley is addressed separately in Section 5.2 of the HES FI Response.

2.12.1.3.3 Soils

Several comments/submissions suggest that there is a risk of landslide/peat slide from the Proposed Development. The GSI landslide mapping indicates that the site generally has a 'low' susceptibility to landslides. This is because of the relatively shallow slopes across the site and the absence of material typically associated with instability, such as peat. The overburden noted on site and recorded in the trial pits was described as a stiff Silt and Clay, which is not typically susceptible to landslides. Excavations within this overburden material, such as at the proposed borrow pits or at turbine locations, will be maintained at stable angles, typically 1(v):2(h) (26 degrees). Stockpiles of overburden will also be maintained to a similar angle, and shaped and sealed to prevent water ingress.

2.12.1.3.4 Geology

A submission by Paddy Massey states:

“There is inadequate evidence of details of borrow pits to understand the rock formation or the feasibility of their use and the nature and extent of materials sourced”.

The bedrock on the site comprises Siltstone and Sandstone from the Ballytrasna Formation. Trial pits excavated at the proposed borrow pit locations have confirmed the presence of weathered Siltstone and Sandstone bedrock. (refer to section 9.3.2 and 9.3.3 of Chapter 9 of the EIAR for more detail). This material will be suitable for reuse within roads and hardstands as Class 1 granular fill material to the TII Specification (600 Series).

2.12.1.3.5 Bird Ecology

Whooper Swan

Concerns are raised related to the potential for the Proposed Development to significantly impact whooper swans. For example, one such submission stated:

The wind farm project site is located between the flight paths of Blackwater Callows SPA and Blackwater Estuary SPA, and wind turbines form a collision risk for multiple SCIs of these European sites.

There is a potential risk that the flight of the whooper swans would bring the whooper swans within the vicinity of the wind farm turbines and imminent threat of loss and collision with turbine blades.

A regularly used whooper swan commuting corridor (as described above) was not identified during surveys. As is noted in Section 8.4.2 of the EIAR, whooper swans were only recorded once during vantage point surveys. Furthermore, there were no observations of whooper swan during dusk hen harrier winter roost surveys, this is of note given whooper swans are known to commute to roost sites at dusk. There were no other observations within 4.5km of the wind farm site throughout a comprehensive suite of surveys (please see Section 8.2.4 of the EIAR for survey details). There were 23 observations of whooper swan recorded during dedicated waterfowl

surveys, all of which were more than 4.5km from the Proposed Development site (please see EIAR Appendix 8-3, Table 5). Flock sizes range from five to 209 birds.

Notwithstanding the above, it is acknowledged that the Proposed Development is located approximately between the Blackwater Callows SPA and Blackwater Estuary SPA and if whooper swans were to travel between these two sites there would be the potential to collide with the proposed turbines in absence of avoidance behaviour. However, following two full years of survey in strict accordance with SNH 2017, this species was only recorded on one occasion.

It is noted in the literature (SNH, 2018⁷) whooper swans show a very high rate of turbine avoidance (99.5% avoidance). That is to say, a whooper swan flying towards a wind farm will avoid a collision 99.5% of the time (SNH, 2018). In the present theoretical scenario, the birds will detect and manoeuvre around the turbines 99.5% of the time on route to/from the Blackwater Callows SPA and Blackwater Estuary SPA.

In the absence of evidence of a regularly used whooper swan commuting corridor that crosses the site and the high rate of turbine avoidance demonstrated by this species and the infrequent occurrence of the species, significant collision risk is unlikely.

In addition, it is noted that an impact assessment of cumulative effects including collision risk is provided in Section 8.13 of the EIAR as submitted. Section 8.13.2 of the EIAR states that no potentially significant cumulative habitat loss, disturbance displacement or collision risk effects on any of the KORs has been identified with regard to the development proposal. In the specific case of whooper swan, there was only a single (90-second flight) observation of this species at the Proposed Development throughout two years of surveying. As a result of such a low rate of occurrence, no pathway to significant effects was identified. Please see Section 8.6 of the EIAR for further discussion. It is reasonable to conclude that such minimal impacts could not give rise to significant cumulative effects.

Furthermore, while no significant effect has been identified, in line with best practice and following a precautionary approach, a comprehensive programme of operational phase surveys is proposed in the EIAR to monitor for interactions between the Proposed Development and the local avian community. Please refer to EIAR Appendix 8-7 for further details. The programme of works will monitor parameters associated with collision risk, displacement/barrier effects and habituation during the lifetime of the project. The results of this monitoring will be reported to the Planning Authority following each monitoring year and will include recommendations that may inform additional mitigation if required.

Snipe

Concerns are raised in relation to impacts on snipe. It is noted in Section 8.8.3.9 of the EIAR that an impact assessment was undertaken for snipe for which no significant effects were identified. It is noted that the majority of the Proposed Development site is located in commercial forestry. A habitat not favoured by this species.

Barn Owl

Several submissions discuss the potential occurrence of barn owl locally. However, following two full years of survey in strict accordance with SNH 2017, this species was not recorded.

Black Tailed Godwit Collision Risk

Concerns were raised in relation to black-tailed godwit collision risk. As detailed in Section 8.4.14 of the EIAR, numerous species were recorded at wetlands, at distances up to ten kilometres from the wind farm, but never on or near the Proposed Development site. This is likely due to a lack of suitable waterfowl habitat onsite. These species included bar-tailed godwit, black-tailed godwit, brent goose, curlew, dunlin, little egret, redshank, ringed plover, shelduck, shoveler and wigeon. The dominant habitat type within the Proposed Development site is

⁷ *Scottish Natural Heritage (2018) Avoidance rates for the onshore SNH wind farm collision risk model.*

conifer plantation. This habitat does not provide suitable foraging or roosting habitat for any of the species listed above. Furthermore, none of these species were observed flying over the Proposed Development site during the extensive two-year survey effort.

Significant collision risk is therefore not predicted for black-tailed godwit nor any of the other wetland species that were not recorded on or near the Proposed Development.

2.12.1.3.6 Archaeological Heritage

Johnny and Mary Mills

Concerns regarding several archaeological findings in the area

The construction stage effects on archaeological heritage were addressed and assessed in detail in Section 14.4.3 of Chapter 14 where direct impact (physical impact) on monuments and sites are addressed. The construction phase of the development consists largely of earthmoving activities such as topsoil removal. The potential impacts on the known and potential archaeological, architectural and cultural heritage of the area are outlined with detailed mitigation measures proposed. The impacts are described according to each element of the Proposed Development, turbines, grid connection, delivery routes etc. These mitigation measures are reiterated in the Archaeology and Cultural Heritage Report Submitted by Tobar as part of this FI Response (refer to **Appendix 6**).

Maria Conran

Concerns were raised regarding Kilcalf School House, the gates and railings of which are a protected structure (Ref WA750774) and listed in the NIAH. As this structure falls within the 5km study area it is included in the assessment in Chapter 14 of the EIAR in Section 14.3.3.2.

The ZTV used in the LVIA chapter was also used in Chapter 14 and in Section 14.4.5.3 the following was concluded:

‘The Zone of Theoretical Visibility suggests that 13-17 turbines may be visible from the majority of locations where RMPs/RPS and NIAH structures are located within 5km from the proposed Turbines. This impact is considered to be slight/moderate. No RPS or NIAH is located in the immediate vicinity of any of the proposed turbines. All built heritage structures are situated at a remove from the proposed turbine locations. In the wider landscape setting, the ZTV (used in the LVIA Chapter 12) shows that there may be varying levels of visibility from the locations of the built heritage structures and some where there is no visibility, in particular from the south’.

In summary, it was acknowledged in Chapter 14 that the potential effects on such structures was slight/moderate, slight being defined in the EPA Guidelines (2022) as ‘An effect which causes noticeable changes in the character of the environment without affecting its sensitivities’ and a moderate effect as ‘An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends’.

No very significant or profound effects will occur since these effects would result in either ‘An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment’ or in the case of a Profound Effect where it is defined as ‘An effect which obliterates sensitive characteristics’.

A number of concerns were raised in this third-party submission and are addressed separately below:

Concerns related to monuments within the EIAR

Section 3.6.2 of the EPA Guidelines requires that the EIAR assessment take cognisance of any limitations when establishing the baseline data and existing environment within which, in the case of Chapter 14, cultural heritage assets may occur. The EPA guidelines state the importance of drawing attention within the EIAR to limitations about factors that may affect the reliability of baseline data. These can include the availability, completeness, accuracy, age, accessibility and compatibility of data.

Three monuments were noted in the submission by Mr Hennessy as follows:

- Map ID 45. RMP CO055-012 – Enclosure
- Map ID 72/123. RMP CO55-69/WA033-016 – Ford
- Map ID 83/122. RMP CO056-009/WA033-014 – Boundary Stone

These are described in Section 14.3.2.2.1 of the EIAR where the original Archaeological Survey of Ireland descriptions were also provided. There is no doubt as to the location of the monuments having used previous survey descriptions as well as historic mapping. The limitation lies solely in accessibility as the monuments are covered by dense overgrowth. Regardless of the accessibility or otherwise, the three recorded monuments are protected under National Monuments legislation and protective buffer zones around same will be implemented as appropriate mitigation accordingly. In terms of potential construction phase impacts (direct), Section 14.4.3.2 of Chapter 14 noted that the monuments “*are situated away from the proposed infrastructure (including hardstands, turbine bases, construction compounds, borrow pits, new roads and the proposed substation). The monuments have been designed out of the proposed site layout and therefore they have been mitigated by avoidance. No construction effects will occur in this regard. Protective buffer zones around each monument is required as mitigation however and this has been incorporated into the Construction and Environmental Management Plan (CEMP) ...*”

The mitigation measures for the recorded monuments at this stage is to establish a protected buffer zone around each monument.

Concerns Relating to Coillte and the Code of Practice

The Coillte code of practice sets out guidelines for afforestation and clearance in terms of impacts on archaeology. The aim of the archaeological assessment undertaken as part of the EIAR is to establish the current baseline data available and to assess the monuments in their current setting (i.e. the Existing Environment). Any requirement for the principles of the Code of Practice to be implemented precedes that of the Proposed Development. The third party asserts that the monuments are unidentified. The EIAR states that the monuments were inaccessible, and this was the baseline environment required to be described as part of the assessment. Any potential inaccessibility issues pre-date the assessment. Mitigation measures in the form of buffer zones will be implemented prior to construction to protect the areas of the monuments. The monuments are designed out of the Proposed Development and any requirement for clear-felling outside the Proposed Development is a matter for Coillte and such works would fall under the Coillte Code of Practice therefore.

Concerns relating to the area of Turbine 8 and borrow pit west of T12 and the lack of a statement from the author of Chapter 14 that these areas did not contain above ground archaeological features:

Section 14.3.2.5 of Chapter 14 states that no new above ground features or sites were encountered within any of the areas proposed for development including the area of the proposed turbines, roads and other infrastructure. This means that no new archaeological sites or monuments were recorded during fieldwork.

In preparation of the EIAR Chapter, a field inspection was undertaken on the 12th and 27th September and 3rd October 2018, 19th May 2020 and the 19th of November 2020. The Proposed Development site and its surrounds were inspected by Annette Quinn and Miriam Carroll of Tobar Archaeological Services. The inspection consisted of a walk-over examination of the Proposed Development site, an assessment of any recorded monuments, architectural, built or cultural heritage items within the site and the potential direct and indirect impacts on those monuments. Any newly discovered archaeological monuments, items of built heritage or cultural heritage value within the study area were also recorded during the field inspection. A full photographic record of the site was made and is described in Section 14.3.1 of the EIAR as lodged.

The area of Turbine 8 was visited again on the 26th July 2022. While this area is under coniferous forestry it was accessible on foot. No above-ground archaeological sites or monuments were noted during the site walk-over. Further detail is provided in Section 2.4 of the Tobar Archaeology and Cultural Heritage Report.

Concerns relating to laneway / access to Turbine 16.

As described in Section 14.3.3.4.1 of the EIAR, a small historic settlement is located outside the EIAR boundary to the north of T16. This will be preserved in situ resulting in no direct construction effects. Part of the associated historic road (southwestern section) will be utilised as the new access road to T16 and therefore direct impacts are anticipated and acknowledged. The laneway is a non-statutory item of local cultural heritage and accordingly mitigation measures are proposed. A photographic and descriptive record of the boundary removal will be undertaken by the monitoring archaeologist in advance of groundworks associated with T16.

Concerns relating to Potential Bronze Age monuments along the proposed collector network cable route.

This section of the third party submission is an extract from Chapter 14 which states that *'It is proposed to connect the two turbine clusters via an underground cable located within existing agricultural land and within the public road corridor. One watercourse (stream) was encountered where the cable route crosses the Rearour North and Breeda townland boundary. This stream was accessible, shallow and clear on the day of survey and no archaeological features were noted. A rushy field in pasture to the east of the river may be regarded as an area of archaeological potential. Fulachta fia and burnt mounds, low visibility monuments, are often found in such locations adjacent to a water source. This monument type may span from the Bronze Age (c. 2400-500 BC) to the early medieval period (5th - 12th century AD. They consist of a circular or irregularly shaped mound of material consisting of burnt stones, ash and charcoal and often have no surface evidence of a trough or depression. Levelled examples can appear as a spread containing burnt stones. Impacts relating to sub-surface archaeology is addressed in Section 14.4.3.3 of the EIAR.'*

It is a requirement of the assessment to highlight areas of archaeological potential so that they can effectively be mitigated either at the pre-construction or construction stage. The mitigation measures are described in Chapter 14 of the EIAR.

Reference to the Granada Convention for the Protection of the Architectural Heritage.

This section of the third party submission asserts that the Granada Convention has not been complied with in light of the apparent lack of 'identification' of the recorded monuments within the EIAR boundary and the Coillte Code of Practice not being complied with. This is discussed in detail in section (2.10) of the Tobar Archaeology and Cultural Heritage Report.

Reference to a Contravention of Cork County Development Plan Policy HE3-6

Chapter 14 of the EIAR Section 14.1.3.1.5 details the CDP policy HE 3-6: Archaeology and Infrastructure Schemes which states the following *'Have regard to archaeological concerns when considering proposed service schemes (including electricity, sewerage, telecommunications, water supply) and proposed roadwork's (both realignments and new roads) located in close proximity to Recorded Monuments and Places and their known archaeological monuments'*.

The policy merely states that regard should be had to archaeological concerns when considering Proposed Developments. The assessment process (Chapter 14 of the EIAR) has presented all available baseline data and a detailed suite of mitigation measures where potential impacts may occur. Furthermore, Cork County Council's Archaeologist assessed Chapter 14 of the EIAR with regard to archaeology and the cultural heritage. The Planning Authority is satisfied with the report and the mitigation measures outlined in 14.4.3.3. No further information is required in this regard by Cork County Council.

Reference to Contravention of Cork County Development Plan HE 4-2 (f)

Section 14.1.3.1.6 of Chapter 14 provides details regarding HE 4-1: Record of Protected Structures policies. Cork County Council's Archaeologist assessed Chapter 14 of the EIAR with regard to archaeology and the cultural

heritage. The Planning Authority is satisfied with the report and the mitigation measures outlined in 14.4.3.3. No further information is required in this regard by Cork County Council.

Reference to Contravention of Waterford County Development Plan Objective AH3

Waterford County Council have requested Further Information as well as an Bord Pleanála regarding visual impacts on Built Heritage. All concerns are addressed in Section 1.2.1 of the Tobar Report enclosed (**Appendix 6**).

Niall Slevin

This third-party submission raises concerns regarding ‘The Thatch Cottage’ at Glennaglogh. There is one thatch house listed in the Record of Protected Structures WA750529 in the County Waterford Development plan as being located in Glennaglogh. No locational information is provided in the list of protected structures such as a coordinate. A digital dataset with coordinates of protected structures was requested from the Conservation Officer by email in 2020 to which no response was received. Resultingly the Record of Protected structures could not be plotted on the project base mapping since no coordinates are provided in the County Development Plan. Further details related to this submission are detailed in the Tobar Archaeology and Cultural Heritage Report.

Paddy Massey

It is considered that all concerns regarding built heritage along the Blackwater Valley in terms of impacts on visual setting have been addressed and can be referred to in Section 1.2.1 of the Tobar Archaeological and Cultural Heritage Report (**Appendix 6**). The wider landscape along the Blackwater River is also described in landscape and visual terms at Section 2.5.1.1.2 of this FI response. As it stands, the robust document compiled by Dr. Olley provides an extensive overview of the Munster Blackwater Valley’s natural and cultural heritage in an attempt to gain tentative World Heritage Status for the region. Currently the baseline data provided in Chapter 14 of the EIAR is such that the Blackwater Valley is not included in the current UNESCO World Heritage tentative list.

2.12.1.4 Third-Party Submissions - Noise Assessment

The matters raised in relation to noise by third parties are noted. A portion of these refer to the potential environmental noise impact from the Proposed Development. The primary issues raised in respect of the noise impact of the Proposed Development refer to the following topics:

- Health concerns and WHO Guidelines
- Amplitude modulation.
- Infrasound and Low Frequency Noise.
- Wind Turbine Syndrome.
- Quality of background noise surveys.

Chapter 13 of the EIAR address these issues however the report by AWN further examines each of these concerns in detail in Section 3 of the AWN Technical Note submitted as part of this FI Response at **Appendix 4**.

2.12.1.5 Third-Party Submissions - Landscape Visual Assessment

A Third-Party submission prepared by Diana Royce, titled ‘Conformance and Technical Assessment of the Applicant’s Photomontage Visualisation for the Lyrenacarriga Wind Farm’ laid out a number of critiques of the Photomontages prepared by MKO as part of the EIAR. Section 1.6 of the FI LVIA Report submitted as part of the FI Response (**Appendix 5**) addresses that submission in detail. It is noted that all of the points made in the

response and the critiques made are in the first instance, immaterial to the determination of residual effects. It is submitted that even if all of the critiques made were valid then this would not have any material impact on the determination of the significance of visual effects conducted. The discussion within the FI LVIA Report concludes that the Photomontages are fit for purpose. Any minor edits resulting from the critique made would not amount to a difference in the determination of visual effects made and there are no points raised that are fundamental to the determination of landscape and visual effects.

2.12.1.6 Third-Party Submissions - Traffic and Transport

Concerns relating to access

Concerns relating to Local Access arose in a small number of third-party submissions. Although non-specific we believe that the concerns may relate to an existing access to the site on the L2003 which some local people may use at present. It is proposed to improve the junction with the L2003 for general construction traffic for the eastern site. Long term, this access will there are no changes proposed to existing access rights/arrangements.

Concerns relating to Safety during construction and operation phase

A detailed assessment of the additional traffic volumes that will be generated on the regional and local road network is set out in Chapter 15 of the EIAR, together with proposed designs for all access junctions proposed to serve the site on the R634, L7806 and L2003. All junctions are designed to TII specifications. All deliveries made to the site by abnormally large loads, including the turbine components, will be accompanied by a Garda escort during night-time hours. It is also noted in section 10.4.3 of the Construction Environmental Management Plan submitted with the original EIAR (Appendix 4-4) that, once agreed with the Planning Authority and An Garda Síochána, a detailed traffic management plan will be in place during the entire construction period. This detailed Traffic Management Plan includes a series of measures aimed at ensuring a safe environment for all. As Traffic Management Co-ordinator will be appointed for the duration of the project who will be the main point of contact for all matters relating to traffic management. Residents and members of the public will be able to contact the Traffic Management Co-ordinator with any specific safety concerns. During the operational stage there will be very limited numbers of vehicle trips (maximum of 1 or 2 on any given day) visiting the site.

Concerns relating to flicker for drivers on the R634

The Wind Energy Guidelines (2006) and Draft Wind Energy Guidelines (2019) set out limits for shadow flicker effects on residential and office receptors only, which can occur in certain circumstances namely:

- the sun is shining and is at a low angle (after dawn and before sunset), and
- the turbine is directly between the sun and the affected property, and
- there is enough wind energy to ensure that the turbine blades are moving

The Wind Energy Guidelines set a threshold that shadow flicker at **offices or dwellings** with 500m of the turbine should not experience shadow flicker in excess of 30 hours per year or 30 minutes per day.

The guidelines do not address road users as receptors for shadow flicker.

In the event that a road user should experience shadow flicker at a certain point along the R634 depending on the circumstances as outlined above, if the receptor (road user) is driving or walking the potential effects would be momentary. The shadow effect is not considered dissimilar to the shadows and light effect frequently experienced where roadside planting/vegetation exists. This is a common occurrence on Irish roads.

Furthermore, motorists are expected to drive in an alert and safe manner at all times despite the distractions that may arise during the course of any normal journey, such as advertising signs which are designed to grab a motorist's attention.

Road users are momentary - at a certain time, under certain conditions, and with additional variables such as speed, vehicle type, screening along the roadway, wind speed etc. As such, the potential impacts cannot be quantified and the WEGs set out no guidance as to how such an issue could be reasonably approached.

Concerns regarding the impact on bridges and boundaries on the haul routes

An assessment of the haul route was made from the proposed port of entry for the large turbine components in Waterford – refer to Section 15.1.2.3 of the EIAR as lodged. The proposed delivery route for general HGV construction traffic may vary depending on the location of suppliers and construction material – refer to section 15.1.2.4 of the EIAR as lodged for more detail. The concerns raised in the Local Authority’s report do not specify what bridge/locations are of concern. In terms of traffic management details of alterations required to the existing infrastructure is set out at Section 15.1.8 of the EIAR. The location of proposed works on the turbine delivery route are assessed at Section 15.1.8 of the EIAR.

The works required along the haul route will only last for the duration of the construction phase and will be temporary in nature. There will be two locations along the haul route where temporary works will be required. Those are Lombards Crossroads on the R634, opposite the post office and Breeda Bridge. At Lombards Crossroads temporary hard surfacing is to be installed on the southwest corner at road verge/edge of field, in area measuring approx. 70 square metres. This will be restored following delivery of turbines to the site. At Breeda Bridge a new access road measuring approx. 300 metres is to be constructed on geogrid/geotextile. The field will be reinstated during the post-construction period. The road uses an existing entrance, and a new exit point will be cleared of existing vegetation resulting in a small amount of hedgerow removal, which will be reinstated following the construction phase. Section 14.3.15 of the EIAR as lodged illustrates these locations. Section 14.3.5 discusses these with regards cultural heritage, as follows:

Proposed road widening at Lombards’ Cross Roads

A short section of road widening is required at Killea townland on the south side of the public road. This section measures approximately 80m in length East-West. No new sites were encountered within the area of the proposed road widening corridor, however, it is possible that previously unknown subsurface archaeological finds, features and deposits may be present not currently visible above ground. Sub-surface archaeological potential in green areas is considered to be medium where land has not been subject to ground disturbance.

Proposed new road at Breeda and Rearour South townland

A new section of road will be constructed through pastureland in order to avoid a sharp bend in the public road to the east of Breeda Bridge. The new section of road measures approximately 300m. There are no known archaeological or architectural heritage constraints located along the route or adjacent to same. No new sites were encountered within the area of the proposed road, however, it is possible that previously unknown sub-surface archaeological finds, features and deposits may be present not currently visible above ground. Sub-surface archaeological potential in green areas is considered to be medium where land has not been subject to ground disturbance.

Potential impacts and mitigation measures in relation to these works are set out in Chapter 14 of the EIAR. It notes:

- *The junction accommodation areas along the haul routes are also in green field pastureland. The potential for the development area to contain as yet unrecorded sub-surface sites and artefacts is likely to be low within the forested section of land and medium within the green-field sections of the proposed development.*
- *Proposed mitigation measures include archaeological monitoring under licence of all ground works during construction. If archaeological finds, features or deposits are uncovered during archaeological monitoring, the developer will be prepared to provide resources for the resolution of such features whether by preservation by record (excavation) or preservation in situ (avoidance). Once the project is completed, a report on the results of the monitoring will be compiled and submitted to the relevant authorities.*

It is proposed to construct a section of access road at Breeda Bridge (refer to Figure 3-1 of the EIAR). Location 14, Breeda Bridge, is included in Chapter 15: Material Assets as follows:

- A new local access track 5 metres wide and 300 metres long will be laid on agricultural land on the northern side of the existing L7806 in order that the abnormally sized turbine vehicles are able to negotiate this location. This temporary access road will be constructed using geogrid / geotextile with the area proposed to be re-instated to its original state post construction. It is noted that this local link road will be used for the delivery of the large turbine vehicles only, which will be accompanied by An Garda Síochána escort. The road will be closed by means of fencing at all other times during the construction period and will be closed off and reinstated post construction.
- As noted at Section 14.1.10.6 of the EIAR a range of mitigation measures are proposed which includes a pre and post construction condition survey as well as liaison with relevant authorities. Where required by the local authority, a pre-condition survey of roads associated with the Proposed Development can be carried out immediately prior to construction commencement to record an accurate condition of the road at the time. A post construction survey will be carried out after works are completed to ensure that any remediation works required are carried out to a satisfactory standard. Where required the timing of these surveys will be agreed with the local authority. All road surfaces and boundaries will be reinstated to pre-development condition, as agreed with the local authority engineers.
- Liaison with the relevant local authority - Liaison with the County Councils and An Garda Síochána, will be carried out during the delivery phase of the large turbine vehicles, when an escort for all convoys will be required. Once the surveys have been carried out and “prior to commencement” status of the relevant roads established, (in compliance with the provisions of the CEMP), the Roads section will be informed of the relevant names and contact numbers for the Project Developer/Contractor Site Manager as well as the Site Environmental Manager

Appendix 15-1 contains the swept path analysis for the route, where Figures A15.1.57 and 15.1.28 illustrate the swept path for Location 14 -L7806 Breeda Bridge with a blade extended artic and tower extended artic, respectively.

As noted in the CEMP lodged (Appendix 4-4 of the EIAR), pre-commencement monitoring measure MX28 includes for archaeological monitoring along the public road where it crosses the bridge at Breeda townland. A photographic and descriptive record of the bridge arches will be made (if exposed) and a report compiled on the findings.

3.

TURBINE 5 RELOCATION

3.1

Introduction

During the course of preparing the Further Information response, it has come to the attention of the Applicant that two residential dwellings have been granted planning permission in the vicinity of the Proposed Development. The coordinates of the consented dwellings (not constructed) are:

Table 3-1: New Dwelling Detail

Application Ref:	Detail	Decision Date	Distance to T5 (approx.)
217120	A single storey dwelling house, garage, entrance, wastewater treatment system, percolation area, borewell, landscaping, and all necessary ancillary site works.	01.03.2022	530 metres
206991	To construct single-storey dwelling, entrance, treatment plant, percolation area and auxiliary site services.	13.09.2021	580 metres

The consented dwellings are not yet constructed. Neither of the consented dwellings are located within the 500 metre set back from individual wind turbines as required under the Wind Energy Guidelines 2006. It is acknowledged however that the dwellings fall just outside of that setback distance as evidenced in the above table. The design approach for the Proposed Development has been to ensure a setback of 700 metres from all dwellings. While not a requirement, in a bid to maintain this setback across the project as a whole, the applicant is satisfied to relocate Turbine 5 to ensure the greater set back is maintained and invite An Bord Pleanála to condition this should the Board be minded to consent the project. The location of the new consented dwellings can be seen below in Figure 3-1.

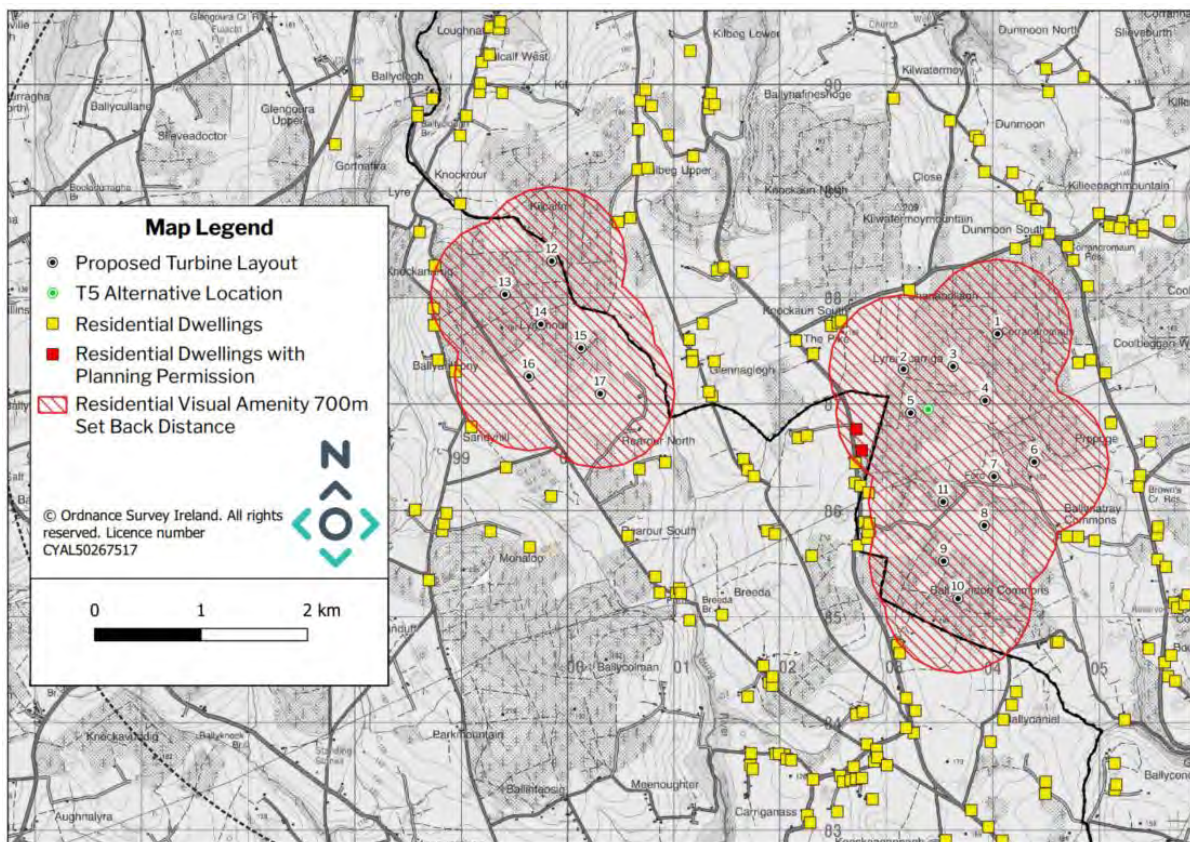


Figure 3-1: Newly Consented Residential Dwellings

Following a design and constraints exercise, a new potential location for T5 has been identified, 165m to the east of its existing location⁸, in order to maintain a 700m setback distance from all dwellings (the same set-back distance from dwellings set out in the 2021 EIAR). The relocated T5 remains within the EIAR study area and the redline planning application boundary.

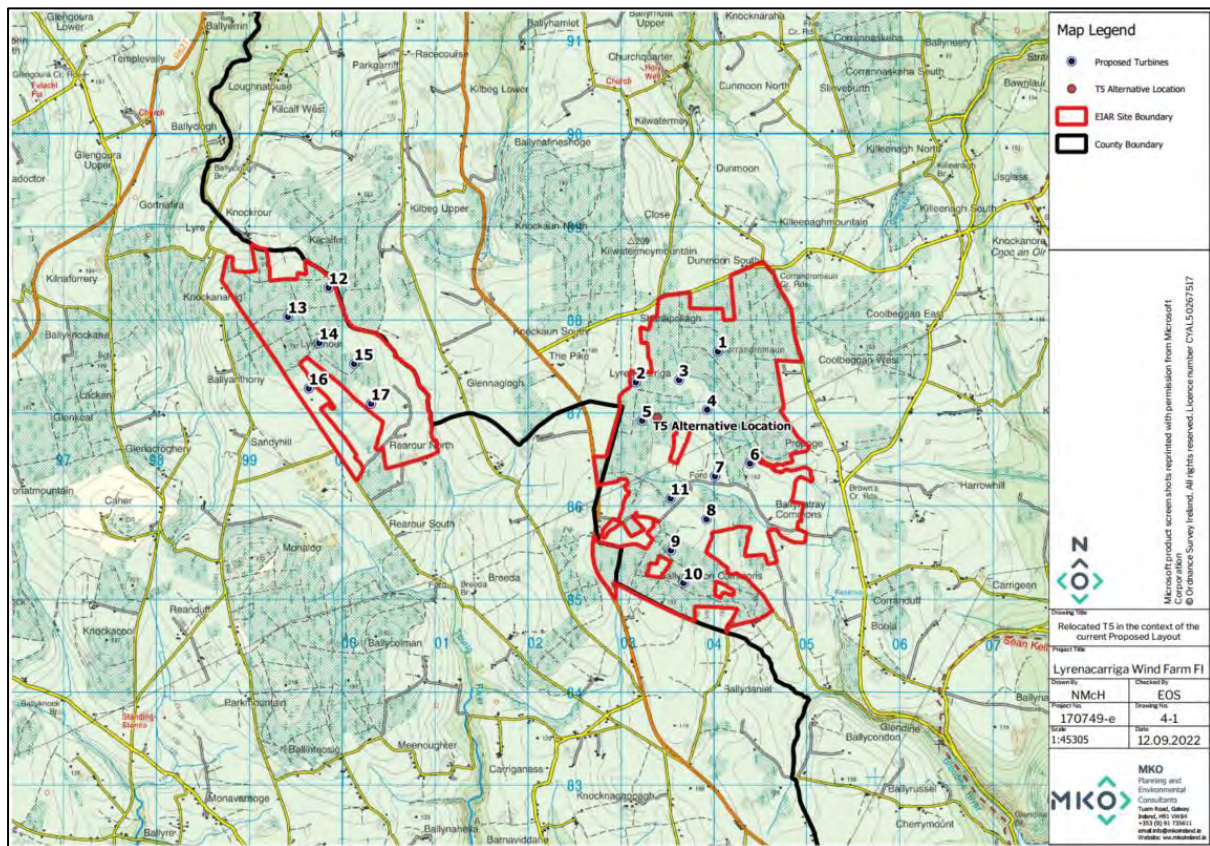


Figure 3-2 – Turbine 5 as originally proposed, new potential location for T5

The relocated T5 is located in an area of wind felled forestry. As the relocated T5 is further east within the site than the original T5, the length of access road required from the main access road to the turbine itself will be extended from 145m to 334m. Please refer to drawings 170747e-01-FI, -02 FI and -03 FI enclosed which illustrate the new potential location of T5 in more detail. It is important to note that all other aspects of the turbine, hardstand and works remain as originally proposed.

The relocation of T5 has been considered against each of the EIAR topic headings and NIS which is set out in Table 3 overleaf and in the supporting documentation contained in the appendices to this report, where necessary. Where considered necessary, additional site visits were undertaken as follows:

Table 3-2: Site Visit Log

Discipline	Site Visit Date
Archaeology (Tobar Archaeological Services)	26 th July 2022
Hydrological (Hydro Environmental Services Ltd)	12 th August 2022
Ecology (MKO)	11 th August 2022

⁸ The existing T5 coordinates are ITM 603176, 586974. The relocated T5 is located at ITM 603340m 587009.

Table 3-3: EIAR Impact Assessment – Relocated Turbine 5

Environmental Consideration & Chapter	Current Context	T5 Relocation
<p>Population & Human Health (Chapter 5)</p>	<p>The location of Turbine 5 is described in Appendix 7-1 of the EIAR as lodged:</p> <ul style="list-style-type: none"> This turbine and associated infrastructure is located within an area of dense plantation forests dominated by Sitka spruce (<i>Picea sitchensis</i>). The ground cover was bare, dominated by pine needles with only hard fern (<i>Blechnum spicant</i>) recorded in some areas surrounding the survey plot. The habitat classification is described as Conifer Plantation (WD4) <p>One of the principal concerns in the development process is that people, as individuals or communities, should experience no diminution in their quality of life from the direct or indirect impacts arising from the construction and operation of a development. The key issues examined in this chapter of the EIAR include population, human health, employment and economic activity, land-use, residential amenity, community facilities and services, tourism, property values, shadow flicker, noise and health and safety.</p> <p>Population The population baseline is set out at Section 5.2.1-5.2.9.2 of Chapter 5 of the EIAR as lodged. The Study Area for the Population section of this EIAR is defined in terms of the District Electoral Divisions (DEDs) in which the proposed wind farm site is located, as well as adjacent DEDs which have the potential to be affected by the Proposed Development.</p> <p>Tourism</p>	<p>The new potential location of T5 remains within the EIAR study area and given redline planning application boundary. Following a site visit undertaken by Pdraig Desmond, B.Sc of MKO, on the 11th of August 2022 the location for the relocated T5 is described as</p> <ul style="list-style-type: none"> This location comprises a large area of wind felled Sitka spruce conifer plantation (WD4) with establishing Scrub (WS1). The scrub habitat was dominated by bramble (<i>Rubus fruticosus</i> agg.) with occurrences of foxglove (<i>Digitalis purpurea</i>), rosebay willowherb (<i>Chamaenerion angustifolium</i>), and soft rush (<i>Juncus effusus</i>). No watercourses were recorded within or adjacent to this location. <p>Population The new potential location of T5 has been considered in the context of the baseline presented within the EIAR as lodged. The new potential location of T5 will remain within the overall Study Area as set out. In terms of distance to receptors, the movement of the turbine 165m east from the current T5 location will have an imperceptible impact on the individuals or communities in the area of the wind farm as set out in Chapter 5 of the EIAR.</p> <p>Tourism</p>

Environmental Consideration & Chapter	Current Context	T5 Relocation
	<p>Section 5.3.2 of the EIAR finds that there are no key identified tourist attractions pertaining specifically to the site of the Proposed Development itself.</p> <p>Tourist attitudes to wind farms is assessed at Section 5.3.3 of the EIAR as lodged.</p> <p>Public perceptions of wind energy is discussed at Section 5.4 of the EIAR as lodged.</p> <p>Health Impacts of Wind Farms</p> <p>Section 5.5 of the EIAR addresses health impacts of wind farms, including turbine safety, electromagnetic interference etc. The findings include:</p> <p><u>Effects on human health</u></p> <p>The EIAR concludes that there is potential for negative effects on human health during the wind farm construction phase however the assessments show that the residual impacts are not significant and will not lead to significant effects on any environmental media.</p> <p>The wind farm will have a long term, slight, positive effect on air quality as set out in Chapter 11 which will contribute to positive effects on human health.</p> <p>A comprehensive drainage design and surface water management plan and drainage plan has been prepared for the Proposed Development and this will ensure that surface water runoff from the developed areas of the site will be of a high quality and will therefore not impact on the quality of downstream rivers. The proposed site design and mitigation measures outlined in Chapter 10 ensures that the potential for impacts on the water environment are not significant. No impacts on local water supplies are anticipated.</p> <p><u>Project vulnerability to natural disaster –</u></p>	<p>The new potential location of T5 will not adversely affect the tourism baseline as set out in the EIAR, or alter the findings set out in relation to same.</p> <p>Health Impacts of Wind Farms</p> <p>The new potential location of T5 165m east of its current location will not alter the findings of the assessments contained in Section 5.5 of the EIAR as lodged in relation to human health.</p> <p>The potential effects on human health during the construction stage arising from, for example, noise or dust, will be the same for the new potential location of T5 as it was presented in the EIAR as lodged. The EIAR concludes that there is potential for negative effects on human health during the wind farm construction phase however the assessments show that the residual impacts are not significant and will not lead to significant effects on any environmental media. On this basis the potential for negative health effects associated with the Proposed Development is negligible. The movement of T5 will not affect these findings as the construction methodologies will remain as set out. While an additional portion of road will be required to facilitate the new potential location of T5 location (an increase of 189 metres) the impacts in terms of the overall assessment are considered negligible.</p> <p>The offset of carbon emissions will remain as set out in the EIAR, with the new potential location of T5 replacing the T5 currently shown, thus no increase or decrease in terms of emissions arises. At operational stage therefore, the findings of the EIAR as set out remain valid i.e. the wind farm will have a long term, slight, positive effect on air quality as set out in Chapter 11 which will contribute to positive effects on human health.</p> <p>The relocated T5 location has been considered by HES, who also contributed to Chapter 9: Land, Soils and Geology, and 10: Hydrology/Hydrogeology of the original EIAR. HES undertook a site walkover for the proposed new potential location of T5 on the 12th of August 2022. Their assessment concluded that:</p>

Environmental Consideration & Chapter	Current Context	T5 Relocation
	<p>The wind farm site is not regulated or connected to or close to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO sites and so there is no potential effects from this source. There is limited potential for significant natural disasters to occur at the Lyrenacarriga Wind Farm site. Ireland is a geologically stable country with a mild temperate climate. There are no significant sources of pollution from the wind farm with the potential to cause environmental or health effects. Also, the spacing of the turbines and distance of turbines from any properties limits the potential for impacts on human health.</p> <p>Property Values The impact of wind farms on property values is assessed at Section 5.6. No empirical studies have been carried out in Ireland on the impacts of wind farms on property prices. It is reasonable to conclude based on the available international literature and evidence, that the provision of a wind farm at the proposed location would not impact on the property values in the area.</p> <p>Residential Amenity Section 5.7 of the EIAR states that the proposed wind farm site is located on a site currently used for forestry; therefore a certain level of industrial activity and traffic movements are associated with the site, which will assist in the assimilation of the Proposed Development into the receiving environment. There are no occupied properties located within approximately 700 metres of a proposed turbine location. When considering the amenity of residents in the context of a proposed wind farm, there are three main potential impacts of relevance: 1) Shadow Flicker, 2) Noise, and 3) Visual Amenity. Shadow Flicker modelling is contained in</p>	<ul style="list-style-type: none"> • The baseline environment of the proposed new T5 location is the same as that documented in the 2021 EIAR. • The revised T5 location setting is the same as the previously proposed location (i.e. forestry which is underlain by mineral subsoils – sandstone tills). • No additional hydrological constraints or potential impact pathways were identified. • The new potential location of T5 will not result in any change of potential effects to those assessed in the 2021 EIAR with regard Land, Soils/Geology and Water environments. • Implementation of the pollution prevention mitigation measures and robust drainage control measures as detailed in Chapter 9 and Chapter 10 of the EIAR means there will be no change in residual effects. <p><u>Project vulnerability to natural disaster-</u> The new potential location of T5 does not alter the findings of the EIAR assessment in relation to project vulnerability to major accidents or to natural disaster.</p> <p>Property Values The findings of the EIAR remain valid irrespective of the movement of T5. The approach to the relocation ensures a setback distance from existing and consented dwellings remains at 700m – in excess of what is called for in the Wind Energy Guidelines 2006.</p> <p>Residential Amenity As noted in the opening paragraphs before this table, the rationale for the movement of T5 is the existence of two newly permitted (but not constructed) dwellings within the 700m setback buffer of the originally proposed T5. The proposal is therefore to ensure the 700m buffer is</p>

Environmental Consideration & Chapter	Current Context	T5 Relocation															
	<p>Chapter 6. Noise modelling is contained in Chapter 13. Visual amenity is addressed in Chapter 12.</p> <p>The mitigation measures set out at Section 5.8 of the Chapter address the construction phase, operational and decommissioning phase.</p>	<p>maintained across the site. Pertinent matters of shadow flicker, noise and visual amenity with regards the proposed relocated T5 are all considered here (refer to specific chapters below).</p> <p>Detailed shadow flicker modelling for the new potential location of T5 has been undertaken - refer to Shadow Flicker below.</p> <p>Detailed noise modelling for the new potential location of T5 has been undertaken – refer to Noise below.</p> <p>In terms of visual amenity, the new potential location of T5 has been considered and relevant commentary can be found at Landscape and Visual below.</p> <p>It is concluded that the relocation of T5 will not result in impacts on residential amenity beyond those set out in the EIAR as lodged. All mitigation set out in respect of shadow flicker, noise and visual amenity remain valid and applicable in terms of the T5 relocation.</p> <p>The mitigation measures set out at Section 5.8 of the Chapter which address the construction phase and operational phase remain valid and applicable to the relocated T5.</p>															
<p><i>Shadow Flicker (Chapter 6)</i></p>	<p>The shadow flicker study area is shown in Figure 6-3 of Chapter 6 of the EIAR. The assessment is based on compliance with the current DoEHLG Guidelines limit (30 hours per year or 30 minutes per day). If the revised wind energy guidelines specify zero shadow flicker to occur at dwellings, the Proposed Development will be capable of meeting this requirement via turbine control measures and the other mitigation measures set out in Section 6.4.3 of Chapter 6 as detailed below.</p> <p>The model results assume worst-case conditions, including:</p> <ul style="list-style-type: none"> • 100% sunshine during all daylight hours throughout the year, 	<p>The proposed new location for T5 remains within the established shadow flicker study area as shown in the EIAR as lodged. To support the relocation of T5 the shadow flicker model was rerun. Both turbine variants as set out in Section 2 of the FI response document were run for this location, namely:</p> <table border="1"> <thead> <tr> <th>Label</th> <th>Tip Height (m)</th> <th>Hub Height (m)</th> <th>Blade Length (m)</th> <th>Rotor Diameter (m)</th> </tr> </thead> <tbody> <tr> <td>Turbine Option 1</td> <td>150</td> <td>83.5</td> <td>66.5</td> <td>133</td> </tr> <tr> <td>Turbine Option 2</td> <td>150</td> <td>98.5</td> <td>56.5</td> <td>113</td> </tr> </tbody> </table>	Label	Tip Height (m)	Hub Height (m)	Blade Length (m)	Rotor Diameter (m)	Turbine Option 1	150	83.5	66.5	133	Turbine Option 2	150	98.5	56.5	113
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Turbine Option 2	150	98.5	56.5	113													

Environmental Consideration & Chapter	Current Context	T5 Relocation
	<ul style="list-style-type: none"> • An absence of any screening (vegetation or other buildings), • That the sun is behind the turbine blades, • That the turbine blades are facing the property, and • That the turbine blades are moving. <p>Under this condition, a total of 50 residential properties may experience daily shadow flicker in excess of the current DoEHLG guideline threshold of 30 minutes per day. The DoEHLG total annual guideline limit of 30 hours is predicted to be exceeded at 4 of the modelled properties when the regional sunshine average of 31.0% is taken into account. Mitigation is set out at Section 6.4.3 of Chapter 6. In the event of an occurrence of shadow flicker exceeding guideline threshold values of 30 hours per annum or 30 minutes per day at residential receptor locations, a turbine shutdown/curtailment procedure (Supervisory Control and Data Acquisition or SCADA) shall be implemented as a mitigation measure within the operating system of the permitted wind farm. Additional to the above Wind Turbine Control Measures, in the event of an occurrence of shadow flicker exceeding guideline threshold values of 30 hours per annum or 30 minutes per day at residential receptor locations, mitigation options will be discussed with the affected homeowner, including:</p> <ul style="list-style-type: none"> • Planting of screening vegetation; • Installation of appropriate window blinds in the affected rooms of the residence; • Other site-specific measures which might be agreeable to the affected party and may lead to the desired mitigation. 	<p>The results for the shadow flicker model for the new potential location of T5 (Appendix 10) show that for Option 1 leads to a total of 60 no. dwellings experiencing daily shadow flicker exceedances and 8 no. dwellings experiencing annual shadow flicker exceedances. Similarly, Option 2 leads to a total of 38 no. dwellings experiencing daily shadow flicker exceedances and 0 no. dwellings experiencing annual shadow flicker exceedances. Ultimately the movement of Turbine no. 5 does not give rise to any significant changes in the number of dwellings in which there are daily shadow flicker exceedances and annual shadow flicker exceedances. It is therefore concluded that there is no material difference between the current T5 location, and the new potential location proposed here in relation to shadow flicker and the conclusions of the EIAR remain relevant. The proposed mitigation measures set out at Section 6.4.3 of the EIAR remain relevant and appropriate.</p> <p>The assessment herein is based on compliance with the current DoEHLG Guidelines limit (30 hours per year or 30 minutes per day). If the revised wind energy guidelines specify zero shadow flicker to occur at dwellings, the Proposed Development will be capable of meeting this requirement via turbine control measures and the other mitigation measures set out in Section 6.4.3 of Chapter 6 of the EIAR. Based on the assessment and the mitigation measures proposed there will be no significant effects related to shadow flicker arising from the new potential location of T5 irrespective of what turbine configuration within the 150m tip height is selected.</p>

Environmental Consideration & Chapter	Current Context	T5 Relocation
	Based on the assessment above and the mitigation measures proposed there will be no significant effects related to shadow flicker.	
Biodiversity (Chapter 7)	<p>The location of Turbine 5 is described in Appendix 7-1 of the EIAR as lodged:</p> <ul style="list-style-type: none"> This turbine and associated infrastructure is located within an area of dense plantation forests dominated by Sitka spruce (<i>Picea sitchensis</i>). The ground cover was bare, dominated by pine needles with only hard fern (<i>Blechnum spicant</i>) recorded in some areas surrounding the survey plot. The habitat classification is described as Conifer Plantation (WD4) <p>The impact assessment carried out concluded that none of the elements of the Proposed Development are located within the boundaries of any National or European designated sites. There will be no direct effects on any designated site as a result of the construction, operation and decommissioning of the wind farm project including the haul route, substation and grid connection.</p> <p>No significant effects on surface water quality, groundwater quality or the hydrological/ hydrogeological regime were identified during either construction, operation or decommissioning phases of the Proposed Development.</p> <p>Provided that the Proposed Development is constructed and operated in accordance with the design, best practice and mitigation that is described within this application, significant impacts on ecology are not anticipated.</p> <p>Designated sites</p>	<p>The relocated T5 remains within the EIAR study area and the redline planning application boundary.</p> <p>The location of the relocated T5 was assessed from a biodiversity stance which included a desk study and site visit, undertaken by Padraig Desmond BSc. (Hons) Ecology and Environmental Biology, on the 11th of August 2022. As the original walkover surveys comprehensively covered the entire study area, the additional walkover undertaken in respect of the new potential location of T5 was to confirm changes to the baseline, which if found, were recorded.</p> <p>Following the site visit undertaken, the location for the relocated T5 is described as</p> <ul style="list-style-type: none"> This location comprises a large area of wind felled Sitka spruce conifer plantation (WD4) with establishing Scrub (WS1). The scrub habitat was dominated by bramble (<i>Rubus fruticosus</i> agg.) with occurrences of foxglove (<i>Digitalis purpurea</i>), rosebay willowherb (<i>Chamaenerion angustifolium</i>), and soft rush (<i>Juncus effusus</i>). No watercourses were recorded within or adjacent to this location. <p>No Annex I habitat or significant supporting habitat for Annex II species associated with European Sites was recorded within or adjacent to the proposed works site. No protected flora listed on Annex II or the Flora Protection Order were recorded within or adjacent to the proposed works. Sika Deer (<i>Cervus nippon</i>) were recorded within the forestry where the proposed alternative site is located. No evidence of Annex II listed faunal species were recorded during the site visit and no evidence of other species such as badger, Irish hare, pygmy shrew and Irish stoat that are protected</p>

Environmental Consideration & Chapter	Current Context	T5 Relocation																										
	<p>The EIAR as lodged considers the Likely Zone of Influence for Designated Sites. The closest to T5 is the Blackwater River (Cork/Waterford) SAC, circa 2.13km to the north. The potential for impacts on the Designated Sites has been fully considered in the EIAR that accompanied the planning application. No pathways for impact on any European or Nationally designated site was identified in respect of Turbine 5 as originally proposed. Turbine 5 as originally proposed is not located in close proximity to any watercourse.</p> <p>Review of NPWS Article 17 GIS Datasets The originally proposed Turbine 5 location is not within or adjacent to any Annex I habitats. No hydrological connectivity was identified between the original T5 location and any Article 17 mapped habitats.</p> <p>Water Quality The online EPA Envision map viewer provides access to water quality information on waterbodies and watercourses for all the River Basin Districts in Ireland. As per Section 7.5.1.11.1 of the EIAR, the EPA Envision map viewer was consulted on the 22nd of November 2020. There are no EPA watercourses within or adjacent to the location for Turbine 5.</p> <p>River Basin Management Plans (RBMPs) have been published for all River Basin Districts in Ireland in accordance with the requirements of the Water Framework Directive. The online EPA Envision map viewer provides access to water quality information at individual waterbody status for all the River Basin Districts in Ireland. This was accessed on the 22/11/2020 and the results of the</p>	<p>under the Irish Wildlife Act 1976-2018, were recorded during the site visit</p> <p>Designated Sites The assessment undertaken for the proposed new potential location of T5 included a review of designated sites within a 15km radius, the closest being the Blackwater River (Cork/Waterford) SAC, circa 2.10km to the north. All Designated Sites within a 15km radius of the potential new location of T5 are set out below:</p> <table border="1"> <thead> <tr> <th>Site Name</th> <th>Distance</th> </tr> </thead> <tbody> <tr> <td colspan="2">Special Area of Conservation</td> </tr> <tr> <td>Blackwater River (Cork/Waterford) SAC [002170]</td> <td>2.10 km</td> </tr> <tr> <td>Ballymacoda (Clonpriest and Pillmore) SAC [000077]</td> <td>13.11 km</td> </tr> <tr> <td colspan="2">Special Protection Area (SPA)</td> </tr> <tr> <td>Blackwater Estuary SPA [004028]</td> <td>5.90 km</td> </tr> <tr> <td>Blackwater Callows SPA [004094]</td> <td>11.94 km</td> </tr> <tr> <td>Ballymacoda Bay SPA [004023]</td> <td>13.14 km</td> </tr> <tr> <td colspan="2">Proposed Natural Heritage Areas (pNHA)</td> </tr> <tr> <td>Blackwater River And Estuary [000072]</td> <td>4.21 km</td> </tr> <tr> <td>Tallow (Disused Church) [000670]</td> <td>4.47 km</td> </tr> <tr> <td>Ballyvergan Marsh [000078]</td> <td>10.94 km</td> </tr> <tr> <td>Blackwater River Callows [000073]</td> <td>11.81 km</td> </tr> </tbody> </table> <p>The potential for impacts on the Designated Sites has been fully considered in the EIAR that accompanied the planning application. No additional sites have been identified to be within the Likely Zone of Influence of the proposed alternative location for Turbine 5. No pathways for impact on any European or Nationally designated site was identified as a result of the relocation of Turbine 5 to the proposed new location. The proposed new location is not located in close proximity to any watercourse and no hydrological connectivity was identified between the proposed alternative location for Turbine 5 and any designated site.</p> <p>Review of NPWS Article 17 GIS Datasets</p>	Site Name	Distance	Special Area of Conservation		Blackwater River (Cork/Waterford) SAC [002170]	2.10 km	Ballymacoda (Clonpriest and Pillmore) SAC [000077]	13.11 km	Special Protection Area (SPA)		Blackwater Estuary SPA [004028]	5.90 km	Blackwater Callows SPA [004094]	11.94 km	Ballymacoda Bay SPA [004023]	13.14 km	Proposed Natural Heritage Areas (pNHA)		Blackwater River And Estuary [000072]	4.21 km	Tallow (Disused Church) [000670]	4.47 km	Ballyvergan Marsh [000078]	10.94 km	Blackwater River Callows [000073]	11.81 km
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Blackwater River (Cork/Waterford) SAC [002170]	2.10 km																											
Ballymacoda (Clonpriest and Pillmore) SAC [000077]	13.11 km																											
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Blackwater Callows SPA [004094]	11.94 km																											
Ballymacoda Bay SPA [004023]	13.14 km																											
Proposed Natural Heritage Areas (pNHA)																												
Blackwater River And Estuary [000072]	4.21 km																											
Tallow (Disused Church) [000670]	4.47 km																											
Ballyvergan Marsh [000078]	10.94 km																											
Blackwater River Callows [000073]	11.81 km																											

Environmental Consideration & Chapter	Current Context	T5 Relocation																		
	<p>surface water quality status of the watercourses which flow from the Proposed Development site are shown in Table 7-12.</p> <p><i>Table 7-12 Environmental Protection Agency (EPA) WFD River Waterbody Status 2010-2015 (EPA, 2018)</i></p> <table border="1"> <thead> <tr> <th>Waterbody</th> <th>Status</th> <th>Risk</th> </tr> </thead> <tbody> <tr> <td>Glendine (Blackwater) (010)</td> <td>Good</td> <td>Not at risk</td> </tr> <tr> <td>Tourig (010)</td> <td>Good</td> <td>Not at risk</td> </tr> <tr> <td>Glenaboy (010)</td> <td>Good</td> <td>Not at risk</td> </tr> <tr> <td>Glenaboy (020)</td> <td>Moderate</td> <td>At risk</td> </tr> <tr> <td>Bride [Waterford] (010)</td> <td>Unassigned</td> <td>Not at risk</td> </tr> </tbody> </table>	Waterbody	Status	Risk	Glendine (Blackwater) (010)	Good	Not at risk	Tourig (010)	Good	Not at risk	Glenaboy (010)	Good	Not at risk	Glenaboy (020)	Moderate	At risk	Bride [Waterford] (010)	Unassigned	Not at risk	<p>No Annex I habitats have been identified within or adjacent to the revised location for Turbine 5. No hydrological connectivity was identified between the proposed alternative location for Turbine 5 and any Article 17 mapped habitats.</p> <p>Water Quality</p> <p>The online EPA Envision map viewer provides access to water quality information on waterbodies and watercourses for all the River Basin Districts in Ireland. The EPA Envision map viewer was consulted on the 16th of August 2022. There are no EPA watercourses within or adjacent to the proposed alternative location for Turbine 5</p> <p>As per the EPA map viewer, consulted again on the 16th of August 2022, the results of the surface water quality status of the watercourses which flow from the Proposed Development site remain as they were in 2020. As the new potential location for Turbine 5 is within the original site boundary, no additional watercourses require assessment.</p> <p>There will be no significant impacts on any ecological receptors due to the relocation of T5 and no changes to the conclusion of the biodiversity chapter of the EIAR submitted are required.</p> <p>No potential pathway for significant effects on any European Site as a result of the relocation of T5 to the new potential location was identified. No connectivity was identified between the alternative location and any European Site. There will be no changes to the conclusion of the AASR and NIS submitted with the planning application for the proposed Wind Farm as a result of the relocation of Turbine 5.</p> <p>Appropriate Assessment Screening and Natura Impact Statement</p>
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Environmental Consideration & Chapter	Current Context	T5 Relocation																
		<p>The AA Screening Report (AASR) and Natura Impact Statement (NIS) submitted with the planning application for the Proposed Development have been reviewed in the context of the proposed relocation of Turbine 5. Both the original or new locations occur within areas of commercial forestry with no watercourses within or adjacent to them.</p> <p>The relocated T5 remains within the AA Screening and NIS assessment area and the redline planning application boundary.</p> <p>All Designated Sites within a 15km radius of the potential new location of T5 are set out below:</p> <table border="1"> <thead> <tr> <th>Site Name</th> <th>Distance</th> </tr> </thead> <tbody> <tr> <td colspan="2">Special Area of Conservation</td> </tr> <tr> <td>Blackwater River (Cork/Waterford) SAC [002170]</td> <td>2.10 km</td> </tr> <tr> <td>Ballymacoda (Clonpriest and Pillmore) SAC [000077]</td> <td>13.11 km</td> </tr> <tr> <td colspan="2">Special Protection Area (SPA)</td> </tr> <tr> <td>Blackwater Estuary SPA [004028]</td> <td>5.90 km</td> </tr> <tr> <td>Blackwater Callows SPA [004094]</td> <td>11.94 km</td> </tr> <tr> <td>Ballymacoda Bay SPA [004023]</td> <td>13.14 km</td> </tr> </tbody> </table> <p>The potential for impact on European Sites has been fully considered in the AA Screening and NIS that accompanied the planning application. No additional sites have been identified to be within the Likely Zone of Influence of the proposed alternative location for Turbine 5.</p> <p>Potential pathways for impact identified in the AASR and NIS remain valid. All mitigation originally proposed in the NIS will continue to apply to the relocated T5 and is sufficient to ensure all potential pathways for impact are robustly blocked.</p>	Site Name	Distance	Special Area of Conservation		Blackwater River (Cork/Waterford) SAC [002170]	2.10 km	Ballymacoda (Clonpriest and Pillmore) SAC [000077]	13.11 km	Special Protection Area (SPA)		Blackwater Estuary SPA [004028]	5.90 km	Blackwater Callows SPA [004094]	11.94 km	Ballymacoda Bay SPA [004023]	13.14 km
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Environmental Consideration & Chapter	Current Context	T5 Relocation
		<p>In conclusion, the proposed relocation of Turbine 5 does not change the findings of the original AASR and NIS submitted with the planning application.</p>
<p><i>Ornithology (Chapter 8)</i></p>	<p>The Proposed Development is not located within the boundaries of any European or Nationally designated sites important for nature conservation (see Figure 8.8 of Chapter 8 of the EIAR). There will be no direct effects on any designated site as a result of the construction, operation and decommissioning of the Proposed Development site. There are no pNHAs or NHAs considered as KORs in their own right for the following reasons:</p> <ul style="list-style-type: none"> Distance/buffer from the Proposed Development site; and/or Nature of the conservation sites (e.g. terrestrial nature of habitats). <p>Vantage point locations for the wind farm as originally set out, including the current Turbine 5 location, are illustrated on Figure 8-1 of the EIAR as lodged.</p> <p>Chapter 8 of the EIAR concludes that:</p> <p>Following consideration of the residual effects (post mitigation) it is concluded that</p> <ul style="list-style-type: none"> The Proposed Development will not result in any significant effects on any of the identified KORs. No significant effects on receptors of International, National or County Importance were identified. A comprehensive suite of bird surveys was undertaken at the Proposed Development which have informed the impact assessment. <p>Provided that the Proposed Development is constructed, operated and decommissioned in accordance with the design, best practice and mitigation that is described within this application, significant</p>	<p>The new potential location of T5 does not alter the findings of the EIAR in respect of effects on Designated Areas, as the proposed T5 location remains within the red-line application boundary and EIAR study area boundary set out and as such is not located within the boundaries of any European or Nationally designated sites important for nature conservation.</p> <p>Collision risk monitoring (CRM) is considered the most pertinent with regards the potential relocation of T5. MKO have re-run the collision risk modelling at the new potential location of T5. The movement of the turbine from its original location 165m eastwards into the site has not altered the visibility of turbines from each vantage point.</p> <p>The Risk Area for birds decreased slightly under the relocation, as the turbines are closer together, but this made no change to the outputted collision risk for each species.</p> <p>T5 is not located within the zone of sensitivity of any breeding territories or winter roosts for KORs. Therefore the potential relocation of T5 will not cause any additional habitat loss or disturbance/displacement for KORs than that described in the EIAR.</p> <p>Ultimately it is considered that the conclusions reached in the EIAR at Chapter 8 remain valid should T5 be relocated. All mitigation and monitoring originally proposed in the EIAR will continue to apply to the relocated T5.</p>

Environmental Consideration & Chapter	Current Context	T5 Relocation
	<p>individual or cumulative effects on ornithology are not anticipated at the international, national or county scales or on any of the identified KORs.</p>	
<p><i>Land, Soils & Geology (Chapter 9)</i></p>	<p>Within Chapter 9, the baseline environment in the ‘eastern cluster’ of wind turbines where Turbine 5 is located is given as:</p> <ul style="list-style-type: none"> • the Proposed Development site is formed from tills (subsoils) derived from Devonian sandstone • At the eastern cluster, acidic mineral soil (AminDW) soils are mapped on the more elevated north-eastern and southwestern sections of the cluster with AminPD mapped in the lower-lying north-western and south-eastern sections of the cluster. Alluvium is mapped along the watercourses particularly along the lower-lying central and south-eastern sections of the eastern cluster. <p>A map of the local subsoil cover is presented as Figure 9-1 (www.gsi.ie) of Chapter 9. This shows the mapped distribution of subsoil deposits around the Proposed Development site. The majority (>90%) of both cluster areas are overlain by tills derived from Devonian sandstone with localised areas of rock subcrop or outcrop on the most elevated parts.</p> <p>Trial pits were undertaken across the site on 28th and 29th May 2020. Trial pits logs are attached as Appendix 9-1 of this EIAR. Fifteen trial pits were excavated on the eastern portion of the wind farm site, and 12 trial pits were excavated on the western portion of the wind farm site. The trial pit locations are shown in Figure 9-2. Varying depths (0.8 to 4.0 metres below ground level (mbgl)) of Devonian-derived glacial tills were encountered at all trial pits excavated at the eastern portion of the wind farm site. No significant peat deposits (some organic topsoils were noted) were encountered anywhere on site during the trial pitting works.</p>	<p>The relocated Turbine 5 will be located in the same soils and geology conditions as the existing T5.</p> <p>No significant peat deposits (some organic topsoils were noted) were encountered anywhere on site during the trial pitting works.</p> <p>There are no recorded Geological Heritage sites, mineral deposit sites, or mining sites (current or historic) within 5 km of the Proposed Development site.</p> <p>The Proposed Development site is not located within any designated site.</p> <p>There are no known areas of soil contamination on the site of the Proposed Development which includes the relocated T5.</p> <p>The likely impacts and mitigation at the construction phase of the development as set out at Section 9.5.2 of the EIAR, the operational stage and decommissioning stages of the development (Sections 9.5.3 and 9.5.4 refer) remain valid in terms of the relocated Turbine 5.</p> <p>There is no material difference between the current T5 location and the revised location.</p>

Environmental Consideration & Chapter	Current Context	T5 Relocation
	<p>The underlying bedrock at the Proposed Development site is mapped exclusively as the Ballytrasna Formation which comprises purple mudstone and sandstone (Figure 9-3). The Ballytrasna Formation dates to the Upper Devonian, with the type area characterised by ~90% dusky red mudstone with the remainder consisting of pale red fine-medium grained sandstone. Bedrock in the area is steeply dipping at ~60-80° and trend in both a northern and southern dipping direction.</p> <p>There are no mapped faults in the area. Outcrop is relatively sparse on lower ground but is mapped locally on higher ground, particularly on the western cluster which has a slightly higher overall elevation than the eastern cluster. Site mapping, observations of exposed bedrock and trial pits confirm these mapped conditions.</p> <p><u>Geological Resource Importance</u></p> <ul style="list-style-type: none"> • The GSI online Aggregate Potential Mapping Database shows that the Proposed Development site is located within an area mapped as being typically Very Low to Low in terms of crushed rock aggregate potential. • There are no mapped active quarries within 4 – 5 km of the site. Typically, the mudstones/sandstones of the Ballytrasna formation are of low geological resource importance. • The soils and subsoils in the area of the Proposed Development site could be classified as “Medium” importance as they support agricultural and forestry activities in this area. Refer to Table 9-1 of the EIAR for criteria. <p><u>Geological Heritage and Designated Sites-</u></p>	

Environmental Consideration & Chapter	Current Context	T5 Relocation
	<ul style="list-style-type: none"> There are no recorded Geological Heritage sites, mineral deposit sites, or mining sites (current or historic) within 5 km of the Proposed Development site <p><u>Soil Contamination</u></p> <ul style="list-style-type: none"> There are no known areas of soil contamination on the site of the Proposed Development. During the site walkovers and site investigations, no areas of contamination concern were identified. According to the EPA online mapping http://gis.epa.ie/Envision), there are no licensed waste facilities on or within the immediate environs of the site of the Proposed Development. There are no historic mines at or in the immediate vicinity of the site of the Proposed Development that could potentially have contaminated tailings. <p>Likely impacts and mitigation measures at the Construction Phase of the wind farm are set out at Section 9.5.2 of the EIAR as lodged. In terms of the wind farm site (as opposed to the turbine delivery route), the EIAR concludes that no significant effects on land, soils, subsoils or bedrock will occur during the construction stage. Decommissioning, set out at Section 9.5.4 of the EIAR concludes that <i>“No significant impacts on the land, soils and geology environment are envisaged during the decommissioning stage of the proposed development.”</i></p>	
<i>Water (Chapter 10)</i>	On a regional scale, the Proposed Development site is located in the River Blackwater surface water catchment within Hydrometric Area 18 of the South Western International River Basin District (SWIRBD). The River Blackwater, which is transitional (i.e. estuarine) at this location, flows in a southerly direction	The proposed new T5 location remains in the Blackwater Catchment, as is the case with the entire eastern cluster of turbines. The existing T5 location and the new potential location, remains within the Tourig_SC_010 sub-catchment.

Environmental Consideration & Chapter	Current Context	T5 Relocation
	<p>approximately 5km to the east of the eastern cluster at its closet point. The River Bride flows in an easterly direction approximately 4km to the north of the western cluster and is a major tributary to the River Blackwater. There is no proposed wind farm infrastructure from the eastern cluster located in the River Bride catchment. In terms of local hydrology, the Proposed Development is located in the main within the Tourig_SC_010 sub-catchment.</p> <p>There are no mapped groundwater source protection areas for either public water supplies or group water schemes (National Federation Group Water Schemes registered) in the area of the Proposed Development.</p> <p>The proposed drainage management for the development are set out in Section 10.4.2 of the EIAR.</p>	<p>A site walkover/inspection of the new potential T5 location was carried out by David Broderick (HES) on 12th August 2022 with the purpose of assessing location suitability, baseline environment along with any additional hydrological constraints and potential impact pathways to those identified in the 2021 EIAR. HES have prepared a Technical Note regarding the potential new T5 location and associated proposed drainage layout (dwg: P1453-0-0922-A1-D103-00B) enclosed at Appendix 11.</p> <p>HES, who carried out the original EIAR Chapter, have considered the potential effects of the new location in respect of the following environmental impact aspects:</p> <ul style="list-style-type: none"> • Soil, subsoil, bedrock excavation volumes; • Tree felling and water quality/hydrological effects; • Earthworks and surface water quality effects; • Oils/fuels/cements and surface water/groundwater quality effects; • Groundwater level and hydrogeological effects; and, • Land, soils and geological cumulative effects; and, • Hydrological and Hydrogeological cumulative effects. <p>HES have concluded in respect of the new potential location of T5:</p> <ul style="list-style-type: none"> • The baseline environment of the proposed new T5 location is the same as that documented in the 2021 EIAR. • No additional hydrological constraints or potential impact pathways were identified. • The relocated T5 will not result in any change of potential effects to those assessed in the EIAR with regard Land, Soils/Geology and Water environments. • Implementation of the pollution prevention mitigation measures and robust drainage control measures as detailed in Chapter 9 and

Environmental Consideration & Chapter	Current Context	T5 Relocation
		Chapter 10 of the EIAR means there will be no change in residual effects.
<i>Air & Climate (Chapter 11)</i>	<p>The site of the Proposed Development lies within Air Quality Zone D, which represents rural areas located away from large population centres.</p> <p>The production of energy from wind turbines has no direct emissions in contrast to direct emissions from energy production at fossil fuel-based power stations. Harnessing more energy by means of wind farms will reduce dependency on fossil fuels, thereby resulting in a reduction in harmful emissions that can be damaging to human health and the environment. Some minor short term or temporary indirect emissions associated with the construction of the wind farm include vehicular and dust emissions.</p> <p>A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-4 of the EIAR) and includes dust suppression measures. In addition, turbines and construction materials will be transported to the site on the specified haul routes only. The haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as necessary.</p> <p>In terms of climate, the EIAR Chapter calculates the carbon savings associated with the Proposed Development, estimating that 2,429,706 tonnes of carbon dioxide will be displaced over the proposed thirty-year lifetime of the Proposed Development. Construction of the Proposed Development will have a Short-Term, Imperceptible Negative Effect as a result of greenhouse gas emissions from construction plant and vehicles. Operation of the Proposed Development will have a Direct Long-Term Moderate Positive Impact on climate as a result of reduced greenhouse gas emissions.</p>	<p>The proposed number of turbines (17) will remain should T5 be relocated. No additional infrastructure beyond that currently set out for T5 will be required. A length of roadway to access the new potential T5 location which extends to 334m, will be required. This is an additional 189m on that length of road originally required to access the current T5 location.</p> <p>There is no material difference between the current T5 location and the new potential location in Air and Climate terms as the construction and operation of the wind turbines will remain as assessed in Chapter 11 of the EIAR as lodged. The nature of the Proposed Development is such that, once operational, it will have a long-term, moderate, positive impact on the air quality and climate and the proposed relocation of T5 will not alter this.</p>

Environmental Consideration & Chapter	Current Context	T5 Relocation
<p><i>Landscape & Visual (Chapter 12)</i></p>	<p>As set out in Chapter 12 of the EAIR as lodged, the Proposed Development is located on an elevated plateau. The area that the proposed turbines are to be located has been designated as ‘Open to Consideration’ in County Cork and ‘Preferred’ in County Waterford, with regard to wind farm development. Hence, turbines in this landscape are not inappropriate as long as the design and local siting of these turbines is seen to be appropriate.</p> <p>No designations apply to the site within the County Cork portion of the Proposed Development. Within Co. Waterford the Scenic Landscape Evaluation shows small areas of ‘Sensitive’ and a linear area of ‘Visually Vulnerable’ within the Proposed Development site. However, areas classed as sensitive within the site do not comply with the description set out in Appendix A9 of the CDP in terms of their character or vegetation cover. The skyline that is shown on the Scenic Landscape Evaluation as ‘Visually Vulnerable’ was found not to be particularly distinctive relative to the surrounding topography</p> <p>The Zone of Theoretical Visibility (ZTV) map shows many areas that will have no visibility of the proposed turbines throughout the 20-kilometre study area. The most significant of these are the lowlands in the wide Blackwater and Bride River Valleys, an area around and to the north of the N25, and a large area surrounding the Owennacurra and Templebodan Rivers.</p> <p>Within five kilometres, higher ground partially screens the turbines from many areas and fully at the periphery of the 5-kilometre radius from the turbines. Extensive areas of forestry and road-side screening provide additional screening as illustrated by the route screening analysis.</p>	<p>In terms of the landscape and visual effects, the new potential location for Turbine 5 will have an extremely low level of change, and there will be no fundamental change to the landscape and visual effects set out within the EIAR and accompanying documents. Any landscape effects discussed in the EIAR will be unchanged by virtue of the movement of T5, with the character of the site remaining almost identical under the proposal.</p> <p>An additional photomontage has been prepared from Viewpoint 29 (Appendix 5) demonstrating the visual differences between the original location for T5 and the proposed alternative location. It is emphasised that the slightly different positioning of the turbine will not affect the significance of the residual visual effect deemed to arise from this location. This is also the case for the other viewpoints, where the slight movement of T5 within the image will not alter the predicted residual visual effect. As is demonstrated throughout the multiple photomontages prepared showing differing turbine dimensions within the outlined range and as discussed above in relation to alternative turbine configurations, a turbine comprising of different dimensions (within the range) than that shown in Viewpoint 29, or indeed any other photomontage, with the new potential location of T5 will not alter the predicted residual visual effect.”</p> <p>Overall, the new potential location of T5 will not alter the significance of any of the landscape and visual effects reported in the EIAR as lodged.</p>

Environmental Consideration & Chapter	Current Context	T5 Relocation
	<p>The assessment finds that overall, the visual effects are deemed to be 'Slight' for the visual study area as a whole.</p>	
<p>Noise & Vibration <i>(Chapter 13)</i></p>	<p>Based on detailed information on the site layout, the likely turbine noise emissions and turbine hub height for the Proposed Development, a series of 'worst-case' turbine noise prediction models have been prepared for review within the Chapter. The predicted turbine noise levels have been calculated at all NSLs in accordance with the Institute of Acoustics (IOA) Good Practice Guide recommendations. The predicted turbine noise levels associated with the Proposed Development in isolation are predicted to be well within the best practice noise criteria curves recommended in Irish guidance document 'Wind Energy Development Guidelines for Planning Authorities 2006 in all cases. Therefore, it is not considered that a significant effect is associated with the Proposed Development.</p> <p>No significant vibration effects are associated with the operation of the site. In summary, the noise and vibration impact of the Proposed Development is not significant considering national guidance and best practice for wind farm developments.</p>	<p>Specific setback distances are not part of the noise assessment, rather the impact is evaluated based on the predicted noise levels against noise criteria. The new dwellings were added to the noise model and new sets of predicted noise levels calculated by AWN Consulting who undertook the noise and vibration Chapter of the EIAR as lodged. The turbine technology is assumed to be that in the EIAR, i.e. a Nordex N117 3.6 MW at a hub height of 91.0 m. The model shows that all noise levels comply with the adopted criteria from the EIAR at section 13.4. There is no material difference between the current T5 location and the new potential location of T5 in terms of noise. All mitigation measures set out in the EIAR and accompanying FI remain valid for the potential new location. The turbine model to be installed on the site will be the subject of a competitive tendering process. The maximum height of the turbines that will be selected for construction on the site will not exceed 150 metres when measured from ground level to blade tip</p>
<p>Archaeology & Cultural Heritage <i>(Chapter 14)</i></p>	<p>With regards the eastern parcel of turbines, Chapter 14 of the EIAR finds that T5 is (refer section 14.3.1.1.18) is located in mature forestry and "<i>no above-ground archaeological or cultural features were noted in this area...</i>"</p> <p>Four National Monuments (NM) were recorded within 10km of the Proposed Development. Visibility from NM's was assessed, and it was found that in no instances were the proposed turbines potentially visible from NMs save for in relation to NM no. 286 where T8-T11 may potentially be seen.</p>	<p>The new potential location of T5 is 165 metres east of the current T5 location. There are no archaeological or cultural heritage features at the new potential location of T5 or in the vicinity of it.</p> <p>The movement of the Turbine is not expected to affect the potential visibility of the turbines from the noted NMs.</p> <p>Appendix 14-3 sets out the proximate Recorded Monuments within 5km of all turbines. With regards the new potential T5 location, the following are relevant:</p>

Environmental Consideration & Chapter	Current Context	T5 Relocation				
	<p>With regard Recorded Monuments, three were recorded in the EIAR site boundary.</p> <p>Potential for sub-surface archaeology in forested areas is considered to be low due to the planting process and drainage that has occurred.</p> <p>No built heritage structures which are subject to statutory protection or otherwise are located within the EIAR site boundary.</p> <p>All potential direct effects on cultural heritage have been assessed and mitigated. The mitigation measures when implemented will minimise, reduce or remove the impact altogether and therefore the addition of the Proposed Development to other surrounding projects (including other wind farms, one-off housing etc) will not result in cumulative effects at the construction stage.</p>	ID	RMP No	Description	Turbine ID	Distance (m)
		73	CO055-070—	Standing stone	5	1609
		83	CO056-009—	Boundary stone	5	277
		122	WA033-014—	Boundary Stone	5	283
		124	WA033-035—	Burial ground	5	1453
		<p>The closest listed in the Sites and Monuments Record is located to the west of the relocated T5 as shown in Figure 14.8 of the EIAR and summarised as follows:</p> <p><i>Map ID 83 /122, RMP CO056-009 / WA033-014 Boundary stone: 'Marked 'stone' on Bateman map (1716-1717) at point where Cork-Waterford border changes direction. No visible surface trace' (Archaeological Inventory of County Cork. Volume 2: East and South Cork). It is described as follows in the County Waterford Inventory: 'Situated on a gentle E-facing slope of the relatively high ground around Kilwatermoy Mountain. It is also on the W-E county boundary with Cork at a point where the boundary changes direction to NNE-SSW. It is marked as a standing stone only on a 1716 Bateman map (NLI, MSS 6148-9). Nothing remarkable is visible at the location'. As shown in Plate 14.77 the monument is located in what is described as an "overgrown, inaccessible area on the EIAR boundary looking west."</i></p> <p>Given that the new potential location of T5 will be further away from this site, it is held that the findings and conclusions of the EIAR as originally presented remain valid.</p> <p>The mitigation set out in Chapter 14 will continue to apply to the relocated T5.</p>				
Material Assets (Chapter 15)	Chapter 15: Material Assets contains the assessment in relation to traffic and transport, and telecommunications and aviation. 'Access A' of the assessment relates specifically to the access from the R634 regional road into the eastern cluster of wind turbines.	The point of access to the eastern cluster (which includes T5) will not be altered in the event of the relocation of T5 . The findings of the traffic and transport assessment contained in the EIAR remain valid.				

Environmental Consideration & Chapter	Current Context	T5 Relocation
	<p><u>Traffic and Transport</u> The Chapter assesses the effects on roads and traffic, of the traffic movements that will be generated during the construction, operation and decommissioning of the wind farm. Key findings relevant here include:</p> <ul style="list-style-type: none"> • During the 17 days when the concrete foundations are poured the effect on the surrounding road network will be negative, resulting in an increase in traffic levels of 29.3% on the R634, 41.7% on the local roads leading to the site access junctions. The direct effect will be temporary and will be slight. • During the 17 days of the turbine construction stage when general materials are delivered to the site, the delivery of construction materials will result in a negative impact on the surrounding road network. An increase of travel levels by 5.8% on the R634 to 8.3% on the local roads leading to the site access junctions is predicted. The direct effect during this period will be temporary and will be slight. • During the 31 days when the various component parts of the wind turbine plant are delivered to the site using extended articulated HGVs, the effect of the additional traffic on these days will be moderate due to the size of vehicles involved, resulting in increased traffic volumes of 8.7% on the R634 to 12.3% on the local road network. The direct effect will be reduced to slight if the delivery of the large plant is done at night, as is proposed. <p>In relation to abnormal loads, delivery of such will take place after peak evening traffic. An outline traffic management plan (TMP) is set out in the Construction Environmental Management Plan (CEMP) contained in Appendix 4-4 of the EIAR. A confirmatory /</p>	<p>The method of delivery of turbine components, and the impacts of such including construction days, are not altered by the relocation of T5.</p> <p>It is not considered that any impacts beyond those considered in the EIAR will arise in relation to the relocated T5. It is acknowledged that the relocated T5 will require an additional length of roadway – an increase from 145m to 334m to the main access road to the turbine location itself, however this is considered negligible in that the construction methodology, impacts and mitigation mirror those set out in the EIAR as lodged.</p>

Environmental Consideration & Chapter	Current Context	T5 Relocation
	<p>final Traffic Management Plan (TMP) will be provided specifying details relating to traffic management and included in the CEMP prior to the commencement of the construction phase of the Proposed Development. The TMP will be agreed with the local authority and An Garda Síochána prior to construction works commencing on site.</p> <p>During the operational phase, the direct effect on the surrounding local highway network will be neutral and long term given that there will be approximately two maintenance staff on average regularly travelling to site for routine inspections and maintenance work, resulting in typically two visits to the site regularly made by a car or light goods vehicle.</p> <p><u>Telecommunications and Aviation</u></p> <p>Wind turbines, like all large structures, have the potential to interfere with broadcast signals, by acting as a physical barrier or causing a degree of scattering to microwave links. The most significant effect at a domestic level relates to a possible flicker effect caused by the moving rotor, affecting, for example, radio signals. The most significant potential effect occurs where the wind farm is directly in line with the transmitter radio path.</p> <p>RTÉ Transmission Network (operating as 2rn), stated that they have no microwave links in the vicinity of the proposed windfarm site. However, to mitigate against potential interference to viewers in the area receiving from RTE sites at Dungarvan, Mullaganish and Ferrypoint (Youghal), RTÉ have recommended that a protocol agreement be put in place for the wind farm development. Pending a grant of permission for the proposed wind farm, the applicant will sign and commit to the standard Protocol Document with RTÉ (2rn).</p>	<p><u>Telecommunications and Aviation</u></p> <p>In relation to telecommunications and aviation, constraints mapping has been considered in relation to the new potential location of T5. No interference as a result of the relocation of T5 is expected.</p> <p>As noted opposite, RTÉ Transmission Network (operating as 2rn) requested a protocol agreement be entered into should a grant of permission be issued; this will be undertaken.</p> <p>Eir, Three Ltd and Virgin Media noted at Scoping stage that they had links in the area of the Proposed Development and requested buffers to be included in the wind farm design to mitigate potential impacts on the associated links. As noted above, these buffers have formed part of the constraints exercise run for the new potential location of T5 and no interference was found to occur.</p> <p>The IAA requirements as set out opposite will be applied to the relocated T5.</p>

Environmental Consideration & Chapter	Current Context	T5 Relocation
	<p>Of the scoping responses received from telephone, broadband and other telecommunications operators Eir, Three Ltd and Virgin Media noted links in the area and requested buffers to be included in the wind farm design to mitigate potential impacts on the associated links.</p> <p>A scoping response was received from the Department of Defence (DoD) in which they indicated that they had no observations on the proposal.</p> <p>A scoping response was received from the Irish Aviation Authority (IAA). The requirements of the IAA include the following:</p> <ul style="list-style-type: none"> • Agree an aeronautical obstacle warning light scheme for the wind farm development. • Provide as-constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location. • Notify the Authority of intention to commence crane operations with a minimum of 30 days prior notification of their erection. <p>The nearest operational airport to the Proposed Development site is Cork Airport, located approximately 40 kilometres southwest of the site, and therefore outside the range at which such issues would be expected.</p> <p>In summary, there will be no significant impact on telecommunications and aviation as a result of the Proposed Development.</p>	<p>It is held that the new potential location of T5 will not affect the conclusions reached in Chapter 15 in respect of telecommunications and aviation.</p>

T5 Relocation Conclusion

The consented dwellings identified at this Further Information stage are not yet constructed. Neither of the consented dwellings are located within the 500-metre set back from individual wind turbines as required under the Wind Energy Guidelines 2006 as adopted. As set out above, the design approach to the Lyrenacarriga Wind Farm has been to ensure a setback of 700 metres from all dwellings was achieved. The applicant now proposes to relocate Turbine 5 to ensure this setback is maintained across the project. To ensure this relocation is sound in environmental terms, the impact of the relocation in terms of the EIAR and NIS as submitted has been assessed in detail. The results of this impact assessment, set out above in Table 3-3, demonstrate that any impacts arising are imperceptible, the mitigation prescribed in the EIAR and NIS will continue to apply and no significant environmental impacts will arise as a result of the relocation. Should the Board be minded to grant planning permission for the development we therefore invite them to condition this relocation of T5.

4.

OVERALL CONCLUSIONS

This document and appendices constitute a full and robust response to the further information request issued by An Bord Pleanála in respect of planning application reference ABP-309121-21 regarding the proposed Lyrenacarriga Wind Farm.

Items raised within the request have been addressed in full. In addition, third party submissions to the planning application have been considered as part of this response.

It is therefore concluded that the FI request has been responded to in full. We trust that the information provided within this submission satisfactorily addresses each of the items raised within the request for Further Information and respectfully request the Board now finalise their consideration of the planning application.



APPENDIX 1

***FI DRAWING PACK (ENCLOSED
SEPERATELY)***

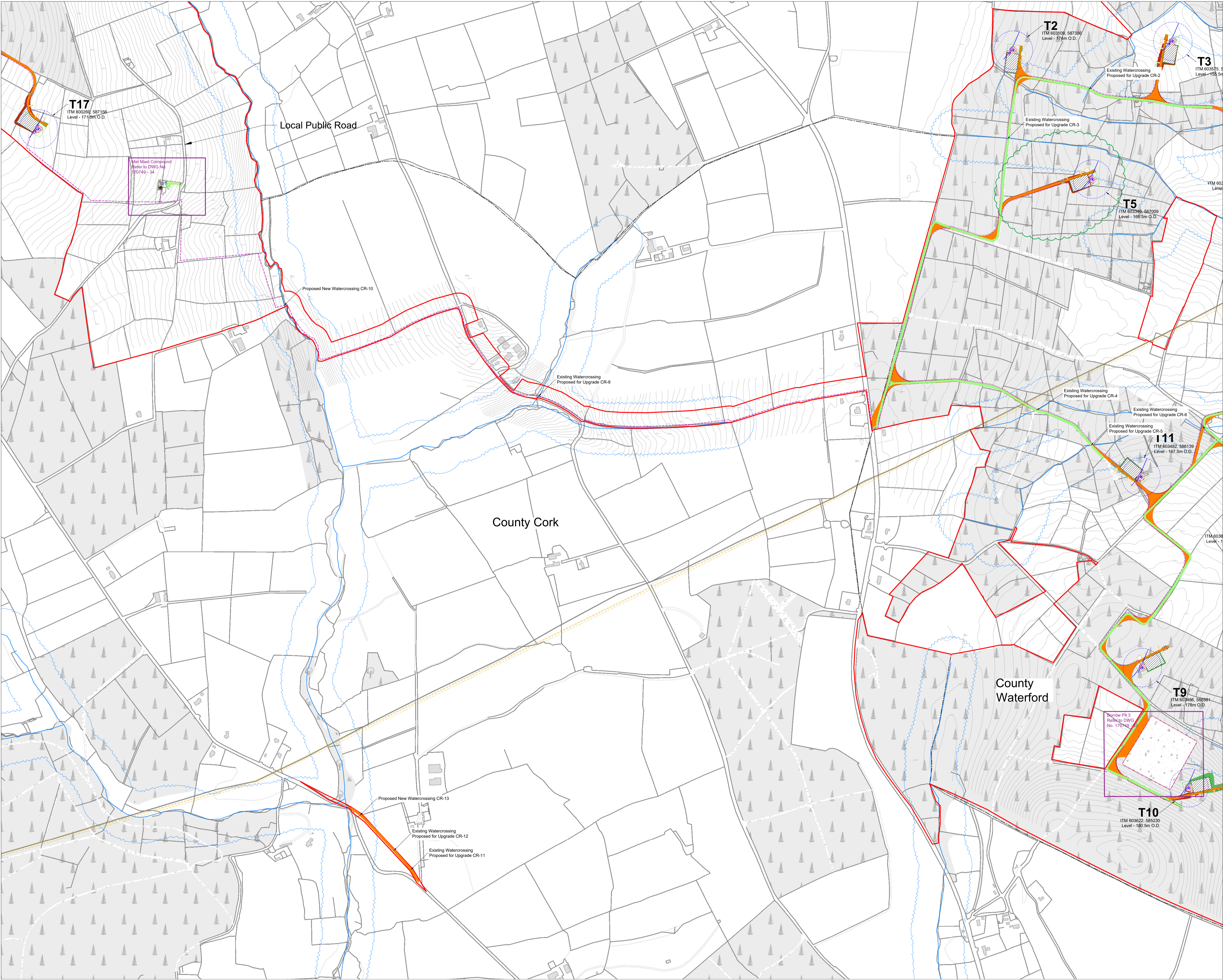
**Lyrenacarriga Wind Farm,
Co. Cork & Co. Waterford
Planning Permission Application Drawings
Further Information Response (ABP 309121-21)**





Schedule of Drawings – FI

Drawing No.	Drawing Title	Scale
170749e – 01 FI	Site Layout Plan (T5 Proposed Relocation) Sheet 2 of 4	1: 5,000 @ A1
170749e – 02 FI	Site Layout Plan (T5 Proposed Relocation) Sheet 3 of 4	1: 5,000 @ A1
170749e – 03 FI	Site Layout Plan (T5 Proposed Relocation) Sheet 4 of 11	1: 2,500 @ A1
170749e – 04 FI	Met Mast Compound Elevation	1: 250 @ A3
170749e – 05 FI	Wind Turbine Range Elevations & Plan	1: 500 @ A1
170749e – 06 FI	Wind Turbine Range Elevations & Plan	1: 500 @ A1



- Project Design Drawing Notes**
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 6. The use of or reliance upon this drawing shall be deemed to be acceptance of these conditions of use unless otherwise agreed in writing, such written agreement to be sought from and issued by the copyright holder to the use or reliance upon this drawing.
 7. Layout plans show typical Turbine rotor diameter as per turbine drawing.
 8. Final levels may vary depending on local ground conditions.
- Drainage Design Notes**
1. All drainage subject to micro-siting and optimisation on site.
 2. The locations of the interceptor drains, check dams, culverts, swales, stilling ponds and level spreaders are shown as indicative, and may be changed to suit the requirements of the local topography.
 3. Supervising hydrologist or environmental clerk of works (environmental scientist) to oversee installation of drainage features following detailed drainage design.
 4. Drainage measures to be installed prior to, or at the same time as the works areas they are intended to drain.
 5. Design elevation of the water surface along the route of the interceptor drains or swales will not be lower than the design elevation of the water surface in the outlet at the level spreader or stilling pond.
 6. The spacing and frequency of the check dams will be dependant on the gradient of the interceptor drain or swale in which they are being installed.
 7. Check dam designs to be selected best to suit particular topography and hydrological environment.
 8. Down gradient slope below level spreader onto which the water will dissipate to have a grade less than 6%.
 9. No direct discharge or pumping to watercourses will be permitted. All discharges from level spreaders or stilling ponds to be via vegetated filters. Selection of suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions.
 10. Stilling ponds to be sized according to the area they will be receiving water from.
 11. Diversion of drainage ditches will only take place when alternative drainage ditch has been installed to handle the same water.
 12. Existing drains/ditches to be incorporated or removed during wind farm construction.
 13. All drainage system features to be subject of inspection and maintenance plan.
 14. The layout shown is slightly offset for scale purposes, and all drainage would be installed as close to the road as possible.

- Drawing Legend**
- Planning Application Boundary
 - Existing Road to be Upgraded
 - Proposed Road
 - Electrical Cable Trench
 - River/Stream
 - 75m River/Stream Buffer
 - Works Area
 - Soft Levelled Area
 - Crane Pad Hardstanding Area
 - Turbine Foundation
 - Turbine Sweep Area
 - Borrow Pit
 - Cut
 - Fill
 - Existing 110kV Overhead Line
 - County Border

DRAWING TITLE:
**Site Layout Plan
 (T5 Proposed Relocation)
 Sheet 2 of 4**

PROJECT TITLE:
**Lyrenacarriga Wind Farm,
 Co. Cork & Co. Waterford - FI Response**

DRAWING BY: Joseph O'Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 170749e	DRAWING No.: 170749e - 01 FI
SCALE: 1:5,000 @ A1	DATE: 30.09.2022

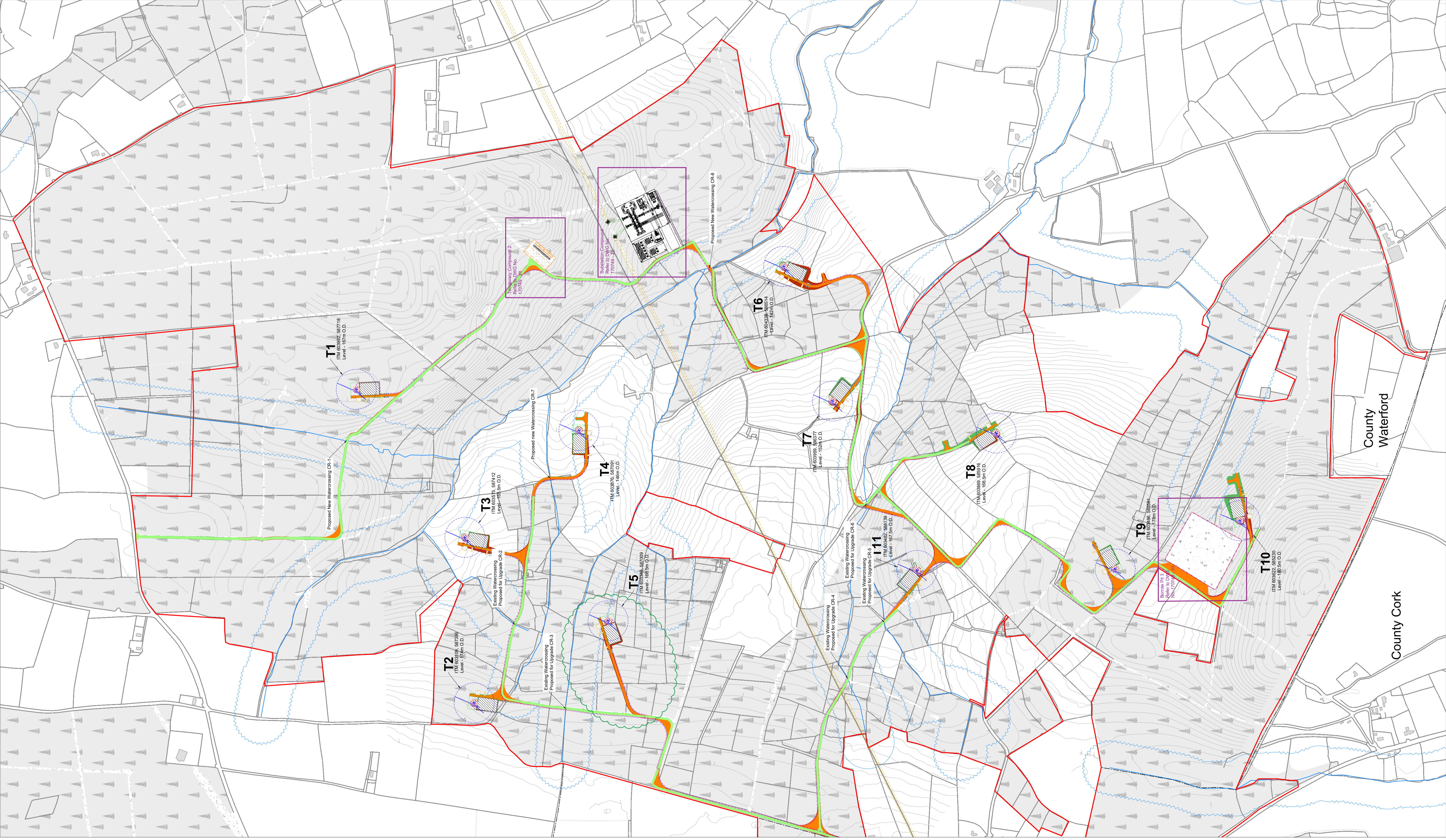
OS SHEET No.: 6108, 6109, 6110, 6111, 6112, 6154, 6155, 6156, 6157, 6158, 6201, 6202, 6203, 6204, 6205, 6249, 6250, 6251, 6252, 6253

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 email: info@www.mkofireland.ie
 Website: www.mkofireland.ie

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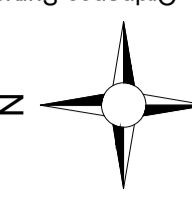
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7. Layout plans show typical Turbine rotor diameter as per turbine drawing.
8. Final levels may vary depending on local ground conditions.



Drawing Legend

- Planning Application Boundary
- Existing Road to be Upgraded
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- Electrical Cable Trench
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- Works Area
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- Crane Pad Hardstanding Area
- Turbine Foundation
- Turbine Sweep Area
- Borrow Pit
- Cut
- Fill
- Existing 110kV Overhead Line
- County Border



DRAWING TITLE:
**Site Layout Plan
 (T5 Proposed Relocation)**
 Sheet 3 of 4

PROJECT TITLE:
**Lyrencarriga Wind Farm,
 Co. Cork & Co. Waterford - F1 Response**

DRAWING BY:
Joseph O Brien

CHECKED BY:
Meabhann Crowe

DRAWING No:
170749e

PROJECT No:
170749e

SCALE:
1:5,000 @ A1

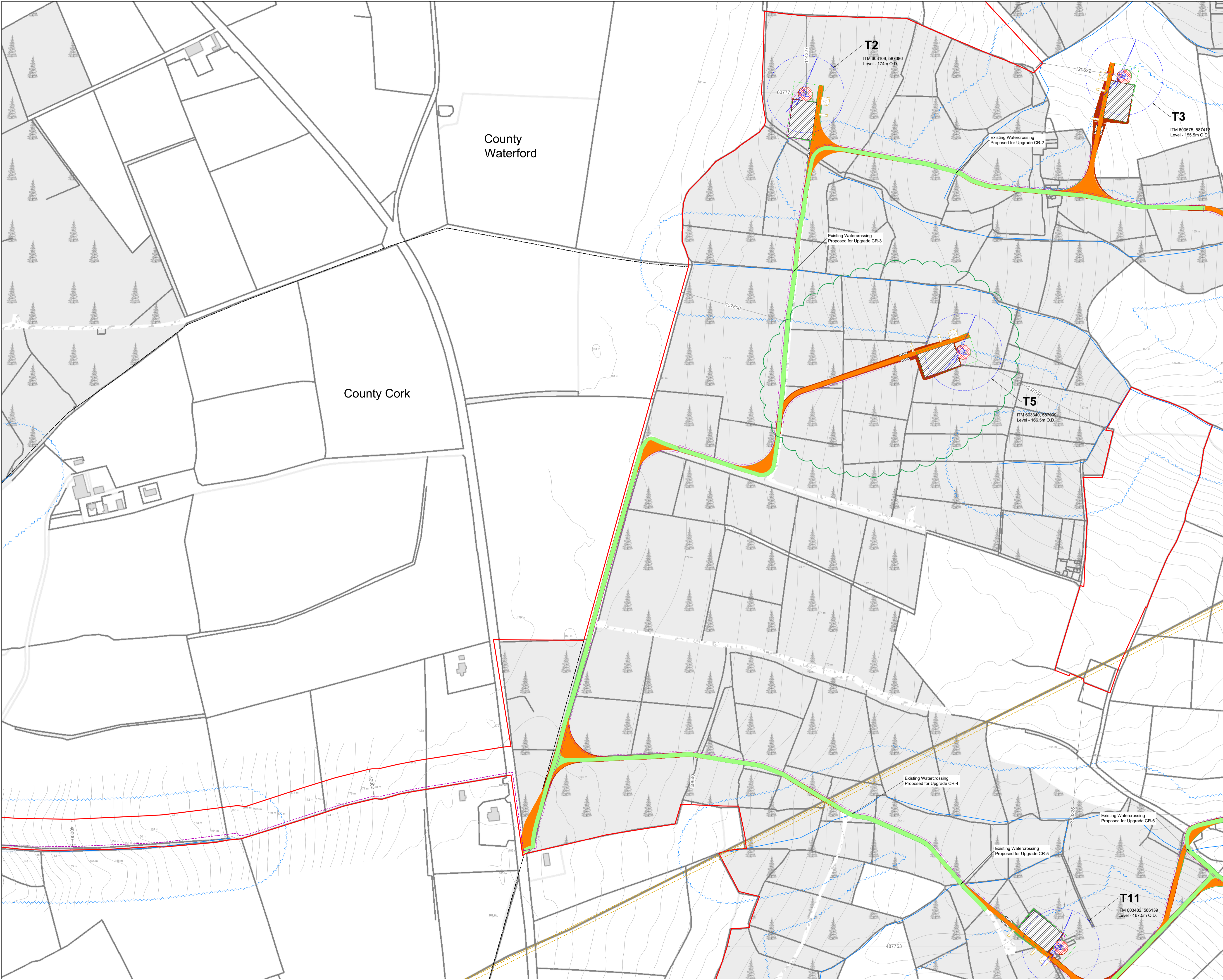
DATE:
30.09.2022

OS SHEET No.:
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 Website: www.mkofireland.ie

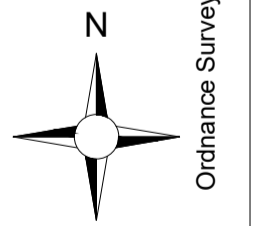
County
 Waterford

County
 Cork



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 7. Layout plans show typical Turbine rotor diameter as per turbine drawing.
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- Drawing Legend**
- Planning Application Boundary
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 - Crane Pad Hardstanding Area
 - Turbine Foundation
 - ⊙ Turbine Sweep Area
 - Cut
 - Fill
 - County Border
 - Existing 110kV Overhead Line



DRAWING TITLE: Site Layout Plan (T5 Proposed Relocation) Sheet 4 of 11

PROJECT TITLE: Lyrenacarriga Wind Farm, Co. Cork & Co. Waterford - FI Response

DRAWING BY: Joseph O'Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 170749e	DRAWING No.: 170749e - 03 FI
SCALE: 1:2,500 @ A1	DATE: 30.09.2022

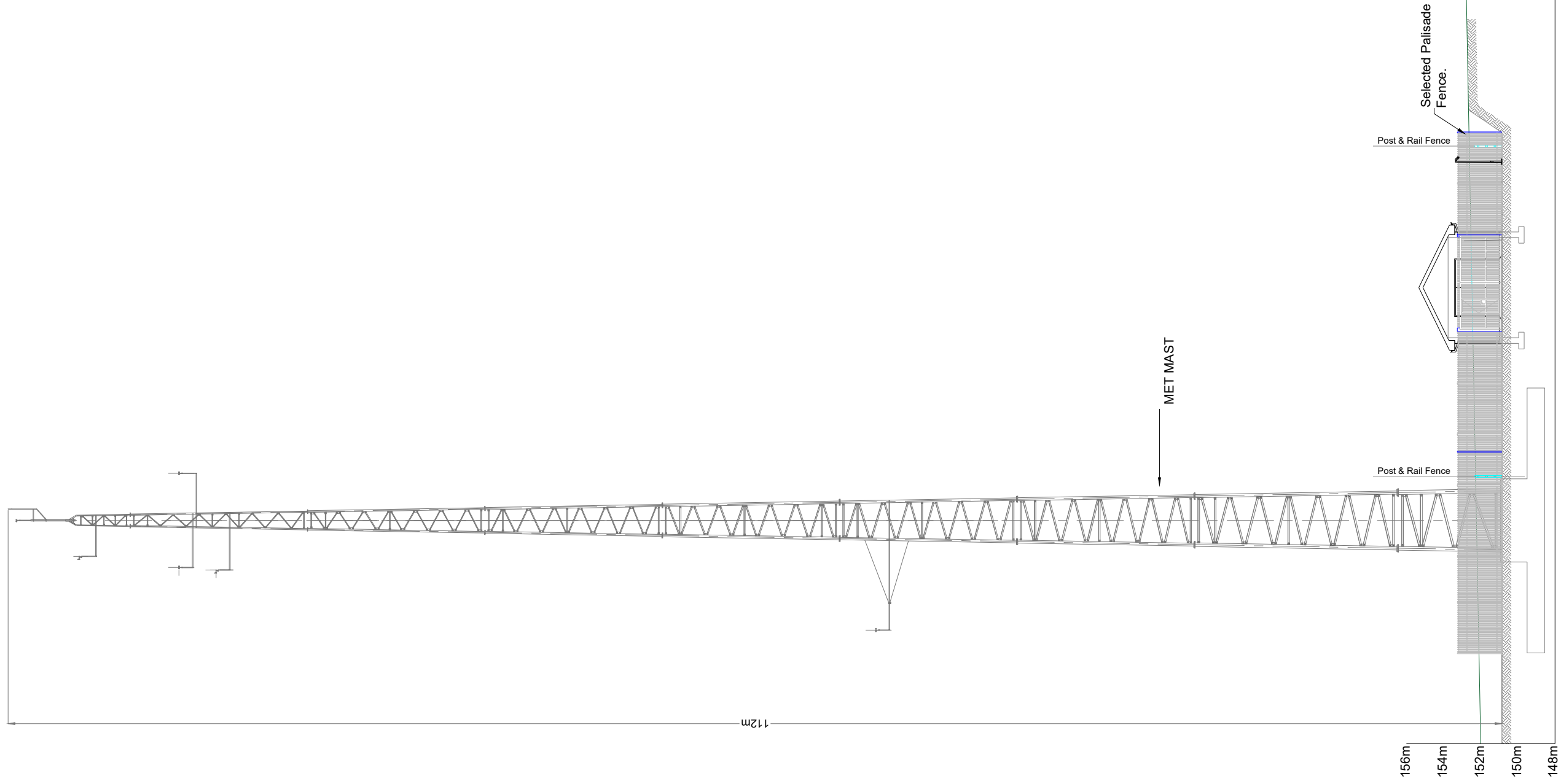
OS SHEET No.: 6108, 6109, 6110, 6111, 6112, 6154, 6155, 6156, 6157, 6158, 6201, 6202, 6203, 6204, 6205, 6249, 6250, 6251, 6252, 6253

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Drawing Notes

- 1. Met mast on site will be free standing met mast.

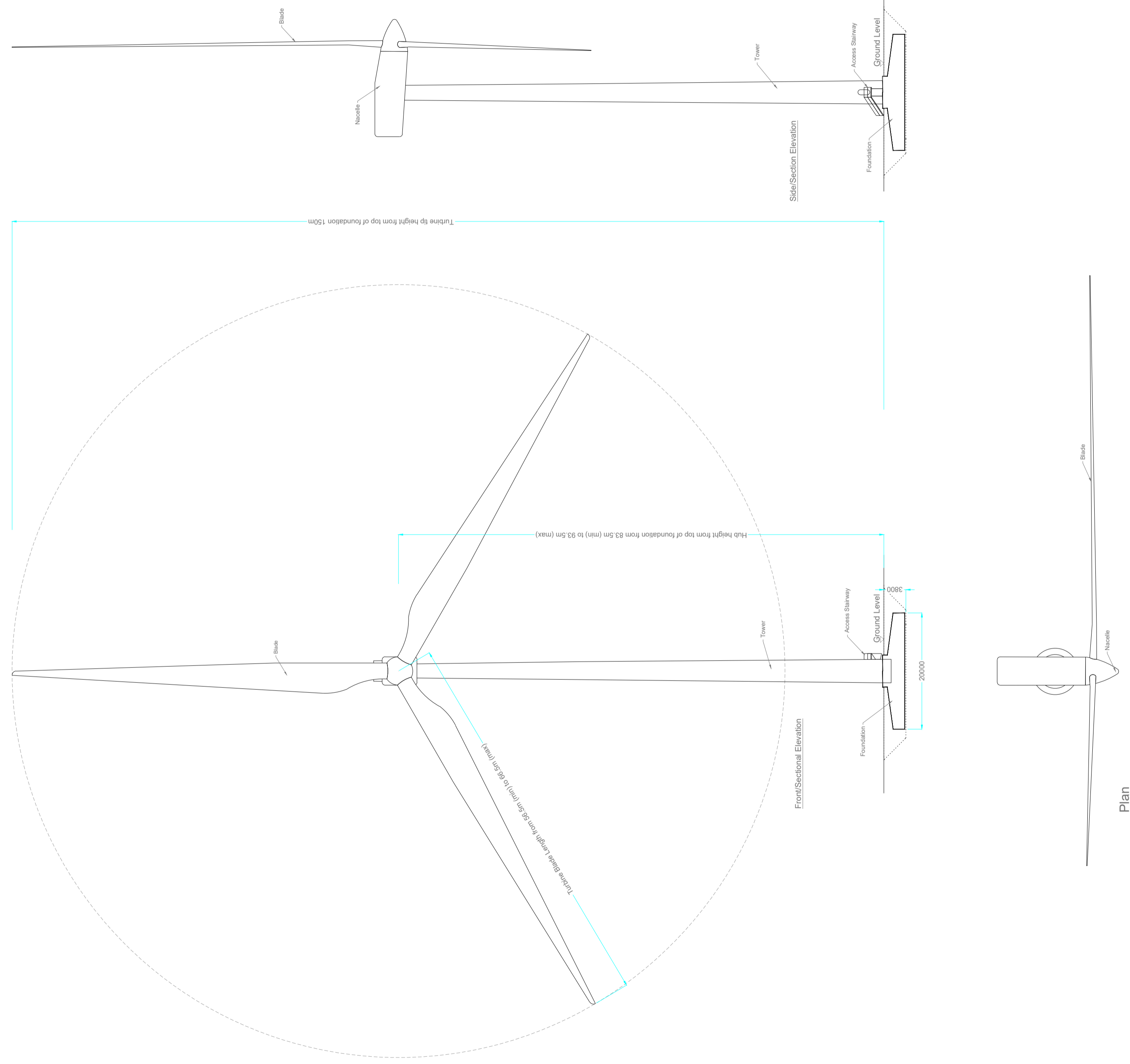


DRAWING TITLE: Met Mast Compound Elevation	
PROJECT TITLE: Lyrenacarriga Wind Farm, Co. Cork & Co. Waterford - FI Response	
DRAWING BY: GD	CHECKED BY: DT
PROJECT No: 1707496	DRAWING No: 1707496 - 04 FI
SCALE: 1:250 @ A3	DATE: 30.09.2022



Drawing Notes

1. Proposed wind turbines to have a maximum ground to blade tip height of 150m.
2. Exact make and model of the turbine to be dictated by a competitive tender process.
3. Installed wind turbine will fall within the parameters set out above in any blade length and hub-height configuration
4. Turbine foundation diameter may range from 18m to 20m and have a depth ranging from 3.2m to 3.8m. The final foundation design would be within these design parameters but will depend on the turbine type and will be calculated by structural engineers at detailed design stage.
5. Ground level represents the top of turbine foundation.



DRAWING TITLE

Wind Turbine Range Elevations & Plan

PROJECT TITLE

Lyrenacarriga Wind Farm,
Co. Cork & Co. Waterford – FI Response

DRAWING BY

Joseph O'Brien

CHECKED BY

Meabhann Crowe

PROJECT NO.

170749e

DRAWING NO.

170749e - 05 FI

SCALE

1:500 @A1

DATE

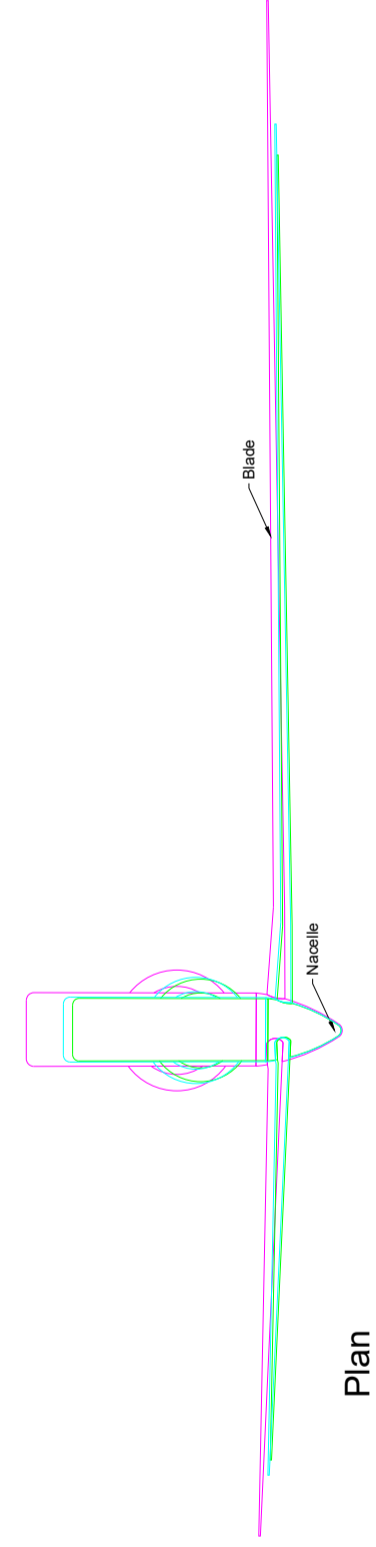
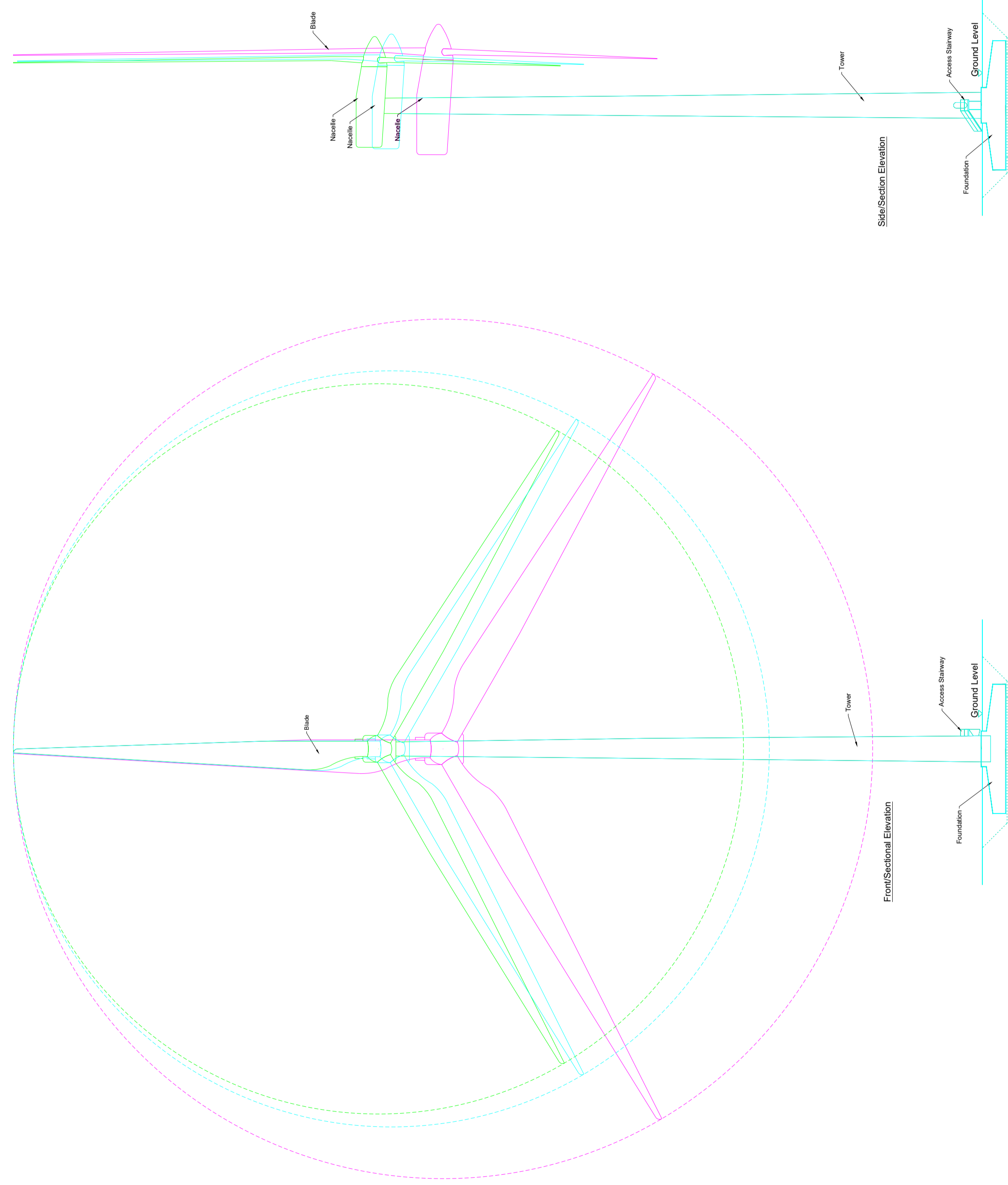
30.09.2022



MKO

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email: info@www.mkoireland.ie
Website: www.mkoireland.ie

93.5m hub and 96.5m blade	
83.5m hub and 66.5m blade	
91.5m hub and 98.5m blade	



Drawing Notes

- Proposed wind turbines to have a maximum ground to blade tip height of 150m.
- Exact make and model of the turbine to be dictated by a competitive tender process.
- Installed wind turbine will fall within the parameters set out above in any blade length and hub-height configuration
- Turbine foundation diameter may range from 18m to 20m and have a depth ranging from 3.2m to 3.8m. The final foundation design would be within these design parameters but will depend on the turbine type and will be calculated by structural engineers at detailed design stage.
- Ground level represents the top of turbine foundation.

DRAWING TITLE

Wind Turbine Range Elevations & Plan

PROJECT TITLE

Lyrenacarriga Wind Farm,
Co. Cork & Co. Waterford – FI Response

DRAWING BY

Joseph O'Brien

CHECKED BY

Meabhann Crowe

PROJECT NO.

170749e

DRAWING NO.

170749e - 06 FI

SCALE

1:500 @A1

DATE

30.09.2022



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APPENDIX 2

FIHES RESPONSE

Date: 07th September 2022
Our Ref: P1453-1-0010

MKO Ireland

Planning & Environmental Consultants
Tuam Road,
Galway.
H91 VW84.

Attn: Ms Meabhann Crowe

Dear Meabhann,

Re: Hydrological & Hydrogeological Responses to An Bord Pleanála Further Information Request, and Statutory and Third-Party Submissions, in respect of the proposed Lyrenacarriga Wind Farm, Co. Cork/Co. Waterford (ABP Ref: 309121-21)

Hydro-Environmental Services (HES) were requested by MKO Ireland (MKO) to respond to a further information request from An Bord Pleanála (ABP) along with hydrological and hydrogeological matters raised in third-party submissions in relation to the proposed Lyrenacarriga Wind Farm, Co. Cork and Co. Waterford.

Firstly, this letter report provides responses to Item C and Item D listed under the heading "Biodiversity" in the ABP further information request letter which was issued on 8th April 2022 (Refer to Section 2 below). The other items from the ABP letter are dealt with by others.

Responses are then provided to hydrological and hydrogeological matters raised by prescribed bodies and third parties. Our response letter follows the following format:

- Cork and Waterford Local Authorities (Section 3 below)
- Statutory Bodies/ Prescribed Bodies (Section 4 below)
- Third-Party Submissions (Section 5 below)
- Submission Summary (Section 6 below)

Direct responses are provided to the Local Authority and Prescribed Body submissions. Responses to non-statutory submissions are grouped responses on repeated matters raised.

1 STATEMENT OF EXPERIENCE – WIND FARM DRAINAGE

Hydro-Environmental Services (HES) has extensive wind farm drainage and hydrogeological experience relevant to this project. Wind farm environmental impact assessment in respect of geology, hydrology and hydrogeology has and is a core business area for HES presently and also over the past 15 years. Wind farm drainage design/management requires experience both as a civil/drainage engineer, a hydrologist, and a hydrogeological specialist. HES have these combined experiences and expertise. HES has worked on over 100 wind farm projects in Ireland and Northern Ireland. Many of these required assessments of existing drainage features and streams and water quality data. HES work at all stages of wind farm developments including feasibility stage, layout design & drainage design/planning stage, and also at construction management stage.

HES's experience also covers the key area of water quality and drainage controls and mitigation during the construction phase of wind farm developments. HES work at EIAR/planning stage to assist with the development of the optimal site layout which involves the development of hydrological constraints maps and interaction with geotechnical and ecological specialists and with site designers, HES also provides a follow-on consultancy service

(if planning is granted and the development proceeds to construction) of detailed drainage design and construction management for drainage during wind farm development/construction stage. This practical on-site experience is invaluable as it has led to the development of improved preliminary and detailed drainage layouts and also many improvements/optimisations to standard peatland drainage mitigation measures.

HES specialises in wetland and peatland eco-hydrology. We also complete flood risk assessments for all types of developments across the country.

All these experiences are particularly relevant to this project, and they have been applied through the project development phase, the constraints mapping phase, and EIAR preparation work, including the cumulative impact assessment.

This response submission has been prepared by David Broderick and Michael Gill. David and Michael prepared the Land Soil and Geology and Water Chapters of the submitted EIAR, and their qualifications and experience are already presented in the EIAR.

2 RESPONSE TO ABP ITEM C AND ITEM D UNDER THE HEADING “BIODIVERSITY”

2.1 “BIODIVERSITY” ITEM C

Item C is written as follows:

“Further detail is required in respect of the design detail of the settlement pond structures”.

2.2 “BIODIVERSITY” ITEM C RESPONSE

The design of temporary settlement ponds is a relatively simple process and is a well-established science, being based on Stoke's Law. The design process is outlined in “Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006)”.

The proposed structural design detail of the settlement ponds is shown in Drawing no. P1453-0-0121-A1-D501-00A which is attached as Appendix 4-6 of the EIAR. (Also note that the drainage drawings form part of the submitted Planning Drawings for the proposed Development).

As shown in detail A1 and A2 of that drawing (P1453-0-0121-A1-D501-00A), temporary settlement ponds will be constructed from suitable excavated soil material and lined with 1000 gauge impermeable polythene. The settlement ponds will be a 2-stage, or a 3-stage, construction (i.e. there will be either 2 stages of settlement, or 3 stages, broken into bays within the settlement pond structure).

There are design specifications referenced in detail A1 and A2 (of drawing P1453-0-0121-A1-D501-00A), but the referenced design table was not included in the final drawing by error (see “Note Dimensions Vary Depending on Catchment Size – See Attached table” referenced below the Title for Type A – Typical Road Side Settlement Pond Detail). An updated version of this drawing is attached in **Appendix I**, and the design table is included on the updated drawing. For clarity, the design table is also presented in **Table A** below. Please note that **Table A** covers a series of catchment sizes and design scenarios that will typically be encountered at the site.

Table A: Proposed Settlement Pond Sizes based on various catchment sizes

Return Period	100-year	Catchment Size (m ²)		
		500	1,000	2,000
6hr retention for Coarse Silt		2.8 x 9 x 1	4 x 13 x 1	5.7 x 18 x 1
11hr retention for Medium Silt		3.2 x 10 x 1	4.5 x 14 x 1	6.4 x 20 x 1m
24hr retention for Medium Silt		3.5 x 11 x 1	5 x 16 x 1	7 x 22 x 1
Settlement Pond Size:		W[m] x L[m] x D[m]	W[m] x L[m] x D[m]	W[m] x L[m] x D[m]

The design process to size the settlement ponds is as follows:

- The proposed development footprint is divided up into drainage catchments (based on topography, outfall locations, and catchment size. Catchment sizes are divided so they are <2,000m² in area, but they can be much smaller depending on local topographical conditions));
- Stormwater runoff rates which are based on the 100-year return period rainfall event are calculated and these flows are used to design settlement pond sizes for each drainage catchment;
- Retention times are based on Stoke's Law (particle settling velocity);
- The settlement ponds for access roads and hardstand surfaces are designed for an 11hr retention time used to settle out medium silt (EPA, 2006)¹; and,
- Borrow pit/ repository areas settlement ponds have been designed to allow a 24hr retention time as per EPA guidance (2006), which is the highest level of protection recommended by the EPA with regard to retention time.

With regards to settlement pond designs and water quality protection, we summarise our response as follows:

- Settlement pond details were provided in the submitted EIAR in Appendix 4-6 and also within the application drawing pack as noted above.
- The design of settlement ponds is a well-established science and is detailed in a guidance document published by the EPA (EPA, 2006).
- We have outlined the design process for each required settlement pond above.
- We have provided example calculations for various catchment sizes within the proposed Wind Farm, and also for various design scenarios. These example calculations can be applied across the site.
- We note that settlement ponds are not a stand-alone element of the water quality protection mitigation outlined in the EIAR.
- Water quality protection will occur as part of a treatment train of mitigation, including source controls, in-line controls, treatment controls (including settlement ponds), and outfall controls. This suite of water quality protection controls will be applied in series to ensure the protection of downstream watercourses.
- To illustrate this point we have included process flow diagrams showing each element of the proposed drainage systems. These process flow diagrams are attached in **Appendix II.**

We trust the above demonstrates the detailed consideration of drainage controls and water quality protection presented in the EIAR.

2.3 "BIODIVERSITY" ITEM D

Item D is written as follows:

"You are requested to respond to concerns expressed in respect of the geochemistry of the borrow pit near the entrance, especially in relation to pyrite and/or marcasite and risk of acid drainage".

2.4 "BIODIVERSITY" ITEM D RESPONSE

In order to respond to this Item, we have completed a detailed review of available geological and geochemical information in respect of acid mine drainage and the referenced minerals. We respond as follows:

¹ Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006).

- There is no history of mining in the area, suggesting there is no significant mineral resource available in the local bedrock geology. The general absence of mineral localities in the area of the wind farm site confirms this (refer to **Figure A** below);
- The nearest historical mines of note are along the Copper Coast (Bunmahon (Tankardstown Mine), in east Waterford;
- Old Red Sandstone (ORS bedrock) in Ireland is of continental origin, not marine and pyrite/marcasite would be a relatively unusual mineral constituent in that context. Unless there is a hydrothermal intrusion, sedimentary rocks need original anaerobic/reducing conditions to generate the sulphides;
- At the old mine in Allihies there is significant copper and sulphide mineralization in the Old Red Sandstone (similar bedrock geology to the proposed development site) but the mineralization is in injected veins in fractures in the ORS, not internal to the ORS itself;
- Therefore, with an absence of similar injected veins, or volcanic rocks (as is the case at Bunmahon), it is highly unlikely that such conditions can ever occur at the site;
- Acid mine drainage is usually associated with deep mines where mineral ores are extracted, and is not typically associated with shallow quarries/borrow pits;
- There are the (worked out and overgrown) remains of some local commercial quarries/pits, but there is no evidence associated with these quarries/pits that acid mine drainage is/was an issue locally;
- pH levels recorded in the streams/drains draining the site are all >7.0 (i.e. there is no apparent acid mine drainage occurring at the site as drainage water has a neutral pH);
- The installation of existing forestry access tracks has created several cut and fill areas within the proposed wind farm site and there is no evidence of acid drainage from these exposures (trackside drainage water pH >7.0);
- Proposed borrow pits at the site are relatively shallow excavations and will not be too dissimilar to the existing cut areas;
- We have also consulted with quarry operators in the region that extract similar rock types (Old Red Sandstone), and they are not aware of this being a significant issue or concern; and,
- We have also consulted with the Geological Survey of Ireland, and academics in Trinity College and University College Cork, and none are aware of this issue in the ORS geology at the proposed Wind Farm site.

As a result of the above, we consider that this particular issue will not result in significant impacts on downstream water quality from the proposed development. The research and investigation we have carried out on the matter have indicated that AMD is not a documented risk in the area of the proposed development.

Issues raised in respect of the Glenaboy River are addressed in Section 4.2 below.

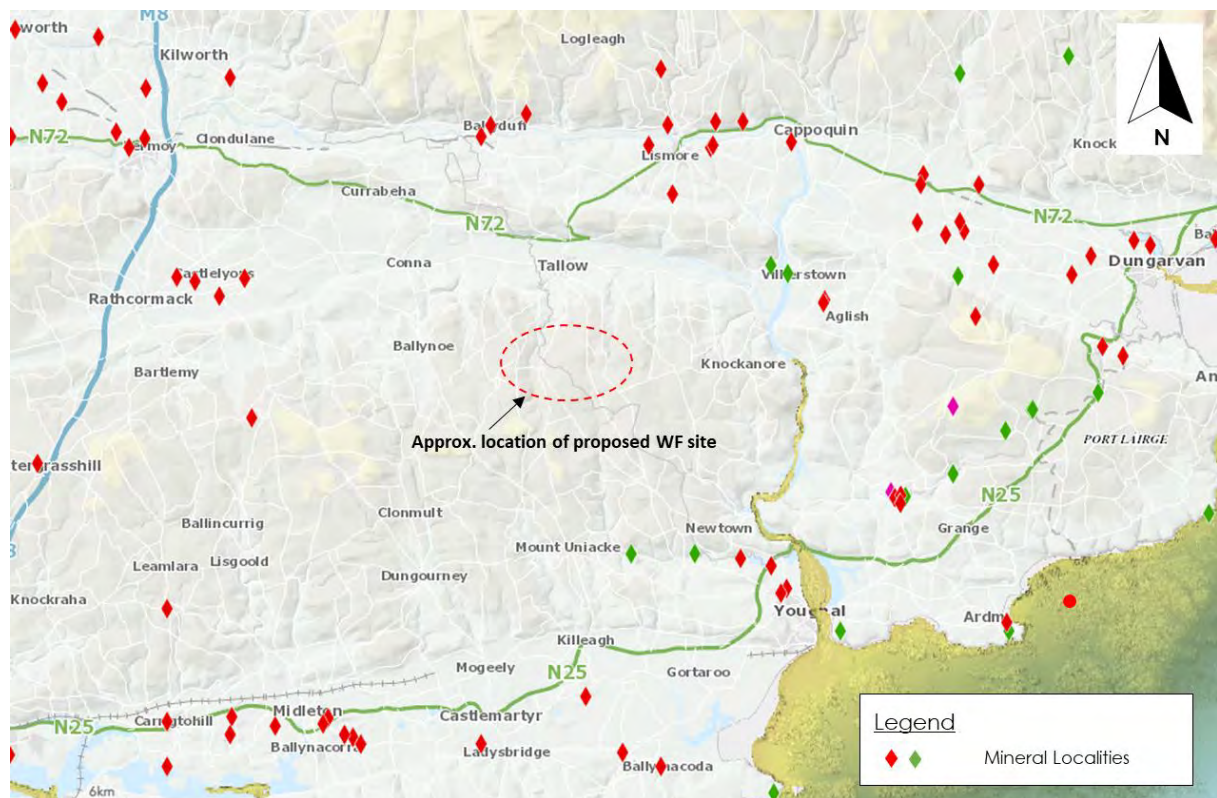


Figure A: GSI mapped Mineral Localities in the area of the proposed development site.
 (note absence of mineral localities in the area of the proposed development)

3 LOCAL AUTHORITY SUBMISSIONS

3.1 CORK COUNTY COUNCIL

The following documents were reviewed with regard to the submission by Cork County Council:

- Planning Authority Report submission (Chief Executive's);
- Report of Area Engineer (Internal);
- Report of Heritage Officer (Internal); and,
- Report of Senior Executive Scientist (Internal).

3.1.1 Key Points Made with Regard Hydrology/Drainage/Water Quality by Cork Co. Co.

In relation to potential impacts on surface water, groundwater and the environment, the Planning Authority Report notes that:

"There is no objection to the grant of permission on environmental grounds".

The Report of the Area Engineer states that:

"There are no objections to the proposals regarding site drainage and attenuation measures".

Report of Senior Executive Scientist makes the following comments:

"There is a significant risk to surface water quality, primarily due to potential for run-off of sediment to surface water due to excavation, traffic movements, stream crossings, etc. There is also a risk to surface & groundwater due to leakage or loss of fuel or hydrocarbons from plant. This can be mitigated with good management, & provision of appropriate spill response equipment & procedures".

"A 75m buffer from the main streams was applied during the constraints mapping and will be maintained during the construction phase. No development, other than identified stream crossings, will be carried out within this buffer. A buffer of this scale provides good protection to the watercourses on site & leaves a significant area for attenuation of any accidental discharges of silt laden water given the generally gently sloping nature of the site".

"I have no objection to grant of permission on environmental grounds".

The Senior Executive Scientist report recommends 9 no. Conditions with regard to water quality protection. All recommended conditions with regard to drainage mitigation/surface water quality protection are already proposed in the EIAR (Chapter 10) within Sections 10.5.2.1, 10.5.2.2 & 10.5.2.5.

Although they indicate some further clarifications are required, which are related to ecological issues (i.e. ex-situ species namely; otter and salmon, particular in the River Tourig) and not water quality or drainage issues, the Report of the Heritage Officer concludes that:

"The Heritage Unit of Cork County Council is not of the opinion that the proposed windfarm will have a significant negative effect on the ecology of the area".

3.2 WATERFORD COUNTY COUNCIL

The following documents were reviewed with regard to the submission by Waterford County Council:

- Planning Authority Report submission (Chief Executive's);
- Heritage Officer (Internal);
- Conservation Officer (Internal);
- Environment Section (Internal); and,
- Water Services Section (Internal).

3.2.1 Key Points Made with Regard Hydrology/Drainage/Water Quality by Waterford Co. Co. The Water Services (WS) Section makes the following comments:

"The most significant risk to water quality will be at deforestation (45.6 ha) and construction phase. WS note that the hydrology report states that many mitigation measures (silt traps, etc) will be put in place to mitigate risks".

WS consider the Siltbuster technology referred to in the mitigation should be deployed if the surface water leaving the site does not comply with <25mg/l TSS and pH 6-9.

Planning Authority Report submission (Chief Executive's) makes the following comments:

"There are 2 no. downstream public water supplies have also been considered. The comprehensive surface water mitigation proposed seeks to ensure no impact on these water sources and no impact on the downstream Blackwater SAC and pNHA".

"WCCC consider the Siltbuster technology referred to in the mitigation should be deployed if the surface water leaving the site does not comply with <25mg/l TSS and pH 6-9".

No issues or concerns were raised by the Heritage Officer, Conservation Officer or Environment Section in Waterford Co. Co.

3.2.2 Local Authority Submissions Summary

- In submissions made by Cork and Waterford Local Authorities to An Bord Pleanála, the proposed Lyrenacarriga WF wind farm was considered acceptable from a water quality/environmental perspective by both Planning Authorities;
- The submission by Cork Co. Co. (County in which Youghal water supply abstraction is located) states that “There is no objection to the grant of permission on environmental grounds”;
- The submissions set out a recommended schedule of conditions. Those applicable to hydrology and water quality generally relate to pollution prevention measures, drainage management, and the submission of a drainage management plan; and,
- These issues have been addressed in the EIAR, and the suggested planning conditions (from the Local Authority Reports) are consistent with the mitigation already outlined in the EIAR for this proposed development.

4 STATUTORY/PREScribed BODIES

4.1 IRISH WATER

Irish Water’s (IW) submission was in relation to the Youghal Public Water Supply:

“Irish Water notes the proposed development is located upstream 0.65km of the nearby abstraction on the Glendine River for the Youghal Public Water Supply. As stated in the information submitted by the applicant this scheme is sensitive to changes in surface water turbidity and requires manual adjustment based on testing of raw water inflows”.

“While the risks to water quality in the Glendine River and catchment should be fully mitigated, such changes to landuse, soils and drainage patterns cannot fully eliminate the risk of impacts on the public water supply source. The onus on the applicant to ensure appropriate mitigations and measures are in place to protect water availability and quality throughout the life of the development, as well as the liability for additional efforts required to maintain normal supply or to recover from an incident preventing sufficient abstraction”.

It is critical that any and all surface/groundwater sources within proximity are protected from any possible pollution arising from the proposed development and it is an environmental objective of the Water Framework Directive to protect drinking water sources and ensure no additional treatment is required”.

4.1.1 HES Response

The wind farm design team were at all times aware that the Youghal Public Water Supply abstractions existed in the downstream watercourses, and as such, all proposed mitigation and drainage design proposals were designed toward providing a “best in class” drainage management proposal for the proposed development considering the significant catchment sensitivities, particularly the eastern cluster which is only 0.65km upstream of the Glendine River gravity offtake.

HES have good knowledge of the Youghal Public Water Supply. A site visit to the Glendine and Tourig abstractions along with the Boola Water Treatment Plant (elements of the Youghal Public Water Supply) was undertaken in January 2019 during the EIAR scoping and preparation in the company of Ken O’Keefe (engineer) from Cork County Council. HES has always been aware of this water supply and its sensitivities and its operating thresholds.

As described in Section 10.5.2.10 of the EIAR, early-stage design constraint mapping was a key avoidance mitigation measure. The proposed use of a 75m watercourse buffer is 50% wider than the standard 50m buffer that would normally be used in wind farm layout design. For a site where surface water rates are only moderate (compared to high rates in peatland sites),

the 75m buffer would be considered conservative. The 50m buffer has been effectively employed on numerous upland, steeper wind farm sites across the country and therefore the additional protection offered by the increased buffer at the Proposed Development is significant given its more undulating and gentle topography compared to an upland site.

Detailed drainage management design and pollution prevention measures proposed during the construction phase are presented in Sections 10.5.2 and 10.5.3 of the EIAR. These proposals are "best in class" and in line with current best practice approaches for surface water quality protection on wind farm and forestry sites.

In addition to the proposed robust drainage design proposal, a final line of defence can be provided by a water treatment train such as a "Siltbuster" if required. If the discharge water from construction areas fails to be of a high quality then a filtration treatment system (such as a 'Siltbuster' or similar equivalent treatment train (sequence of water treatment processes) will be used to filter and treat all surface discharge water collected in the dirty water drainage system.

Waterford County Council is in favour of the use of "Siltbuster" technology as stated in their submission.

IW's concern in relation to land use changes and alteration to drainage patterns is noted. However, due to the relatively small scale of the proposed development in comparison to the total catchment area upstream of the abstraction locations, the potential for effect is negligible as demonstrated below.

With regard to land use changes, the proposed permanent development footprint is approximately 23.3 ha, representing only <3% of the total development site area of 833 ha. Of the proposed wind farm footprint, approximately 6.4 ha are already in place in the form of existing forestry roads/farm tracks (~27.5% of the proposed development is already existing).

Also, the combined total surface water catchment area upstream of the Glendine River intake and Tourig River intake is almost 50km². Therefore, the proposed development footprint (23.3ha) only accounts for <0.5% of the catchment to the Youghal Public Water Supply. Therefore, the effects of land use change and the potential knock-on effect on existing drainage as a result of the proposed development is negligible even in the absence of mitigation.

The proposed development is located in a forested site where felling (in much larger proportions than those required for the wind farm) will be carried out anyway in the absence of the development.

There are two key elements of the proposed drainage design philosophy regarding mitigating hydrological/drainage effects within the proposed site and in downstream catchments:

- The first key element is to maintain the hydrology/drainage regime of the proposed wind farm site and to prevent changes in surface water flows downstream of the proposed development.
- The second key element is to utilize and integrate with the existing forestry infrastructure where possible, whether it be existing access roads or the existing forestry drainage network. Utilising the existing infrastructure means that there will be less of a requirement for new construction/excavations which have the potential to impact on downstream watercourses in terms of suspended solid input and runoff rates (unless managed appropriately).

The key objectives of the proposed drainage mitigation include:

- Surface water quality protection of downstream river water bodies;
- Prevention of increased downstream flood risk;
- Maintain the baseline hydrology/drainage regime;
- Comply with the WFD requirements; and,
- Protection of downstream receptors (designated sites/drinking water sources).

The drainage management proposals for this site are best in class, and were proposed and designed with the protection of downstream watercourses and water supply sources in mind.

For the above reasons, we consider that the minor landuse changes will not result in significant effects on the hydrological regime within the Glendine River and Tourig River catchments.

4.2 DEVELOPMENT APPLICATIONS UNIT - NPWS

Development Applications Unit (DAU)² submission was in relation to surface water quality effects on the downstream Blackwater River SAC:

“The following potential SAC conservation issues arise from the construction of the proposed wind farm:

- a) Siltation of the Glenaboy River due to uncontrolled runoff or landslides from the excavation of the wind farm infrastructure;*
- b) Impacts on the Glenaboy River due to spills from construction machinery or from acid rock drainage from exposed pyritic or marcasitic rocks in the borrow pit.*

Although the frequency and location of the slope roadway settlement ponds are well-designed, the detailed design of the ponds themselves, and how they will be maintained is not stated in the NIS. In heavy rain events on unvegetated soils, the outflow from a settlement pond can often be breached by silt-laden water and this needs to be avoided where possible”.

4.2.1 HES Response

Proposed development within the Glenaboy River catchment is limited to 1 no. turbine and 1 no. borrow pit. The proposed turbine (T12) is set back more than 75m from the nearest watercourse while the borrow pit is ~300m from the nearest watercourse. Therefore, even in the absence of mitigation (i.e. uncontrolled runoff), the potential for significant effects on the Glenaboy River and downstream Blackwater River SAC is very unlikely.

Nevertheless, robust drainage control measures for access roads, turbine bases/hardstands and borrow pits are provided in Section 10.5.2.2 and Section 10.5.2.4 of the EIAR respectively.

Process flow diagrams detailing the range of drainage control measures at turbine bases/hardstands and borrow pits are attached as **Appendix II**. Any effects on the Glenaboy River will be imperceptible and brief in duration as assessed in Section 10.5.2.2 of the EIAR. No significant effects on the Blackwater River SAC downstream of the Glenaboy River will occur.

The Geotechnical Assessment carried out by Fehily Timoney and Company (included as Appendix 4-2 of the EIAR) concluded that there was no evidence of past failures, nor were there any signs of instability noted on the proposed development site. The geotechnical assessment was based on a walkover survey and several trial pits carried out in the area of T12 and the borrow pit (along with the rest of the proposed site). The site has also been used for

² NPWS are part of the Heritage Division of the Department of Housing, Local Government & Heritage.

forestry (including forestry road construction) for many years without any ground stability issues being reported.

The proposed design detail of the settlement ponds is shown in Drawing no. P1453-0-0121-A1-D501-00A (Appendix 4-6 of the EIAR). The design process with regard to settlement pond sizing is described in Section 2.2 above.

The settlement ponds have been designed to accommodate a 100-year return period rainfall fall event. Therefore, potential breaching of the settlement ponds would only occur during a more extreme weather event (>100-year return period) when flows in the receiving waters (i.e. Glenaboy River) would be at flood levels anyway, and thus turbidity levels would subsequently be naturally high. Runoff from the overall site would also be very high.

The monitoring and maintenance of the proposed drainage system are described in Section 10.5.2.2 of the EIAR:

An inspection and maintenance plan for the on-site construction drainage system will be prepared in advance of the commencement of any works. Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended.

Any excess build-up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed. Checks will be carried out on a daily basis.

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken for each primary watercourse, and specifically following heavy rainfall events (as per the CEMP is included in Appendix 4-4 of this EIAR).

For the reasons outlined above, we have demonstrated that even in the absence of mitigation (which will not be the case), no significant effects on the Blackwater River SAC downstream of the Glenaboy River will occur. Nevertheless, an array of mitigation measures are proposed to protect downstream designated sites.

The matter raised concerning acid mine drainage is addressed in Section 2.4 above.

4.3 INLAND FISHERIES IRELAND

In their submission, Inland Fisheries Ireland (IFI), reiterated (similar to their scoping submission) and emphasised the mitigation required to protect water quality and the downstream aquatic environment.

All of the matters raised are addressed through the comprehensive suite of mitigation outlined in the submitted EIAR.

4.4 AN TAISCE

An Taisce raised no water-related matters in their submission.

5 THIRD-PARTY SUBMISSIONS

5.1 INTRODUCTION

This section deals with third-party submissions. Due to the large number of third-party submissions, which generally have recurring themes, the responses outlined below are by matter of topic, except for our response to the submission by Eco-Hydrological Analysis Ltd where we have provided a direct response to a number of hydrological/hydrogeological matters raised.

The key hydrological matters raised by Eco-Hydrological Analysis Ltd are summarised at the end of their submission under the following headings/topics:

- Hydrological Conditions;
- Hydrogeological Conditions;
- Design;
- Buffer Zones; and,
- Elevated Risk.

A response is then provided to recurring matters that are raised in the other third-party submissions under the following topics.

- Private Well Supplies
- Youghal Public Water Supply
- Landfill Site "Super Dump" Unsuitability
- Substation/Battery Storage Area
- WFD Status Effects
- Flood Risk

5.2 ECO-HYDROLOGICAL ANALYSIS LTD

The key hydrological matters raised by Eco-Hydrological Analysis Ltd are re-written below and a response to each of the matters raised is then provided.

We state at the outset, that the issues raised by Eco-Hydrological Analysis Ltd are nit-picky and extreme worst-case scenarios, and we have addressed the key matters raised. The submitted commentary by Eco-Hydrological Analysis Ltd is at odds with the EIAR reviews and submissions made by Cork County Council, Waterford City & County Council, Irish Water, Inland Fisheries Ireland, and An Taisce.

"Hydrological Conditions #1: The development lies in the catchment of two public drinking water supplies, both of which display high sensitivity to suspended sediment levels. The relationship between suspended sediment levels and hydrological conditions in both catchments has not been adequately demonstrated. (Data only for autumn/winter)".

HES Response to Hydrological Conditions #1

- The proposed development is located within the catchments draining to the abstraction locations for one public water supply scheme, i.e. the Youghal PWS.
- No infrastructure associated with the proposed development occurs in the catchment to the Tallow Public Water Supply. This is clearly stated in the EIAR in Section 10.3.7.1.
- The EIAR addresses all potential significant effects that may arise from the proposed development.
- We have at all times during our EIAR assessment acknowledged the sensitivity of the receiving waters downstream of the proposed development.

- Our sampling was event-based (i.e. following rainfall), so we were specifically trying to understand the seasonal variation in flow and water quality (especially during higher flow events). To imply our approach is inadequate is wholly incorrect and disingenuous;
- It should be noted that in general surface water suspended solid levels are normally higher in Winter (high flow conditions) than during Summer (low flow conditions), therefore the collected autumn/winter data is worst-case.
- We also point out that site-specific sampling and monitoring were completed in January, February, June, September, October, and November (not only in autumn /winter as stated in the submission).
- Considering all of the above, the wind farm drainage design seeks to achieve a design threshold for Suspended Solids at the point of discharge, and this will meet required Surface Water quality and WFD requirements;
- For example, the drainage design will achieve <25mg/L in downstream receiving waters which is compliant with S.I. No. 293/1988: European Communities (Quality of Salmonid Waters) Regulations, 1988, and the overall WFD requirements;
- Wind farm drainage design is based on 100-year return period rainfall depths, and includes an appropriate climate change factor, and also for variability in catchment sizes;
- Wind farm drainage design assumes high sensitivity of downstream receptors regardless of seasonal variations;
- Sufficient information on the local hydrological regime has been gathered to design a robust drainage system for the protection of the Youghal Public Water Supply;
- Both Local Authorities (Cork & Waterford) have assessed the information contained in the EIAR, and neither authority has expressed the concerns raised by Eco-Hydrological Analysis Ltd; and,
- Irish Water has not objected to the proposed development assuming the appropriate mitigation is employed, and that there is no significant alteration of the existing hydrological regime.

For the reasons outlined above, we have demonstrated that the original EIAR assessment is appropriate. We have completed sufficient seasonal monitoring to underpin our EIAR assessment, and the comments made by Eco Hydrological Ltd should be disregarded by the Board.

"Hydrological Conditions #2: Generation and use of much of the hydrological data remains unclear, e.g. flow duration curves".

HES Response to Hydrological Conditions #2

- Presentation of surface water flow measurements and flow duration curves (i.e. in Section 10.3.4 of the EIAR) is for baseline definition purposes only. This is a requirement of the EIAR guidelines. The EIAR guidelines require the definition of the baseline environment for the proposed site, and then to complete the environmental assessment with reference to the defined baseline. The duration curve data presented in the EIAR is taken directly from EPA sources;
- The source of the flow duration data is "Flow Duration Curves for Ungauged Catchments in Ireland" which is a dataset provided by the EPA. We reference these data sources in the EIAR ("*Environmental Protection Agency – "Hydro-tool" Map Viewer (www.epa.ie)*"; and,

- Both Local Authorities (Cork & Waterford) and Irish Water have assessed the information contained in the EIAR, and none of these statutory bodies has expressed the concerns raised by Eco-Hydrological Analysis Ltd.

For the reasons outlined above, we have demonstrated that the original EIAR assessment is correct and substantiated by EPA data sources and that the comments made by Eco Hydrological Ltd are minor, and should be viewed by the Board in that context.

“Hydrological Conditions #3: Approximately 10% of the forest on the proposed development site will be cut. This will affect the hydrological regime on both the Eastern Site and Western Site, with changes around those areas where the hydrological properties of the ground surface have changed most proving greatest”.

HES response to Hydrological Conditions #3

- The felling percentage stated by Eco-Hydrological Analysis Ltd is incorrect;
- Proposed felling accounts for only 6.6% (45.6ha) of the existing forestry (~690ha);
- Felling is split between the two blocks of the proposed site. Eastern block and western block of wind farm amounts to 33 and 12.6ha of felling respectively;
- Felling is also split between three sub-catchments (the Glendine River, the Tourig River and the Glenaboy River) which further reduces the potential for downstream effects;
- Felling at the western block is sub-threshold with regard a felling licence (<25ha);
- Felling at the eastern block is slightly above the felling licence threshold level;
- Felling is largely linear in layout and is distributed throughout the site in a non-block/compartment fashion which also significantly reduces the potential for hydrological effects;
- The felling will be carried out over a period of months, not days/weeks which will also significantly reduce the potential for downstream surface water quality effects;
- The existing landuse at the proposed Wind Farm site is mainly forestry, and felling will occur whether the wind farm development is permitted or not;
- The proposed felling area accounts for <1% of the total catchment area to the Youghal Public Water Supply intake (Glendine and Tourig combined);
- Our assessment is based on the existing site context (forestry land use), and the scale and location of the proposed layout relative to each sub-catchment. In all catchments, the scale of proposed works relative to the overall catchment size is negligible; and,
- Impacts from forestry felling are assessed in the EIAR at Section 10.5.2.1, and conclude that with the implementation of standard forestry mitigation, along with a felling licence application and associated implementation of conditions of the felling licence, the impacts will be imperceptible.

For the reasons outlined above, we have demonstrated that the original EIAR assessment is correct and substantiated by quantification and that the comments made by Eco Hydrological Ltd are incorrect and minor, and therefore should be viewed by the Board in that context.

“Hydrological Conditions #4: The loss of forestry and changing of ground surface conditions will increase peak runoff. The impact of this change on flow and water quality in receiving water bodies has not been specified, despite potentially affect both stream ecology and drinking water quality”.

HES response to Hydrological Conditions #4

- The potential for increased site runoff due to wind farm hardstand emplacement was assessed in Section 10.5.3.1 of the EIAR;

- Even in the absence of drainage control measures (which will not be the case) the potential for increased site runoff is calculated to be very small (~4%);
- The proposed permanent development footprint is approximately 23.3 ha, representing only <3% of the total development site of 833 ha;
- Approximately 6.4 ha of hardstand (~27.5%) is already in place in the form of existing roads;
- Proposed felling accounts for <1% of the combined catchment to the Youghal Public Water Supply intake;
- The proposed development footprint accounts for <0.5% of the catchment to the Youghal Public Water Supply intake; and,
- The potential for significant hydrological effects on the downstream catchment simply does not exist even in the absence of mitigation measures.
- The purpose of the EIAR is to assess potential significant effects. The potential changes to hydrology have been assessed as insignificant, just based on land take areas alone. No further analysis or quantification is required.

For the reasons outlined above, we have demonstrated that the original EIAR assessment is correct based on the actual risks posed, and therefore the comments made by Eco Hydrological Ltd are minor, and should be viewed by the Board in that context.

Hydrogeological Condition #1: The change has the potential to reduce recharge and diminish base flow in the headwaters of the streams draining the area. The loss of flow and associated change in water quality may impact aquatic ecology.

HES response to Hydrogeological Conditions #1

- The above statement is completely unfounded from a hydrogeological point of view;
- All rainfall (potential recharge) intercepted by the development footprint is released back onto the site ground surface in a diffuse, regular manner and close to the point of capture. Captured rainwater/runoff will be allowed to dissipate and infiltrate/recharge into the ground naturally;
- There will be no direct discharge of development footprint runoff into local watercourses and therefore there will be no alternation of surface water/groundwater interactions/runoff or reduction in recharge potential;
- The area of the proposed development footprint is very small in the context of the wider landholding, therefore the ability to generate impact needs to be considered in terms of scale and context; and,
- Based on the GSI groundwater body description (see text below), groundwater baseflow (from the rock type underlying the site) is not significant in sustaining surface water flows during dry periods:

“Groundwater will discharge locally to streams and rivers crossing the aquifer and also to small springs and seeps. Owing to the poor productivity of the aquifers in this body it is unlikely that any major groundwater - surface water interactions occur. Baseflow to rivers and streams is likely to be relatively low” – (GSI, 2004)³.

- The purpose of the EIAR is to assess potential significant effects. The potential changes to recharge are assessed as insignificant (refer to Sections 10.3.2, 10.3.9 & 10.5.3.1). No further analysis or quantification is required.

³ Geological Survey of Ireland (2004) Glenville GWB: Summary of Initial Characterisation

For the reasons outlined above, we have demonstrated that the comment/concerns raised by Eco Hydrological Ltd are already addressed in the submitted EIAR, and the potential for impact of the sort described is insignificant in the context of the overall landholding and underlying geology, and as such the issue raised should be viewed by the Board in that context.

“Hydrogeological Conditions #2: Many of the comments made concerning how proposed development of the site will affect the groundwater are speculative, and not supported by site specific data-notably the absence of groundwater level data”.

HES response to Hydrogeological Conditions #2

- Due to the nature of wind farm developments, being near surface construction activities, impacts on groundwater are generally negligible and surface water is generally the main sensitive receptor investigated during impact assessments;
- The above point is not speculative, but is based on experience from over 100 constructed windfarms that HES has had involvement with across Ireland;
- Wind farms do not have the potential to alter the local hydrogeology regime in any significant manner;
- The assessed effects in the EIAR are not speculative, but weighted accordingly for a proposed development that is largely built at or close to ground level;
- The purpose of the EIAR is to assess potential significant effects;
- The primary risk to groundwater at the site would be from cementitious materials, hydrocarbon spillage and leakages. These are common potential impacts on all construction sites (such as road works and industrial sites);
- Turbine base depths are typically 3-4m below ground level and even in a shallow groundwater table scenario (which is not the case at the proposed site based on the trial pitting data⁴), the potential for the turbine structures to affect the groundwater flow regime would be negligible and limited to a very brief period (if any) over the construction phase when short term dewatering of excavations might be required;
- Also, the topographical and hydrogeological setting of the proposed borrow pit locations means no significant groundwater dewatering will be required as described below;
- The proposed borrows pits are relatively shallow excavations on the side of hills/elevated ground;
- The groundwater flow paths (i.e. the distance from the point of recharge to the point of discharge) in the underlying mapped sandstone/mudstone bedrock typically is short, localised, and will also be relatively shallow;
- Thereby, no regional groundwater flow regime, i.e. large volumes of groundwater flow, will be encountered at the proposed borrow pit excavations;
- Moreover, direct rainfall and surface water runoff will be the main inflows that will require pumping and water quality management; and,
- Any effects on groundwater levels/flow regimes will be brief, temporary, reversible and localised to excavation locations.

In summary, our assessment regarding the potential effects on the local groundwater regime is not speculative but based on relevant scientific data and also our experience as hydrogeologists working on numerous energy developments across the country and in hydrogeological conditions that are similar to those that exist at the proposed Lyrenacarriga WF site. As such, for the reasons outlined above, we have demonstrated that the original EIAR assessment (on groundwater regime and supplies and wells) is adequate and appropriate to the actual risks posed.

⁴ Groundwater was encountered in TP06, but this location is remote from any proposed wind farm infrastructure.

Design #1: Tracking the release of sediment to surface water has been proposed through a series of generic design of dams, culverts and settling ponds located around the site, and contained in drawings accompanying the planning application, but not the EIAR.

Design #2: The dimensions of these features does not appear to vary, despite their contrasting settings (catchment areas, topography), nor has this variation been specified in the application.

Design #3: The risk of the proposed sediment management measures becoming overwhelmed and failing to prevent significant sediment loss to water courses has not been presented in either EIAR or NIS documentation.

HES response to Design #1 to Design #3

- Refer to the response to NPWS comments outlined in Section 2 above.
- Drainage drawings are site-specific and are referenced in the EIAR as Appendix 4-6.
- Settlement ponds will be sized based on design rainfall depths and surface area/catchments;
- Settlement pond size will be based on a 100-year return period event including climate change;
- Overwhelming of settlement ponds are possible during extreme events (>100-year return period), but downstream watercourses will already be in flood conditions and turbidity levels/sediment loads will be naturally elevated;
- In such extreme weather events (>100-year return periods), surface water runoff from all parts of the proposed development site will be high and most likely be elevated in turbidity (as will all of the catchment outside the development footprint); and,
- Regular monitoring and drainage inspections (as outlined in the EIAR) will ensure sediment trap/holding areas (i.e. check dams/settlement ponds etc) will be free of sediment build-up in advance of any forecasted extreme weather event.

The design of the settlement ponds was provided as part of the detailed drainage plans which accompanied the EIAR. The plans are site-specific and reflect the hydrological conditions at the proposed development site. As mentioned above, the settlement ponds are a part of a series of water quality protection mitigation measures proposed for the site. We trust our response above reflects these details and also demonstrates the detailed consideration of drainage controls and water quality protection presented in the EIAR.

“Buffer Zone #1: Despite the application of the 75m buffer zone around water courses, many of the sediment management features are located within the buffer zones, in some cases less than 50m from a watercourse”.

“Buffer Zone #2: Discharge from sediment traps in water course buffer zones are surrounded by silt fences. Again, the risk of silt fence failure has not been specified”.

HES Response to Buffer Zone #1 – Buffer Zone #2

- The purpose of the 75m buffer zone is to maintain setback distance for infrastructure such as turbines, borrow pits, the substation etc along with new access roads where possible;
- Water released within buffer zones will have already passed through check dams, settlement ponds and buffered outfalls and therefore will be of good quality;

- Silt fences are only a minor component of the overall treatment train (check dams, settlement ponds, buffered outfalls, silt fences and vegetation filters) and the failure of a silt fence will not compromise the protection of downstream waters; and,
- Regular monitoring and drainage inspections (as outlined in the EIAR) will ensure the upkeep and efficiency of the proposed drainage control measures.
- This issue (encroaching into buffer zones) is raised on numerous occasions by third-party submissions on wind farm development. The purpose of buffer zones is misunderstood. Similar to any linear development (such as motorways or gas lines), there have to be stream and river crossings. In order to limit impacts, there has to be surface water management and controls close to streams and rivers.
- The identified buffer zones serve a number of purposes:
 - They are never intended to be a complete exclusion zone (as stated watercourse crossings are required).
 - They ensure all proposed significant infrastructure (turbine bases, substations, borrow pits etc) are located remote from sensitive watercourses.
 - They provide the separation from key infrastructure to ensure there is adequate space (between the infrastructure and the watercourses) to install appropriate drainage controls.
 - They identify clearly on the drainage drawings for the proposed development where sensitive watercourses are located.

The concerns raised by Eco Hydrological Ltd regarding buffer zones show a lack of understanding of the proposed drainage design for the WF development. Based on the reasons outlined above we consider that this issue has been appropriately explained and addressed.

“Elevated Risk #1: The sediment management strategy relies on vegetation to trap sediment and prevent it reaching watercourses. In the absence of vegetation (in some cases yet to grow), there exists a heightened risk of sediment contamination”.

HES Response to Elevated Risk #1:

- Elevated Risk #1 statement is completely misinformed and shows a lack of understanding of the wind farm drainage proposal;
- Vegetation filters are not intended to be a single or primary treatment component for the treatment of works area runoff. They are not stand alone but are intended as part of a treatment train of water quality improvement/control systems (i.e., source controls→check dams→silt traps→settlement ponds→silt fences→vegetation filters) that will be applied in series to ensure the protection of downstream watercourses. Refer to the process flow diagrams in **Appendix II** attached for water treatment trains for all elements of the proposed development.
- Vegetation filters are essentially end-of-line polishing filters that are located at the end of the treatment train. Vegetation filters are ultimately a positive consequence of not discharging directly into watercourses which is one of the mitigation components of the drainage philosophy.
- This makes use of the natural vegetation of the site to provide a polishing filter for the wind farm drainage before reaching the downstream watercourses.

Elevated Risk #2: Outflows from sediment traps onto formerly afforested areas have an elevated risk of contaminating water courses, even outside buffer zones, due to the presence of existing artificial drains linked to prior forestry, which act as preferential flow paths to receiving water courses”.

HES Response to Elevated Risk #2:

- Existing artificial forestry drains are widespread at the site whether the area is forested, afforested or deforested;
- The interaction with the existing forestry drainage is a key component of the drainage design and this interaction is described in Section 10.5.2.2 of the EIAR and presented again below for ease of reference;
- Existing artificial forestry drains are indeed the primary pathway/preferential flowpath to downstream waters and this has been accounted for in the drainage design; and,
- The main elements of interaction with existing drains will be as follows:
 - Apart from interceptor drains, which will convey clean runoff water to the downstream drainage system, there will be no direct discharge (without treatment for sediment reduction, and attenuation for flow management) of runoff from the proposed wind farm drainage into the existing site drainage network. This will reduce the potential for any increased risk of downstream flooding or sediment transport/erosion;
 - Silt traps will be placed in the existing drains upstream of any streams where construction works/tree felling is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area;
 - Runoff from individual turbine hardstanding areas will be not discharged into the existing drain network but discharged locally at each turbine location through stilling ponds and buffered outfalls onto vegetated surfaces;
 - Buffered outfalls which will be numerous over the site will promote percolation of drainage waters across vegetation and close to the point at which the additional runoff is generated, rather than direct discharge to the existing drains of the site; and,
 - Drains running parallel to the existing roads requiring widening will be upgraded, and widening will be targeted to the opposite side of the road. Velocity reducing and silt control measures such as check dams, sandbags, oyster bags, straw bales, flow limiters, weirs, baffles, and silt fences will be used during the upgrade construction works. Regular buffered outfalls will also be added to these drains to protect downstream surface waters.

Again, the concerns raised by Eco Hydrological Ltd regarding vegetation filters and drainage outfalls show a lack of understanding of the proposed drainage design for the development. For the reasons outlined above, we consider that these issues raised have been appropriately explained and addressed.

5.3 RESPONSES TO RECURRING MATTERS/TOPICS RAISED BY 3RD PARTIES

PRIVATE WELL SUPPLIES

As outlined in the EIAR due to the nature of wind farm developments, being near surface construction activities, impacts on groundwater are negligible and surface water is generally the main sensitive receptor assessed during impact assessments. The primary risk to groundwater at the site would be from cementitious materials, hydrocarbon spillage, and leakages. These are common potential impacts on all construction sites (such as road works and industrial sites). All potential contamination sources will be carefully managed at the site during the construction, operational, and decommissioning phases of the development, and mitigation measures are proposed below to deal with these potential minor impacts.

The potential risk to local wells was also assessed in the EIAR based on the characteristics of the underlying mapped bedrock (sandstone/mudstone) aquifer which is described in the GSI Glenville Groundwater Body Report (GSI, 2004)⁵. In Chapter 10, Section 10.3.8 of the EIAR the following is referenced from GSI Glenville Groundwater Body Report (GSI, 2004).

“The ORS rocks have no intergranular permeability. Groundwater flow occurs in faults and joints which vary in presence and frequency. Most groundwater flow probably occurs in an upper shallow weathered zone. Below this in the deeper zones water-bearing fractures and fissures are less frequent and less well connected. The water table is generally within 10 m of the surface. Groundwater in this GWB is generally unconfined. Local groundwater flow is towards the rivers and streams, and flow paths will not usually exceed a few hundred metres (200-300m) in length.

Owing to the poor productivity of the aquifers in this body it is unlikely that any major groundwater-surface water interactions occur. Baseflow to rivers and streams is likely to be relatively low”.

Based on the hydrogeological conceptual model of the site, the potential impact on local wells was assessed in Chapter 10, Section 10.3.15 of the EIAR. The approach was described as follows:

“The private well assessment undertaken assumes the groundwater flow direction underlying the site mimics topography, whereby flow paths will be from topographic high points (i.e. top of a hill) to lower elevated discharge areas at local streams/rivers. This is consistent with the groundwater body conceptual model as reported by the GSI (2004).

Using this conceptual model of groundwater flow, dwellings that are potentially located down-gradient of the footprint of the Proposed Development are identified and an impact assessment for these actual and potential well locations is undertaken if required.

Based on the above approach no private dwelling houses were identified to be located down-gradient (i.e. downslope) of the proposed wind farm infrastructure (and, in particular, turbine and borrow pit locations where deeper excavations are required) and therefore there is no potential to impact on groundwater supplies. This assessment was focused on the turbine locations and borrow pits as this is where the deepest excavations will be required. All excavations required for roads, compounds, substation, met mast and cabling will be relatively shallow (~1.2m) and therefore have no potential to impact on groundwater supplies.”

The closest private dwellings (assumed private well location) downslope of the proposed infrastructure is at least 500m away. This is at least 1.5 times the expected groundwater flow path distance (i.e., 200 - 300m) for this aquifer type. Therefore, the potential for the proposed development (even in the absence of the proposed pollution prevention mitigation measures) to impact on local groundwater wells/supplies near the site is extremely low as the pathways for potential contaminants does not exist.

Similarly, an excavation of 3 -4m in depth simply does not have the potential to alter the groundwater level in a well over 500m away.

The potential impact on local groundwater wells was thoroughly assessed in the EIAR. This assessment was based on the properties of the underlying bedrock aquifer and the location of the nearest wells.

⁵ Geological Survey of Ireland (2004) Glenville GWB: Summary of Initial Characterisation

Therefore, to summarise:

- The site is underlain by an aquifer of relatively low productivity as stated by the GSI (sandstone/mudstone);
- Groundwater flowpaths are therefore typically short (~200 - 300m maximum);
- Consequently, the majority of groundwater flows within the site emerge as springs/baseline along streams/rivers and leave the site as surface water flows and not groundwater flows as stated by the GSI;
- Therefore, the potential to impact on local wells (whether they are downslope or not) is very low as groundwater flowpaths between the proposed development infrastructure and local wells typically do not exist due to the large setback distance (>500m);
- Nevertheless, mitigation is provided in the EIAR to deal with potential construction phase groundwater hazards such as oils and fuels; and,
- Therefore, based on our hydrogeological assessment of the site with regard to groundwater user risk and the proposed mitigation measures, we can say the potential to impact on local wells/water supply sources is negligible.

The purpose of the EIAR is to assess likely significant effects. We are satisfied, based on the prevailing hydrogeological conditions at the proposed development site, that the assessment presented in the EIAR that the potential to impact groundwater quality or quantity remote from the proposed development site is imperceptible, is a valid and appropriate assessment for the site.

YOUGHAL PUBLIC WATER SUPPLY

The potential impacts of the proposed development on the Youghal Public Water Supply were assessed in Section 10.5.2.10 of the EIAR. A response to the Irish Water submission on the matter of the Youghal Public Water Supply is also provided in Section 4.1.1. above. As outlined above (In Section 3 and Section 4.1) neither Irish Water nor the two Local Authorities are objecting to the proposed development, but they do emphasise the importance of mitigation in order to prevent impacts on the supply. We agree with this emphasis, and all mitigation as described in the EIAR will be implemented.

A third-party submission by Mr Thomas Morley also highlights the sensitivity of the Youghal Public Water Supply with regard to sediment. However, as previously mentioned, the wind farm design team was at all times aware that the Youghal Public Water Supply abstraction is a key downstream receptor. Please refer to Section 3.1 above which illustrates that Cork County Council (Operators of the Youghal Water Supply) have no objections on environmental grounds to the proposed development. In addition, to the proposed robust drainage design proposal, a final line of defence can be provided by a water treatment train such as a "Siltbuster" if required. Waterford County Council has suggested the use of "Siltbuster" technology as stated in their submission.

The submission by Paddy Massey, which included video footage of drainage at the proposed substation, argues that the proposed location of the substation is a wetland area and its construction at this location poses a risk to Youghal Public Water with regard to surface water quality effects. However, trial pits carried out at the substation location in May 2020 identified ground conditions similar to the rest of the proposed wind farm site (i.e. Devonian derived glacial till). Some surface water drainage was noted at ground level, but below ground level, no groundwater inflows were recorded as would most likely not be the case if it were a wetland setting. The proposed drainage design and setback distance (75m) from the Glendine headwater stream will ensure the protection of the Youghal drinking water abstraction and its associated drainage catchment. In simple terms, what Paddy Massey has highlighted is the exact type of scenario the proposed drainage design is intended to deal with. Therefore, this issue has been accounted for within the submitted application and EIAR.

LANDFILL SITE “SUPER DUMP” UNSUITABILITY

A number of the third-party submissions cite the decision not to proceed with the development of a municipal landfill “Super Dump” in the area of the proposed wind farm site (due to site unsuitability/water contamination risks) as a reason to also refuse the proposed wind farm development.

There is no comparison to be made between the risks posed by a municipal landfill and a proposed wind farm development.

Assessment and mitigation for receiving water protection for the proposed wind farm site are robustly dealt with in the EIAR.

SUBSTATION/BATTERY STORAGE AREA & ENVIRONMENTAL RISK

There is a potential for mechanical failures and fires in any given energy generation facility/industrial facility in the absence of regular maintenance and checks. However, mechanical/technical failure and fires at substations/battery storage areas are very rare.

The proposed wind farm development will be subject to routine/preventative maintenance throughout its operational life which will significantly reduce the risk of mechanical failure or fires from occurring (e.g. resulting in potential leakage of lubricating oil / hydraulic fluid or contaminated fire water).

There will also be an Operational Phase Emergency Response Plan (Section 6 of the Construction Environmental Management Plan) in place which can rapidly deal with any spillages/leaks/fires that might occur as a result of an unlikely mechanical failure. This will include the use of booms and spill kits that can contain and remove any spills that might occur.

The risk posed by the failure of a substations/battery storage area to surface water or groundwater quality is extremely low.

POTENTIAL EFFECTS ON WFD STATUS

A WFD assessment is included in **Appendix III** to determine if any specific components or activities associated with the proposed wind farm development will compromise WFD objectives or cause a deterioration in the status of any surface water or groundwater body and/or jeopardise the attainment of good surface water or groundwater status.

Strict mitigation measures (refer to Section **Error! Reference source not found.** and **Error! Reference source not found.** of the EIAR and also detailed in this submission) in relation to maintaining a high quality of surface water runoff from the development and groundwater protection will ensure that the proposed development will not impact upon any surface water or groundwater body as it will not cause a deterioration of the status of the body and/or it will not jeopardise the attainment of good status.

With regard to treatment standards, the drainage system has been designed to achieve compliance with surface water Environmental Quality Standards (EQS) in the downstream receiving waters. The details of the monitoring, to ensure this compliance, are included in Section 4 of the Construction and Environmental Management Plan (CEMP). The CEMP is included in Appendix 4-4 of the EIAR.

The application of the drainage management as outlined will ensure compliance with EU Surface Water Regulations and WFD requirements while also maintaining the baseline hydrology of the site.

As such, the proposed development is compliant with the requirements of the Water Framework Directive (2000/60/EC), as amended.

POTENTIAL EFFECTS ON FLOOD RISK

The proposed development site is in an elevated area, its flood risk is reduced by the prevailing ground slope, drainage density, and runoff rates. It is not intended to change these prevailing conditions, and the proposed wind farm development intends to mimic the prevailing hydrology as much as possible and provides attenuation and water treatment proposals where required.

It is a key mitigation of the proposed wind farm development to preserve and protect all existing watercourses by ensuring all surface water runoff is treated (water quality control) and attenuated (water quantity control) prior to diffuse discharge at pre-existing Greenfield rates. As such the mechanism by which downstream flooding is prevented and controlled is through avoidance by design.

It also should be noted that the Area Engineer from Cork Co. Co. has no concerns with regard to the proposed drainage:

"There are no objections to the proposals regarding site drainage and attenuation measures".

We are confident that the proposed drainage design will remove any risk of increased downstream flooding as acknowledged by Cork Co. Co.

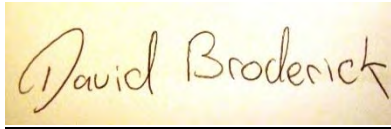
6 SUBMISSION SUMMARY

- A robust and detailed EIAR for the proposed wind farm development was submitted with the SID application. This included a detailed drainage plan.
- We have comprehensively responded to and addressed all matters raised by the Board, and by Statutory Bodies and third-party submissions.
- Both Local Authorities (Cork & Waterford) and Irish Water have assessed the water-related information contained in the submitted EIAR, and all of these statutory bodies recommend the implementation of the water-related mitigation outlined in the EIAR.
- As outlined, at all times during the preparation of the EIAR we were conscious of the requirements to protect water quality in the Glendine and Tourig catchments, both from a water supply and a WFD compliance perspective.
- There is significant water related mitigation outlined in the EIAR to ensure that water quality protection is upheld.
- All (water-related) mitigation as outlined in the EIAR will be implemented.
- We have comprehensively addressed the matters raised in the DAU submission relating to:
 - Settlement pond structure and design;
 - Potential for acid mine drainage; and,
 - Protection of hydrology and water quality in the Glenaboy River which drains to the Blackwater River SAC.
- We consider that the hydrological/hydrogeological matters presented in the Eco-Hydrological Analysis Ltd's submission has limited substance or scientific basis. We have thoroughly responded to and addressed any relevant matters raised; and,
- Other third-party concerns relating to surface water quality, drinking water quality, groundwater well sources, and flood risk are also addressed. All of these third-party concerns are assessed in the submitted EIAR, and appropriate mitigation measures will be applied where required.

7 CLOSURE

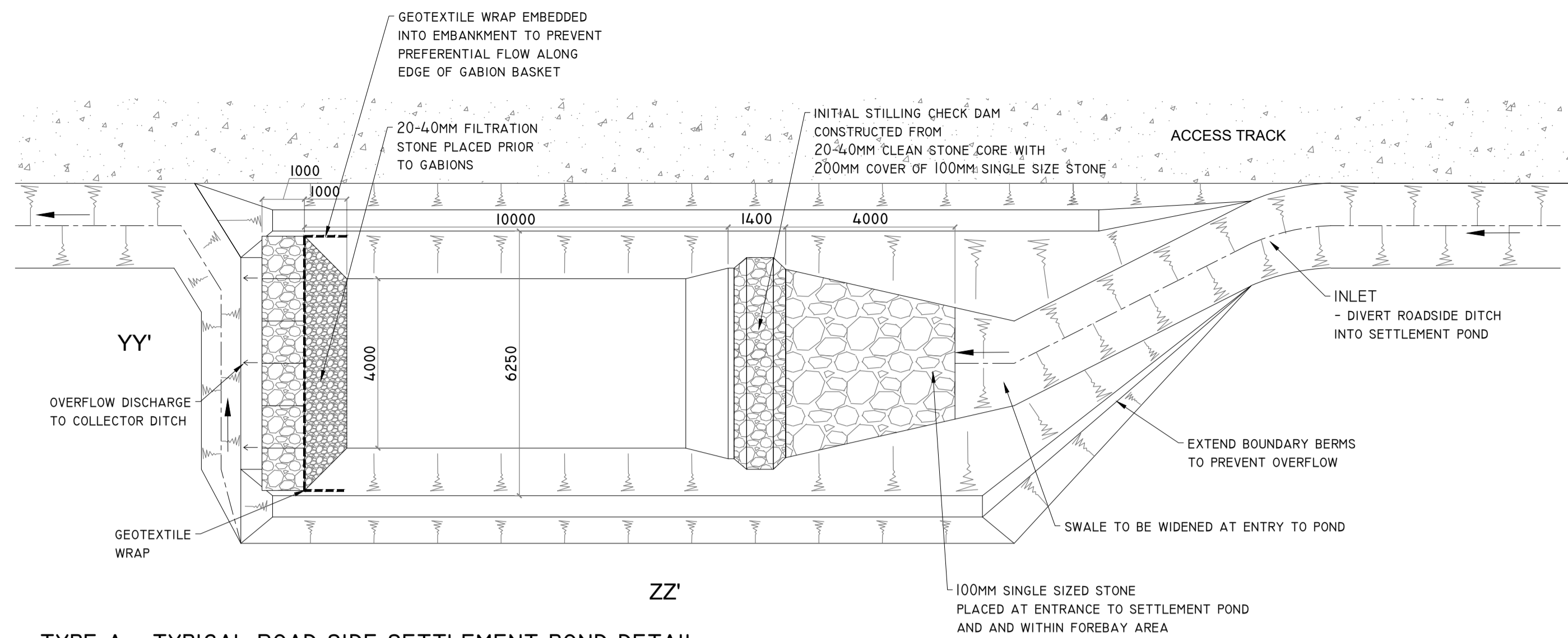
We trust the above response meets your requirements. Please contact the undersigned if you have any questions regarding the above.

Yours sincerely,

A rectangular image showing a handwritten signature in black ink on a light-colored, slightly textured background. The signature reads "David Broderick" in a cursive, slightly slanted script.

David Broderick
Hydrogeologist
B.Sc., H. Dip Env Eng. MSc

APPENDIX I: UPDATED Drawing P1453-0-0121-A1-D501-00B



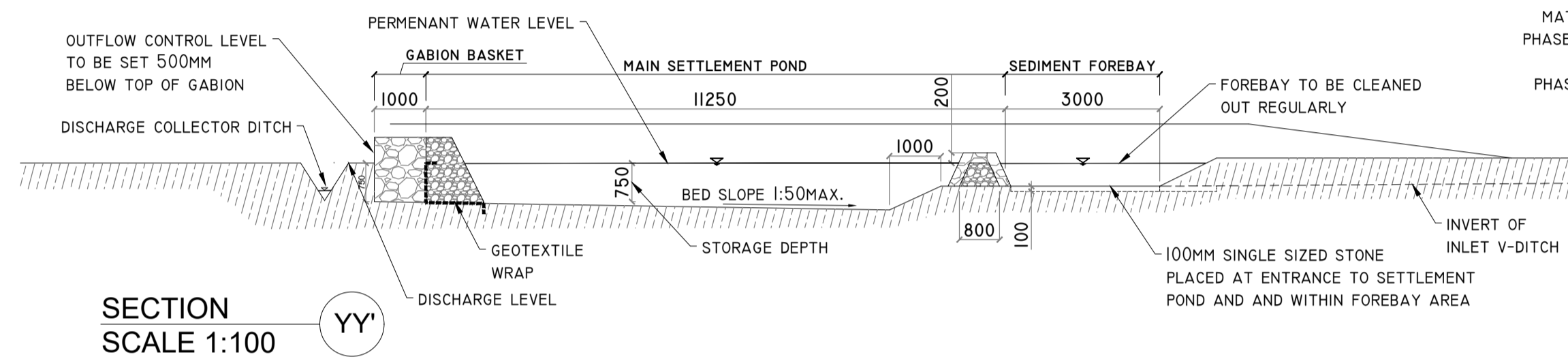
TYPE A - TYPICAL ROAD SIDE SETTLEMENT POND DETAIL
SCALE 1:200 (NOTE DIMENSIONS VARY DEPENDING ON CATCHMENT SIZE - SEE ATTACHED TABLE)

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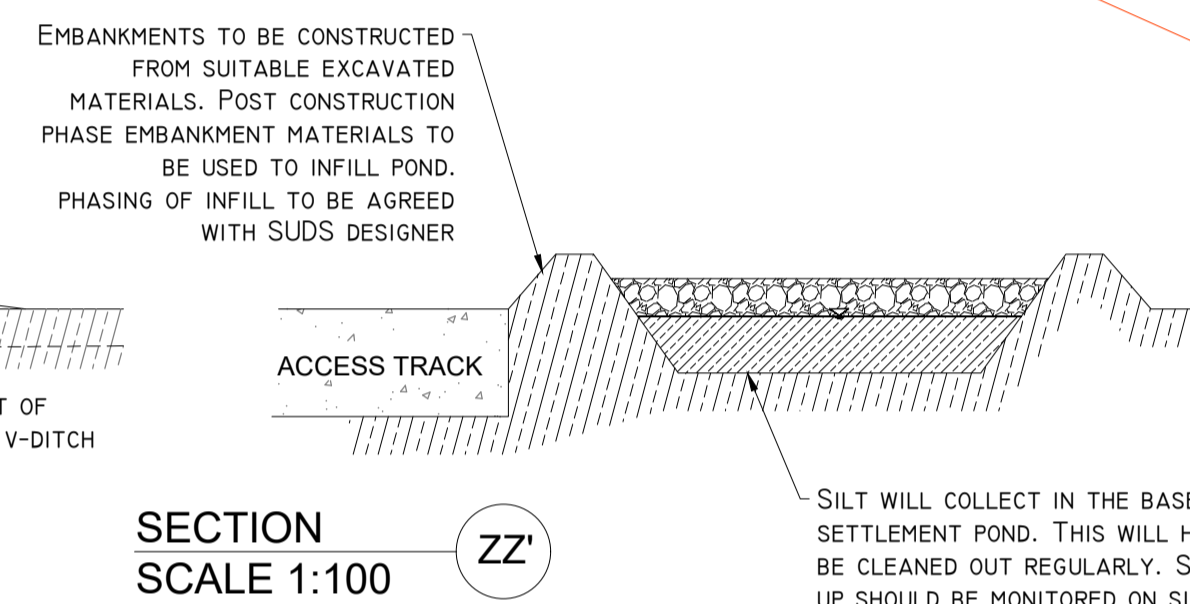
DETAIL A1

RETURN PERIOD	POND SIZE W [M] x L [M] x D [M]			CATCHMENT SIZE (M ²)		
	50 YRS	STORM DURATION		500	1000	2000
6HR RETENTION FOR COARSE SILT	6 HRS			2.8 x 9 x 1 M	4 x 13 x 1 M	5.7 x 18 x 1 M
11HR RETENTION FOR MEDIUM SILT	12 HRS			3.2 x 10 x 1 M	4.5 x 14 x 1 M	6.4 x 20 x 1 M
24HR RETENTION FOR FINE SILT	24 HRS			3.5 x 11 x 1 M	5 x 16 x 1 M	7 x 22 x 1 M

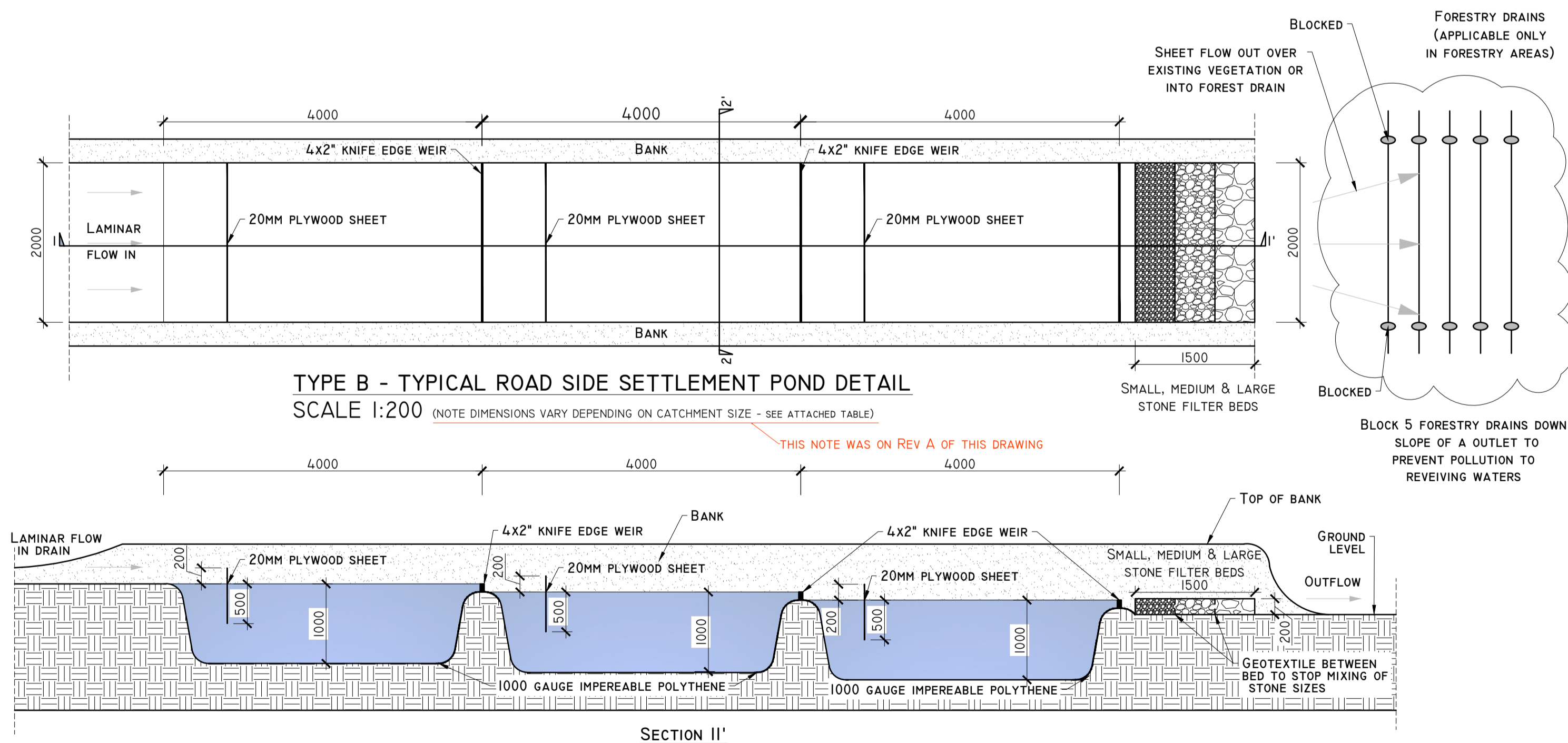
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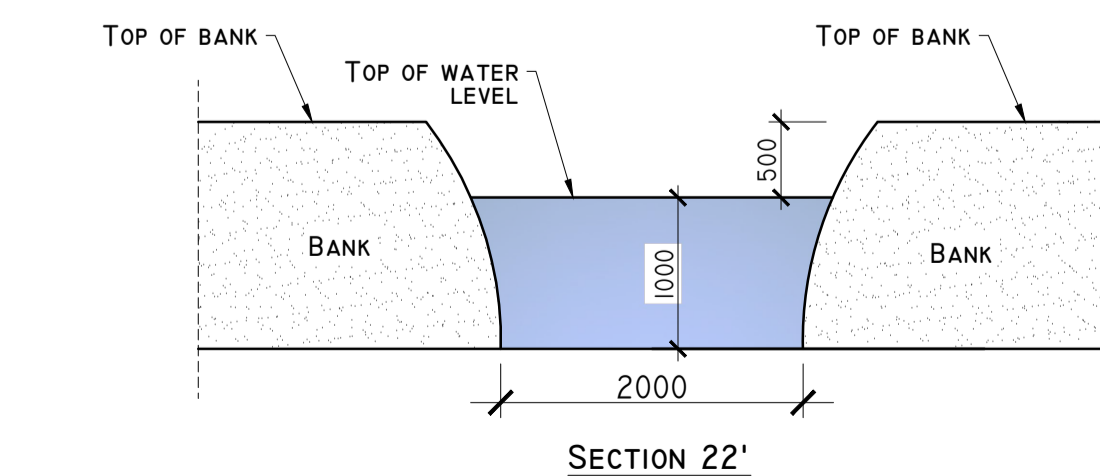


SECTION ZZ'
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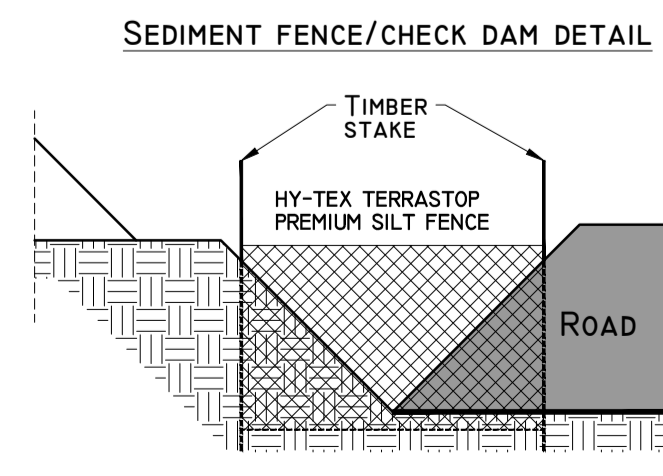


TYPE B - TYPICAL ROAD SIDE SETTLEMENT POND DETAIL
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SECTION 22'



DETAIL A2

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Date	Description	Chkd	Signed

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Job: **LYRENACARRIGA WF, CO. WATERFORD/CO. CORK**

Title: **DRAINAGE DETAILS 1**

Figure No: **D501**

Drawing No: **P1453-0-0922-A1-D501-00B**

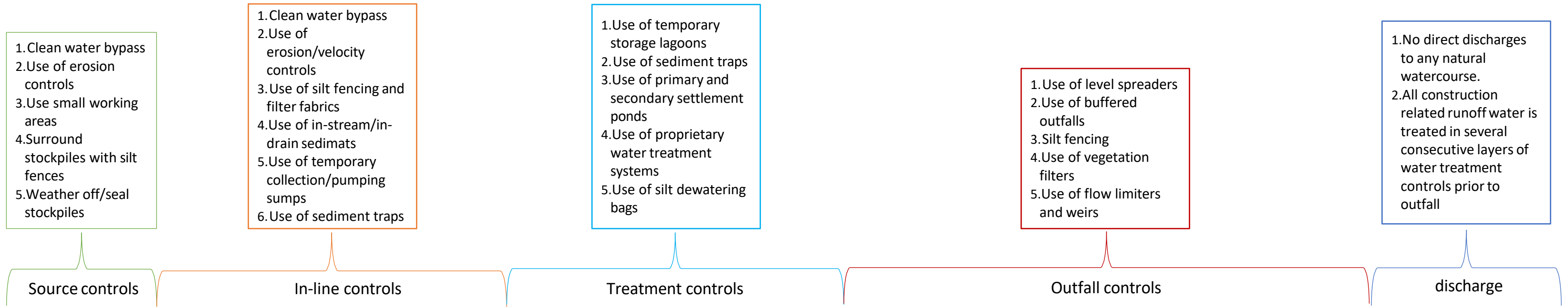
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Scale: **as shown (A1)** Drawn By: **MG/GD**

Date: **07/09/2022** Checked By: **M.G.**

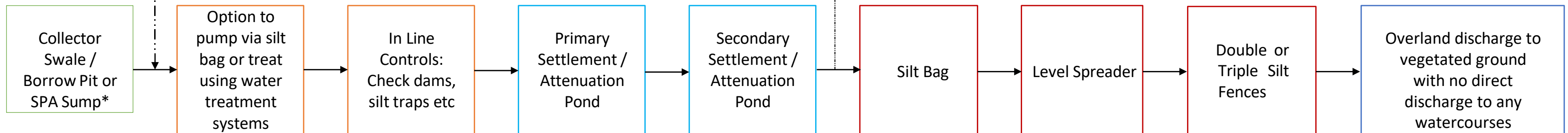
APPENDIX II: Drainage Process Flow Diagrams

Water Management at Proposed Borrow Pits/Spoil Storage Areas



Clear Water By-Pass of development footprint

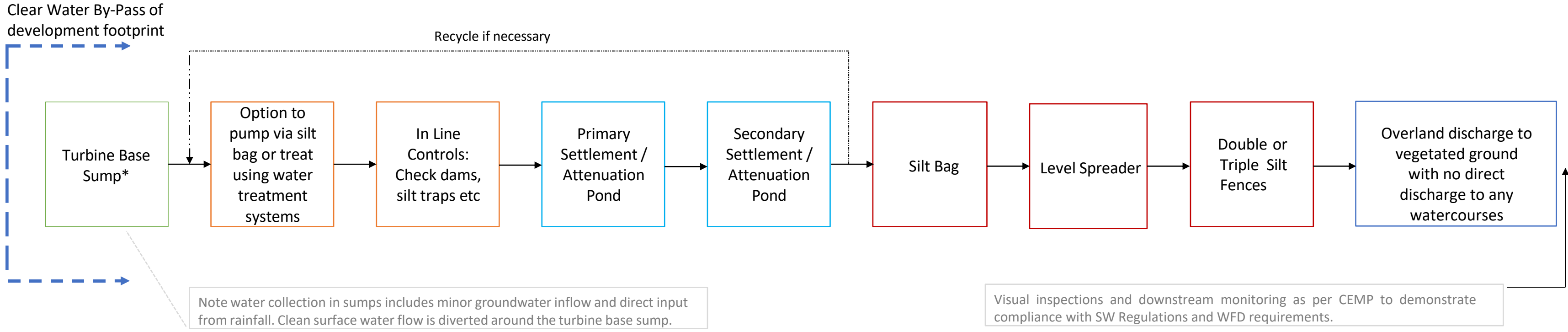
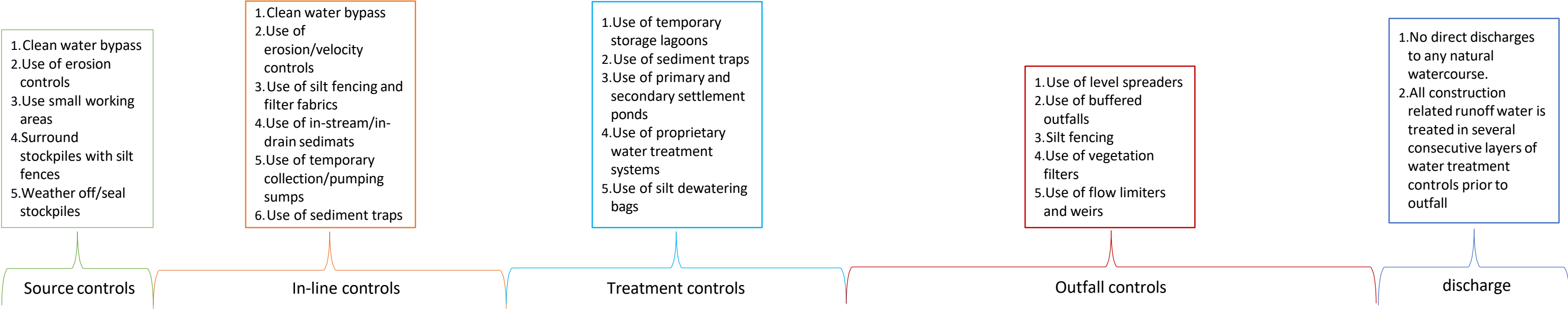
Recycle if necessary



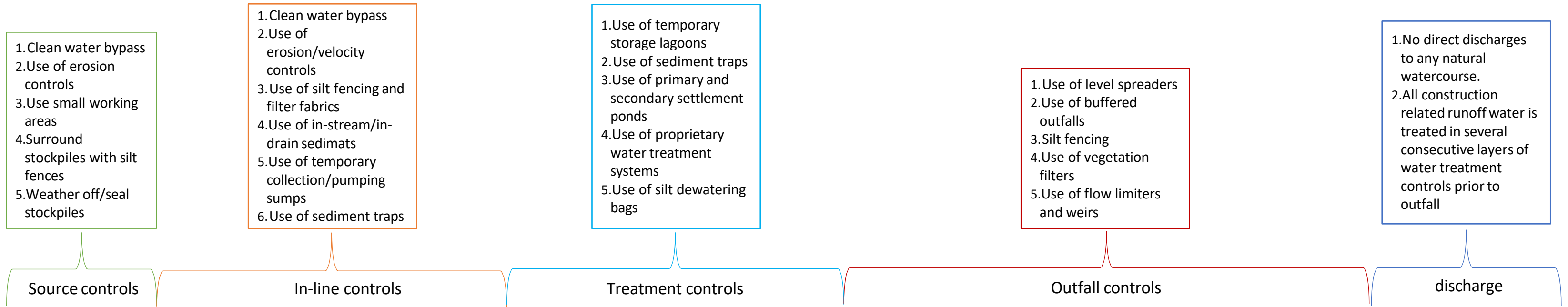
Note water collection in borrow pits includes minor groundwater inflow and direct input from rainfall. Clean surface water flow is diverted around borrow pits.

Visual inspections and downstream monitoring as per CEMP to demonstrate compliance with SW Regulations and WFD requirements.

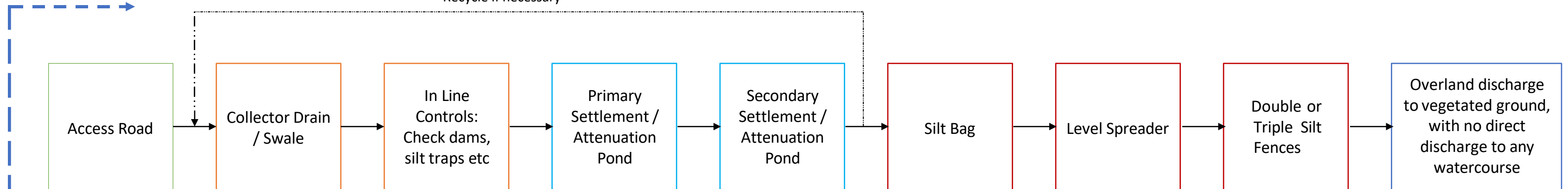
Water Management at Proposed Hardstand/Turbine Bases



Water Management at Proposed Access Roads



Clear Water By-Pass of development footprint

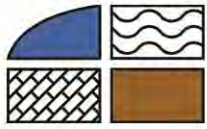


Note: water collection from access road sumps includes surface water runoff and direct input from rainfall. Clean surface water flow is diverted around the access roads.

Note: the majority of discharges are >75m from natural watercourses, but where existing or new stream/river crossings are proposed, there will be localised overland discharges within the buffer zones, but these will be separated from the watercourses by double silt fencing.

Visual inspections and downstream monitoring as per CEMP to demonstrate compliance with SW Regulations and WFD requirements.

APPENDIX III: WFD Compliance Report



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**WATER FRAMEWORK DIRECTIVE ASSESSMENT
PROPOSED LYRENACARRIGA WIND FARM, CO. WATERFORD & CORK**

FINAL REPORT

Prepared for:

MKO

Prepared by:

HYDRO-ENVIRONMENTAL SERVICES

DOCUMENT INFORMATION

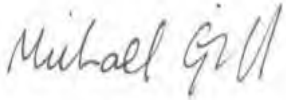
Document Title:	WATER FRAMEWORK DIRECTIVE ASSESSMENT PROPOSED LYRENACARRIGA WIND FARM, CO. WATERFORD & CORK
Issue Date:	08th September 2022
Project Number:	P1453-1
Project Reporting History:	P1453-1
current revision no:	FINAL_REV D1
Author:	MICHAEL GILL DAVID BRODERICK CONOR MCGETTIGAN
Signed:	 Michael Gill B.A., B.A.I., M.Sc., MIEI Managing Director – Hydro-Environmental Services
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1. INTRODUCTION

1.1 BACKGROUND

Hydro-Environmental Services (HES) were requested by MKO, to complete a Water Framework Directive (WFD) Compliance Assessment for a planning application for the proposed Lyrenacarriga wind farm and grid connection development. The proposed wind farm site is located approximately 5km southeast of Tallow, Co. Waterford and approximately 9km northwest of Youghal, Co. Cork. The proposed development comprises a total of 17 no. turbines (11 no. turbines located in Co. Waterford and 6 no. turbines located in Co. Cork), a grid connection and all associated development works. The Proposed Development Site is divided into an eastern cluster with 10 no. turbines and a western cluster with 7 no. turbines.

The purpose of this WFD assessment is to determine if any specific components or activities associated with the proposed wind farm development will compromise WFD objectives or cause a deterioration in the status of any surface water or groundwater body and/or jeopardise the attainment of good surface water or groundwater status. This assessment will determine the water bodies with the potential to be impacted, describe the proposed mitigation measures and determine if the project is in compliance with the objectives of the WFD.

This WFD Assessment is intended to supplement the Hydrological and Hydrogeological Responses to a An Bord Pleanála Further Information Request in relation to the proposed Lyrenacarriga Wind Farm.

1.2 STATEMENT OF AUTHORITY

Hydro-Environmental Services (HES) are a specialist hydrological, hydrogeological and environmental practice that delivers a range of water and environmental management consultancy services to the private and public sectors across Ireland and Northern Ireland. HES was established in 2005, and our office is located in Dungarvan, County Waterford. We routinely complete impact assessments for hydrology and hydrogeology for a large variety of project types including wind farms.

This WFD assessment was prepared by David Broderick, Michael Gill and Conor McGettigan.

David Broderick (BSc, H. Dip Env Eng, MSc) is a hydrogeologist with over 13 years' experience in both the public and private sectors. Having spent two years working in the Geological Survey of Ireland working mainly on groundwater and source protection studies David moved into the private sector. David has a strong background in groundwater resource assessment and hydrogeological/hydrological investigations in relation to developments such as quarries and wind farms. David has completed numerous geology and water sections for input into EIARs for a range of commercial developments. David has worked on the EIS/EIARs for Derrykillew WF, Croagh WF, and Oweninny WF, and over 60 other wind farm related projects across the country.

Michael Gill (P. Geo., B.A.I., MSc, Dip. Geol., MIEI) is an Environmental Engineer with over 18 years' environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological impact assessments of wind farms in Ireland. He has also managed EIAR assessments for infrastructure projects and private residential and commercial developments. In addition, he has substantial experience in wastewater engineering and site suitability assessments, contaminated land investigation and assessment, wetland hydrology/hydrogeology, water resource assessments, surface water drainage design and SUDs design, and surface water/groundwater interactions. For example, Michael has worked on the EIS/EIARs for Slievecallan WF, Cahermurphy (Phase I & II) WF, Carrownagowan WF, and Croagh WF and over 100 other wind farm related projects across the country.

Conor McGettigan (BSc, MSc) is a junior Environmental Scientist, holding an M.Sc. in Applied Environmental Science (2020) from University College Dublin. Conor has also completed a B.Sc. in Geology (2016) from University College Dublin. In recent times Conor has assisted in the preparation of hydrological and hydrogeological impact assessments for a variety of wind farm developments.

1.3 WATER FRAMEWORK DIRECTIVE

The EU Water Framework Directive (2000/60/EC), as amended by Directives 2008/105/EC, 2013/39/EU and 2014/101/EU ("WFD"), was established to ensure the protection of the water environment. The Directive was transposed in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003).

The WFD requires that all member states protect and improve water quality in all waters, with the aim of achieving good status by 2027 at the latest. Any new development must ensure that this fundamental requirement of the WFD is not compromised.

The WFD is implemented through the River Basin Management Plans (RBMP) which comprises a six-yearly cycle of planning, action and review. RBMPs include identifying river basin districts, water bodies, protected areas and any pressures or risks, monitoring and setting environmental objectives. In Ireland the first RBMP covered the period from 2010 to 2015 with the second cycle plan covering the period from 2018 to 2021.

The River Basin Management Plan (2018 - 2021) objectives, which have been integrated into the design of the proposed wind farm development, include:

- Ensure full compliance with relevant EU legislation;
- Prevent deterioration and maintain a 'high' status where it already exists;
- Protect, enhance and restore all waters with aim to achieve at least good status by 2027;
- Ensure waters in protected areas meet requirements; and,
- Implement targeted actions and pilot schemes in focused sub-catchments aimed at (1) targeting water bodies close to meeting their objectives and (2) addressing more complex issues that will build knowledge for the third cycle.

Our understanding of these objectives is that water bodies, regardless of whether they have 'Poor' or 'High' status, should be treated the same in terms of the level of protection and mitigation measures employed.

We note that the River Basin Management Plan 2022-2027 is out for public consultation presently, and that closed in March.

2. WATERBODY IDENTIFICATION CLASSIFICATION

2.1 INTRODUCTION

This section identifies those surface water and groundwater bodies with potential to be affected by the proposed development and reviews any available WFD information.

2.2 SURFACE WATERBODY IDENTIFICATION

On a regional scale, the Proposed Development Site is located in the River Blackwater surface water catchment within Hydrometric Area 18 of the South-Western International River Basin District. The River Blackwater, which is a transitional waterbody at this location (i.e. estuarine), flows in a southerly direction approximately 5km to the east of the eastern cluster at its closest point.

On a more local scale, the northern section of the eastern cluster and the northern section of the western cluster (~20% of the overall wind farm site) are both located in the River Bride sub-catchment (Bride[Waterford]_SC_030). The River Bride flows in an easterly direction approximately 4km to the north of the western cluster and is a major tributary of the River Blackwater. In terms of the proposed wind farm infrastructures, 1 no. turbine (T12) and 1 no. borrow pit from the western cluster are located in the River Bride sub-catchment. This area of the western cluster drains to the River Bride via the Glenaboy River (Glenaboy_010) with all the aforementioned proposed infrastructure being located in the Glenaboy River sub-basin. Meanwhile, the northern section of the eastern cluster is drained by the Killbeg stream which forms part of the Bride[Waterford]_010 river waterbody. However, no proposed wind farm infrastructure associated with the eastern cluster are located in the Bride River sub-catchment.

The remainder of the western and eastern clusters are located in the Tourig River sub-catchment (Tourig_SC_010). In terms of the proposed wind farm infrastructures, 11 no. turbines, 1 no. proposed borrow pit, 1 no. 110kV substation and the eastern section of the overhead grid connection loop are located in the Glendine river sub-basin (Glendine_010). The Glendine River flows to the southeast before discharging into the Lackaroe (Glendine) Estuary, which in turn discharges into the Lower Blackwater Estuary. A small area in the east of the eastern cluster is mapped within the Harrowhill_010 river sub-basin. This river waterbody also drains to the southeast, towards the Lower Blackwater Estuary, however no proposed infrastructure is located in this river sub-basin. Further west, within the western cluster, a total of 5 no. turbines, 1 no. borrow pit, 1 no. temporary construction compound, the western section of the grid connection route collector cable (3.3km) and Turbine Delivery Route (TDR) works at Breeda Bridge are drained by the Tourig River (Tourig_010 SWB). Further downstream the proposed TDR works at Lombards Crossroads are located within the Tourig_020 river sub-basin. The Tourig River discharges into the Lower Blackwater Estuary to the northwest of Youghal, Co. Cork.

Error! Reference source not found. presents the catchment area of each river waterbody downstream of the Proposed Development Site. The Glenaboy_010 river waterbody in the vicinity of the site has the smallest catchment area of 8.70km². The catchment area of the river waterbodies increases progressively downstream as more streams and rivers confluence. Downstream of where the Glenaboy River discharges into the Bride River, the Bride(Blackwater)_070 river waterbody has a total upstream catchment area of 370.73km². Therefore, those river waterbodies which are located in close proximity to the Proposed Development Site with small catchment areas will be more susceptible to water quality impacts as a result of the Proposed Development in comparison to those located further downstream with large catchment areas.

Figure A below is a local hydrology map of the area.

Table A: Downstream Catchment Size for River Waterbodies

WFD River Sub-Basin	Total Catchment Area (km ²)
Bride River sub-catchment (Bride_SC_030)	
Glenaboy_010	8.70
Glenaboy_020	18.16
Bride(Blackwater)_070	370.73
Bride[Waterford]_010	427.88
Tourig River sub-catchment (Tourig_SC_010)	
Harrowhill_010	24.51
Glendine(blackwater)_010	20.87
Tourig_010	17.21
Tourig_020	45.94

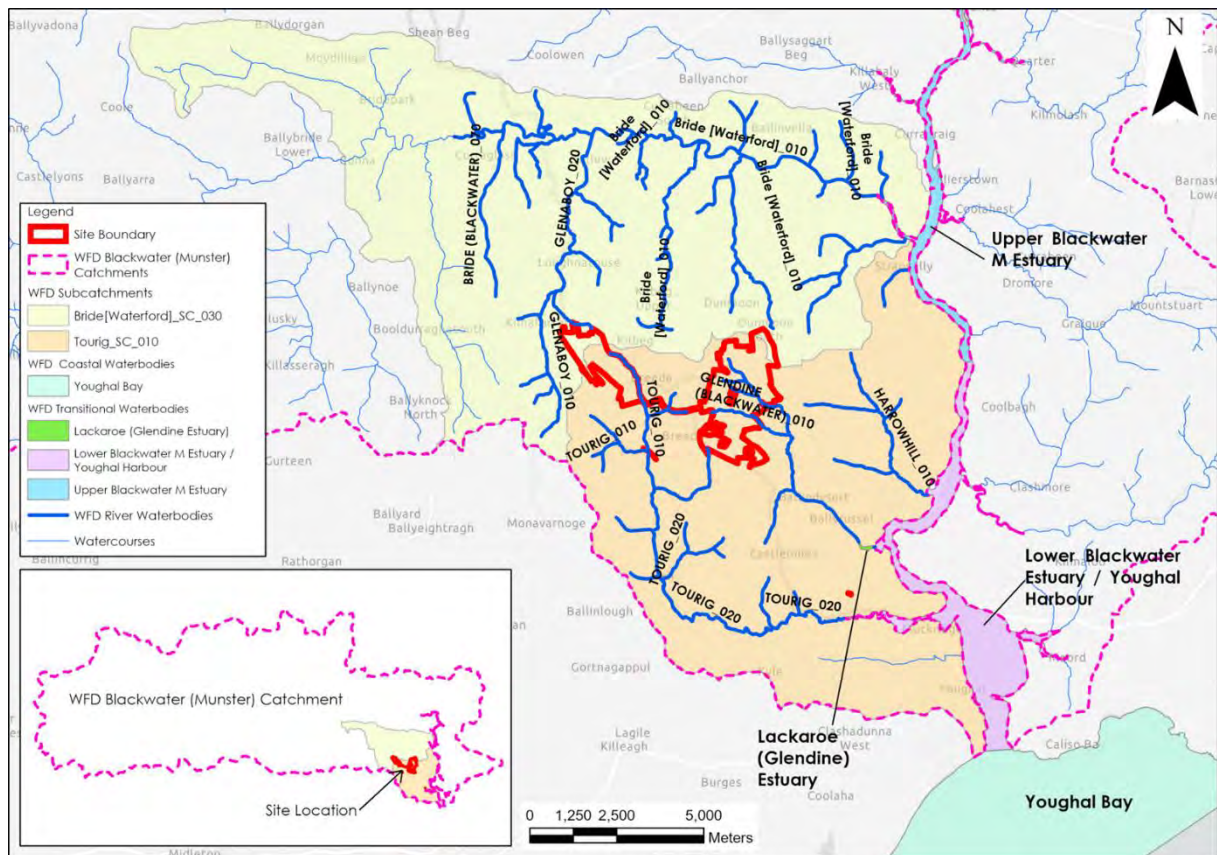


Figure A: Local Hydrology Map

2.3 SURFACE WATER BODY CLASSIFICATION

A summary of the WFD status and risk result for Surface Water Bodies (SWBs) downstream of the proposed development are shown in **Table B**. The overall status of SWBs is based on the ecological, chemical and quantitative status of each SWB.

Local Groundwater Body (GWB) and Surface water Body (SWB) status information is available from (www.catchments.ie).

As stated above the northern section of the Proposed Development Site is located in the River Bride sub-catchment. Within this sub-catchment the western cluster is drained by the Glenaboy_010 SWB which achieved 'Good Status' in both WFD cycles (2010-2015 and 2013-2018). Upstream of its confluence with the Bride River the Glenaboy_020 SWB achieved

'Moderate Status' in the latest WFD cycle. Further downstream the Bride River Bride(Blackwater)_070 and Bride[Waterford]_010 SWBs) achieved 'Good Status'. The Upper Blackwater Estuary achieved 'Moderate' status in both WFD cycles.

The SWBs downstream of the Proposed Development Site within the River Bride sub-catchment have been deemed to be 'not at risk' of failing to meet their WFD objectives with the exception of the Glenaboy_020 SWB is 'at risk'. Meanwhile the risk status of the Upper Blackwater Estuary is currently under review.

Meanwhile within the Tourig River sub-catchment all SWBs in the immediate vicinity of the Proposed Development Site (i.e. Harrowhill_010, Glendine(Blackwater)_010, Tourig_010 and Tourig_020 SWBs) achieved 'Good Status' in the latest WFD cycle (2013-2018). Furthermore, these surface waterbodies have been deemed to be 'not at risk' of failing to meet their WFD objectives and no significant pressures have been identified.

In terms of the transitional and coastal waterbodies downstream of the Proposed Development Site, the Lower Blackwater Estuary / Youghal Harbour transitional SWB and the Youghal Bay coastal SWB both achieved 'Moderate Status'. The Lackaroe (Glendine) Estuary remains unassigned with regards WFD status. In terms of risk status, the Lower Blackwater Estuary / Youghal Harbour transitional SWB and the Youghal Bay coastal SWB are both 'at risk'. The risk status of the Lackaroe (Glendine) Estuary remains under review.

The 3rd Cycle Draft Blackwater (Munster) Catchment Report states that for rivers within this catchment, the main significant issues are nutrient pollution, morphological issues, hydrological issues, organic pollution and sediment impacts. However, the draft report does not identify any significant pressures impacting on any of the river waterbodies downstream of the Proposed Development Site with the exception of the Glenaboy_020 SWB which is under pressure from urban runoff. With regards to the Lower Blackwater Estuary / Youghal Harbour Transitional SWB and the Youghal Bay coastal SWB, the draft report states that these SWBs are impacted by nutrient and organic pollution associated with agricultural activities. Meanwhile, the Lackaroe (Glendine) is listed as being under significant pressure from anthropogenic activities.

The SWB status for the 2013-2018 WFD cycle are shown on **Figure B**.

Table B: Summary WFD Information for Surface Water Bodies

SWB	Overall Status (2010-2015)	Risk Status (2010-2015)	Overall Status (2013-2018)	Risk Status (2013-2018)	Pressures
Bride River sub-catchment (Bride_SC_030)					
Glenaboy_010	Good	Not at risk	Good	Not at risk	-
Glenaboy_020	Good	At risk	Moderate	At risk	Urban Runoff
Bride(Blackwater)_070	Good	Not at risk	Good	Not at risk	-
Bride[Waterford]_010	Unassigned	Not at risk	Good	Not at risk	-
Upper Blackwater Estuary	Moderate	At risk	Moderate	Under Review	Agriculture
Tourig River sub-catchment (Tourig_SC_010)					
Harrowhill_010	Unassigned	Not at risk	Good	Not at risk	-
Glendine(Blackwater)_010	Good	Not at risk	Good	Not at risk	-
Lackaroe (Glendine) Estuary	Unassigned	Under review	Unassigned	Under review	Anthropogenic
Tourig_010	Good	Not at risk	Good	Not at risk	-
Tourig_020	Good	Not at risk	Good	Not at risk	-
Lower Blackwater Estuary / Youghal Harbour	Moderate	At risk	Moderate	At risk	Agriculture
Youghal Bay	Good	At risk	Moderate	At risk	Agriculture

2.4 GROUNDWATER BODY IDENTIFICATION

According to data from the GSI database and bedrock geology series (www.gsi.ie), the Proposed Development Site is underlain by a Locally Important Aquifer (Bedrock which is Moderately Productive only in Local Zones), which consists of Devonian Old Red Sandstones.

The Glenville GWB (IE_SW_020_0100) underlies the Proposed Development site (including the western and eastern clusters and the overhead grid connection loop).

2.5 GROUNDWATER BODY CLASSIFICATION

The Glenville GWB (IE_SW_020_0100) achieved 'Good Status' in both WFD cycles (2010-2015 and 2013-2018). This GWB is deemed to be 'at risk' of failing to meet its WFD objectives. The 3rd Cycle Draft Blackwater (Munster) Catchment Report states that chemical pollution associated with agricultural activities is impacting the Glenville GWB.

The GWB status for the 2013-2018 WFD cycle are shown on Figure B.

Table C: Summary WFD Information for Groundwater Bodies

GWB	Overall Status (2010-2015)	Risk Status (2010-2015)	Overall Status (2013-2018)	Risk Status (2013-2018)	Pressures
Glenville	Good	Under review	Good	At risk	Agriculture

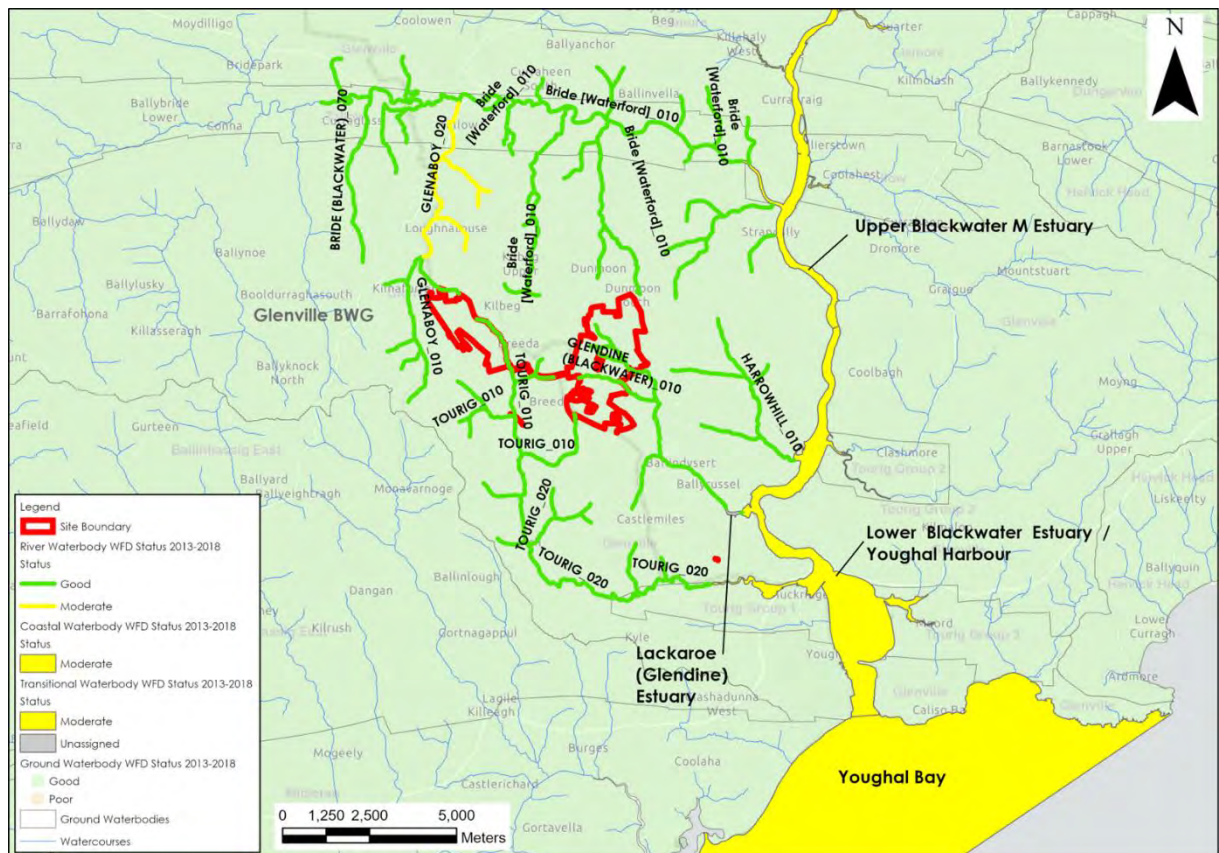


Figure B: WFD Groundwater and Surface Waterbody Status (2013-2018)

3. WFD SCREENING

As discussed in **Section 2**, there are a total of 8 no. river water bodies that are located in the vicinity or downstream of the Proposed Development Site. In addition, there are 3 no. transitional waterbodies and 1 no. coastal waterbodies located downstream. Furthermore, the Proposed Development Site is underlain by 1 no. groundwater body.

3.1 SURFACE WATER BODIES

As shown in **Figure A** above, there are 11 no. SWBs located in the vicinity or downstream of the Proposed Development Site.

With consideration for the construction, operational and decommissioning phases of the proposed development, it is considered that all sections of the Glenaboy (Glenaboy_010 and Glenaboy_020), Glendine (Glendine(Blackwater)_010) and Tourig Rivers (Tourig_010 and Tourig_020) in the vicinity and downstream of the site are carried through into the WFD Impact Assessment. These SWBs have been screened in due to their close proximity to the Proposed Development Site and the occurrence of proposed infrastructure within their respective catchments. These SWBs also have relatively small catchment areas, making them susceptible to potential water quality impacts associated with the Proposed Development. The Bride(Blackwater)_070 SWB has been screened in due to its location directly downstream of the Glenaboy River. However, the potential for water quality impacts on the Bride River in comparison to the Glenaboy are significantly reduced due to its large upstream catchment area. The Proposed Development works must not in any way result in a deterioration in the status of these SWBS and/or prevent them from meeting the biological and chemical characteristics for good status in the future.

Due to the lack of any proposed development works within the Bride[Waterford]_010 and the Harrowhill_010 river sub-basins, these SWBs have been screened out of further assessment. The proposed development has no potential to cause a deterioration in status of these SWBs and/or jeopardise the attainment of good surface water status in the future.

The Upper Blackwater Estuary, the Lackaroe (Glendine) Estuary and the Lower Blackwater Estuary / Youghal Harbour transitional SWBs and the Youghal Bay coastal SWB have been screened out due to their distant location from the Proposed Development Site, the large volumes of water within these SWBs and the saline nature of these waters. The proposed development has no potential to cause a deterioration in status of these SWBs and/or jeopardise the attainment of good surface water status in the future.

Please note that we recognise that the Lackaroe (Glendine) Estuary remains unassigned with regards to WFD status. However irrespective of the condition of this waterbody if it was categorised, the proposed development will not cause it to deteriorate and will not in any way prevent it meeting the biological and chemical characteristics for good status.

3.2 GROUNDWATER BODIES

With respect to groundwater bodies, the Glenville GWB has been screened in due to its location directly underlying the Proposed Development Site. The Proposed Development works must not in any way result in a deterioration in the status of this GWB and/or prevent it from meeting the biological and chemical characteristics for good status in the future.

3.3 WFD SCREENING SUMMARY

A summary of WFD Screening discussed above is shown in **Table D**.

Table D: Screening of WFD water bodies located within the study area

Type	WFD Classification	Waterbody Name/ID	Inclusion in Assessment	Justification
Surface Water Body	River	Glenaboy_010	Yes	The northern section of the western cluster, including 1 no. turbine and 1 no. borrow pit, is mapped within the catchment area of the Glenaboys_010 SWB. An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Glenaboy_020	Yes	The Glenaboy_020 SWB is located directly downstream of the Glenaboy_010 SWB and in close proximity to the Proposed Development Site (<1km). An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Bride(Blackwater)_070	Yes	The Bride(Blackwater)_070 SWB is located directly downstream of the Glenaboy River and in close proximity to the Proposed Development Site (<1km). An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Bride[Waterford]_010	No	The northern section of the eastern cluster is located within the catchment area to the Bride[Waterford]_010 SWB. However, no key development infrastructure is located within this area of the Proposed Development Site. Therefore, the Bride[Waterford]_010 SWB has been screened out as the Proposed Development has no potential to impact the status of this SWB.
	Transitional	Upper Blackwater Estuary	No	The Upper Blackwater Estuary has been screened out due to the saline nature of its waters and the large volumes of water within the estuary. The Proposed Development has no potential to impact the status of this SWB.
	River	Harrowhill_010	No	A small area in the east of the eastern cluster is mapped within the catchment area to the Harrowhill_010 SWB. However, no key development infrastructure is located within this area of the Proposed Development Site. Therefore, the Harrowhill_010 SWB has been screened out as the Proposed Development has no potential to impact the status of this SWB.
	River	Glendine(Blackwater)_010	Yes	Much of the eastern cluster, including 11 no. turbines, 1 no. borrow pit, 1 no. temporary construction compound, 110kV substation and the <u>eastern section of the OHL grid connection loop</u> , is mapped within the catchment area of the Glendine(Blackwater)_010 SWB. An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	Transitional	Lackaroe (Glendine) Estuary	No	The Lackaroe (Glendine) Estuary SWB has been screened out due to the saline nature of its waters and the large volumes of water within the estuary. The Proposed Development has no potential to impact the status of this SWB.
	River	Tourig_010	Yes	Much of the western cluster, including 5 no. turbines, 1 no. borrow pit, 1 no. temporary construction compound, <u>the western section of the grid connection loop</u> and TDR

				works (<u>Breeda Bridge</u>), is mapped within the catchment area of the Tourig_010 SWB. An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	River	Tourig_020	Yes	The Tourig_020 SWB is located directly downstream of the Tourig_010 SWB and in close proximity to the Proposed Development Site (<1km). <u>In addition, TDR works are proposed within this river sub-basin at Lombards Crossroads.</u> An assessment is required to consider the potential impacts of the Proposed Development on this SWB.
	Transitional	Lower Blackwater Estuary / Youghal Harbour	No	The Lower Blackwater Estuary / Youghal Harbour SWB has been screened out due to the saline nature of its waters and the large volumes of water within the estuary. The Proposed Development has no potential to impact the status of this SWB.
	Coastal	Youghal Bay	No	The Youghal Bay SWB has been screened out due to the saline nature of its waters and the large volumes of water within this coastal waterbody. The Proposed Development has no potential to impact the status of this SWB.
Groundwater Body	Groundwater	Glenville GWB	Yes	All of the 17 no. turbines, grid connection and associated infrastructure immediately overlie the Glenville GWB. An assessment is required to consider potential impacts of the proposed development on this GWB.

4. WFD COMPLIANCE ASSESSMENT

4.1 PROPOSALS

The proposed development includes 17 no. turbines, 2 no. borrow pits, 2 no. temporary construction compounds, a 110kV substation, 3.3km collector cable, overhead line grid connection, TDR works and all associated site development works including tree felling, drainage infrastructure and landscaping.

Due to the nature of wind farm developments (and associated grid connections and TDR works), being near surface construction activities, impacts on groundwater are generally negligible and surface water is generally the main sensitive receptor assessed during impact assessments. The primary risks to groundwater at the site will be from cementitious materials, hydrocarbon spillage and leakages, and potential piling works.

The primary risk to surface waters will be entrained suspended sediments (peat and soil particles) in site runoff during earthworks and tree felling along with cement-based compounds.

The proposed development includes works over and in close proximity to waterbodies. There are a number of potential adverse effects to both surface and groundwater.

The primary risks of degradation of surface water bodies include:

- Changes in surface runoff flow volumes and flow patterns;
- Entrainment of suspended solids in surface waters; and,
- Chemical pollution of surface waters by concrete, oil and or fuels.

The primary risks of degradation of groundwaters include:

- Chemical pollution of groundwaters by concrete, oils and fuels.

4.2 POTENTIAL EFFECTS

4.2.1 Construction Phase (Unmitigated)

4.2.1.1 Potential Surface Water Quality Effects from Works within the Wind Farm Site

Construction phase activities including tree felling, site levelling/construction and building turbine foundation excavation and the borrow pit will require earthworks resulting in removal of vegetation cover and excavation of soil and subsoils. A total of 45.6ha of forestry will be permanently felled with an additional 5.4ha of temporary felling.

The main risk will be from surface water runoff from bare soil, spoil storage areas and borrow pit drainage/dewatering during construction works.

Hydrocarbons and cement-based compounds will also be used during the construction phase. The release of effluent from the on-site wastewater treatment systems also has the potential to impact on surface water quality.

These activities can result in the release of suspended solids and pollutants in runoff water and could result in an increase in the suspended sediment load, resulting in increased turbidity, increased pH and contamination which in turn could affect the water quality and fish stocks of downstream water bodies such as the Glenaboy, Glendine and Tourig Rivers.

A summary of potential status change to SWBs arising from surface water quality impacts from earthworks during the construction phase of the proposed development in the unmitigated scenario are outlined in **Table E**.

Table E: Surface Water Quality Impacts from works within WF Site during Construction Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Status Change	Potential
Glenaboy_010	IE_SW_18G050200	Good	Moderate	
Glenaboy_020	IE_SW_18G050600	Moderate	Moderate	
Bride(Blackwater)_070	IE_SW_18B050820	Good	Good	
Glendine(Blackwater)_010	IE_SW_18G070300	Good	Moderate	
Tourig_010	IE_SW_18T030300	Good	Moderate	
Tourig_020	IE_SW_18T030700	Good	Good	

4.2.1.2 Potential Groundwater Quality/Quantity Effects

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a major pollution risk to groundwater. The accumulation of small spills of fuels and lubricants during routine plant use can also be a pollution risk. Chemicals such as cement-based compounds also pose a threat to the groundwater environment. Runoff from concrete works can impact on groundwater quality. Furthermore, the release of effluent from the on-site wastewater treatment systems also has the potential to impact on groundwater quality. These sources of contamination have the potential to impact on groundwater quality in the underlying Glenville GWB groundwater body.

The dewatering of borrow pits and other deep excavations such as turbine bases have the potential to impact local groundwater levels. However, groundwater level impacts are not anticipated to be significant due to the local hydrogeological regime. No groundwater level impacts are predicted from the construction of the collector cabling trench, access roads, substation, compound or met mast due to the shallow nature of the excavation (i.e. 0 ~1.2m).

A summary of potential status change to GWBs arising from potential groundwater quality impacts during the construction phase of the proposed development in the unmitigated scenario are outlined in **Table F**.

Table F: Groundwater Quality Impacts during Construction Phase (Unmitigated)

GWB	WFD Code	Current Status	Assessed Status Change	Potential
Glenville GWB	IE_SW_G_037	Good	Moderate	

4.2.1.3 Potential Surface Water Quality Effects associated with Grid Connection

The two clusters of the Wind Farm Site will be connected via a c.3.3km underground collector cable connection which passes through the Tourig_010 and Glendine(Blackwater)_010 river

sub-basins. The grid connection will be made to the existing 110 kV Overhead Line which passes through the eastern cluster at the location of the proposed on-site substation.

Earthworks are required for the construction of the underground collector cable connection and these activities can result in the release of suspended solids and pollutants in runoff water and could result in an increase in the suspended sediment load, resulting in increased turbidity, increased pH and contamination which in turn could affect the water quality and fish stocks of downstream water bodies such as the Glendine and Tourig Rivers.

A summary of potential status change to SWBs arising from surface water quality impacts from earthworks during the construction phase of the proposed development in the unmitigated scenario are outlined in **Table G**.

Table G: Surface Water Quality Impacts during Construction Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Status Change	Potential Status Change
Glenaboy_010	IE_SW_18G050200	Good	Good	Good
Glenaboy_020	IE_SW_18G050600	Moderate	Moderate	Moderate
Bride(Blackwater)_070	IE_SW_18B050820	Good	Good	Good
Glendine(Blackwater)_010	IE_SW_18G070300	Good	Moderate	Moderate
Tourig_010	IE_SW_18T030300	Good	Moderate	Moderate
Tourig_020	IE_SW_18T030700	Good	Good	Good

4.2.1.4 Potential Surface Water Quality Effects associated with TDR works

Earthworks are required for the turbine delivery route (TDR) works. These include road widening, a new 300m stretch of access road on agricultural land and temporary levelling of the centre island of some roundabouts. Works are proposed at Breeda Bridge within the Tourig_010 river sub-basin and at Lombards Crossroads within the Tourig_020 river sub-basin.

These works can result in the release of suspended solids and pollutants in runoff water and could result in an increase in the suspended sediment load, resulting in increased turbidity, increased pH and contamination which in turn could affect the water quality and fish stocks of downstream water bodies such as the Tourig River.

A summary of potential status change to SWBs arising from surface water quality impacts from earthworks during the construction phase of the proposed development in the unmitigated scenario are outlined in **Table G**.

Table H: Surface Water Quality Impacts during Construction Phase (Unmitigated)

<u>SWB</u>	<u>WFD Code</u>	<u>Current Status</u>	<u>Assessed Status Change</u>	<u>Potential</u>
Glenaboy_010	IE_SW_18G050200	Good	Good	
Glenaboy_020	IE_SW_18G050600	Moderate	Moderate	
Bride(Blackwater)_070	IE_SW_18B050820	Good	Good	
Glendine(Blackwater)_010	IE_SW_18G070300	Good	Good	
Tourig_010	IE_SW_18T030300	Good	Moderate	
Tourig_020	IE_SW_18T030700	Good	Moderate	

4.2.2 Operational Phase (Unmitigated)

4.2.2.1 Increased Site Runoff and Hydromorphology Effects on River Water Bodies

Progressive replacement of the soil or vegetated surfaces with impermeable surfaces could potentially result in an increase in the proportion of surface water runoff reaching the surface water drainage network. This could potentially increase runoff from the Proposed Development Site and increase flood risk downstream of the development.

As stated in the EIAR the emplacement of the proposed development infrastructure could result in an average total increase in surface water runoff of ~15,543m³/month. During storm rainfall events, additional runoff coupled with increased velocity of flow could increase hydraulic loading, resulting in erosion of watercourses and causing hydromorphological effects.

However, this is a small increase in average runoff and results from a relatively small area of the overall Proposed Development site being developed. Specifically, the proposed permanent development footprint is approximately 23.3 ha, representing approximately 3% of the total development site of 733 ha. Of the proposed wind farm footprint, approximately 6.4 ha are already in place in the form of existing roads.

A summary of potential status change to SWBs arising from increased runoff during the operation stage of the proposed development in the unmitigated scenario are outlined in **Table I**.

Table I: Potential Impact on Surface Water Flows during Operational Phase (Unmitigated)

<u>SWB</u>	<u>WFD Code</u>	<u>Current Status</u>	<u>Assessed Status Change</u>	<u>Potential</u>
Glenaboy_010	IE_SW_18G050200	Good	Good	
Glenaboy_020	IE_SW_18G050600	Moderate	Moderate	
Bride(Blackwater)_070	IE_SW_18B050820	Good	Good	
Glendine(Blackwater)_010	IE_SW_18G070300	Good	Good	
Tourig_010	IE_SW_18T030300	Good	Good	
Tourig_020	IE_SW_18T030700	Good	Good	

4.2.2.2 Surface Water Quality Impacts from Operational Site Drainage

During the operational phase, the potential for silt-laden runoff is much reduced compared to the construction phase. In addition, all permanent drainage controls will be in place and the disturbance of ground and excavation works will be complete. Some minor maintenance works may be completed, such as maintenance of site entrances, internal roads and hardstand areas. These works would be of a very minor scale and would be very infrequent. Potential sources of sediment laden water would only arise from surface water runoff from small areas where new material is added during maintenance works.

A summary of potential status change to SWBs arising from surface water quality impacts during the operation stage of the proposed development in the unmitigated scenario are outlined in **Table J**.

Table J: Surface Water Quality Impacts during Operational Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Glenaboy_010	IE_SW_18G050200	Good	Good
Glenaboy_020	IE_SW_18G050600	Moderate	Moderate
Bride(Blackwater)_070	IE_SW_18B050820	Good	Good
Glendine(Blackwater)_010	IE_SW_18G070300	Good	Good
Tourig_010	IE_SW_18T030300	Good	Good
Tourig_020	IE_SW_18T030700	Good	Good

4.3 MITIGATION MEASURES

In order to mitigate against the potential negative effects on surface and groundwater quality, quantity and flow patterns, mitigation measures will be implemented during the construction and operational phases of the proposed development. These are outlined below.

4.3.1 Construction Phase

4.3.1.1 Mitigation Measures to Protect Surface Water Quality during Felling Operations

All felling of coniferous plantations will be done in accordance with the current best practice methods.

These best practice methods/mitigation measures relating to clear felling of coniferous plantations are summarised in

Table K below. These include avoidance controls and mitigation by design which includes source controls, in-line controls, water treatment controls, and outfall controls.

In addition to these mitigation measures, drains in the vicinity and downstream of the proposed felling areas will be subject to frequent inspection both pre and post-felling. Additionally, surface water quality monitoring shall be completed before, during (if the operation is conducted over a protracted time period) and after felling operations and until the water quality has returned to pre-activity status if an impact has occurred. Daily surface water monitoring forms will also be utilised at every works location in close proximity to a watercourse.

Table K: Summary of Mitigation Measures Associated with Proposed Felling Operations

Management Type	Description of drainage control method	Applicable Works Area
Avoidance Controls:	<ul style="list-style-type: none"> A self-imposed 75m buffer will be maintained for all streams with the exception of existing road crossings and proposed stream crossings; Only 2.9ha of the total tree felling area of 45.6ha will be located within the 75m buffer zone; The large separation distance between the proposed felling areas and sensitive aquatic zones means that potential poor quality runoff can be adequately managed and attenuated prior to reaching sensitive watercourses; Works will be completed during periods of no or low rainfall 	Felling areas where sediment is being generated.
Mitigation by Design	<ul style="list-style-type: none"> Machine combinations will be chosen to minimise soil disturbance; Crossing of streams will not be permitted; Removing soil from roads during wet periods and dust suppression during dry periods; Ditches draining from the proposed felling area towards existing watercourses will be blocked and temporary silt traps constructed i.e. no direct discharge to surface watercourses will occur. Double silt traps will be installed where felling is inside the 75m aquatic buffer zone; Discharge channels will taper out before entering 75m buffer zone allowing for further sediment filtration by ground vegetation; All drains and sediment traps will be maintained during the felling works; Brush mats will be used to support vehicles on soft ground; Timber will be stacked in dry areas outside of the buffer zone with straw bales and check dams placed downstream of these storage areas; Trees will be cut manually from along streams and using machinery to extract the tree; and, Travel will only be permitted perpendicular to and away from a watercourse. 	Felling areas where sediment is being generated.
	<ul style="list-style-type: none"> Using small working areas; Covering stockpiles; and, Timber will be stacked in dry areas outside of the buffer zone with straw bales and check dams placed downstream of these storage areas. 	Timber stockpile areas

4.3.1.2 Mitigation Measures to Protect Surface Water Quality during Earthworks

A suite of general SuDs drainage controls available for surface water management are summarised (along with their application) in

Table L below. These include avoidance controls, source controls, in-line controls, water treatment controls, and outfall controls.

Table L: Summary of Drainage Mitigation & their Application

Management Type	Description of SuDs drainage control method	Applicable Works Area
Avoidance Controls:	<ul style="list-style-type: none"> Application of buffer zones to natural watercourses where possible to avoid excavations in close proximity to watercourses and avoid the release of suspended sediment into watercourses; Using small working areas; and, Working in appropriate weather and suspending certain work activities in advance of forecasted wet weather. 	Construction work areas where sediment is being generated.
Source Controls:	<ul style="list-style-type: none"> Use of upstream interceptor drains and downstream collector drains, vee-drains, diversion drains, flumes and culvert pipes. 	Construction work areas where sediment is being generated.
	<ul style="list-style-type: none"> Using small working areas; Covering stockpiles; Weathering off / sealing stockpiles and promoting vegetation growth. 	Stockpiles areas
In-Line Controls:	<ul style="list-style-type: none"> Interceptor drains, vee-drains, oversized swales/collector drains; Erosion and velocity control measures such as: <ul style="list-style-type: none"> sand bags; oyster bags filled with gravel; filter fabrics; straw bales; flow limiters; weirs or baffles; and/or other similar/equivalent or appropriate systems. Silt fences, filter fabrics; Collection sumps, temporary sumps, pumping systems; Attenuation lagoons; Sediment traps, stilling / settlement ponds. 	Interceptor and collection drainage systems
Water Treatment Controls:	<ul style="list-style-type: none"> Temporary sumps; Attenuation ponds; Temporary storage lagoons; Sediment traps, Stilling / Settlement ponds, silt bags; Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 	Surface water treatment locations
Outfall Controls:	<ul style="list-style-type: none"> Levelspreaders; Buffered outfalls; Vegetation filters; Silt bags; Flow limiters and weirs. 	Drainage run outfalls and overland discharge points

Each element of the wind farm development (*i.e.*, access roads, turbines, borrow pit and peat repository) will have an array of drainage control measures to ensure protection of downstream watercourses. Each drainage control element is not stand alone but occurs as part of a treatment train of control systems (*i.e.*, check dams, silt traps, settlement ponds etc).

4.3.1.3 Mitigation Measures to Water Quality during Excavation Dewatering

Management of groundwater seepages and subsequent treatment prior to discharge into the drainage network will be undertaken as follows:

- Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place;

- If required, pumping of excavation inflows will prevent build-up of water in the excavation;
- The interceptor drainage will be discharged to the site constructed drainage system or onto natural vegetated surfaces and not directly to surface waters;
- The pumped water volumes will be discharged via volume and sediment attenuation ponds adjacent to excavation areas, or via specialist treatment systems such as a Siltbuster unit;
- There will be no direct discharge to surface watercourses, and therefore no risk of hydraulic loading or contamination will occur;
- Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work will immediately be stopped and a geotechnical assessment undertaken; and,
- A mobile 'Siltbuster' or similar equivalent specialist treatment system will be available on-site for emergencies in order to treat sediment polluted waters from settlement ponds or excavations should they occur. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction-sites. They will be used as a final line of defense if needed.

4.3.1.4 Mitigation Measures to Protect Against the Release of Hydrocarbons

Mitigation measures proposed to avoid the release of hydrocarbons at the wind farm site and along the grid connection route include:

- Minimal refuelling or maintenance of vehicles or plant will take place on-site. Off-site refuelling will occur where possible;
- On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser;
- The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site, and will be towed around the site by a 4x4 jeep to where machinery is located.
- The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages.
- The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site.
- Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- Onsite refuelling will be carried out by trained personnel only;
- Fuels stored on site will be minimized and will be appropriately banded;
- Surface water runoff from temporary construction compounds will be collected and drained via silt traps and hydrocarbon interceptors prior to recharge to ground;
- A permit to fuel will be put in place;
- The plant used during construction will be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages is included within the Construction and Environmental Management Plan;
- Spill kits will be available to deal with any accidental spillage in and outside the re-fuelling area.

4.3.1.5 Mitigation Measures to Prevent Groundwater and Surface Water Contamination from Wastewater Disposal

Mitigation measures proposed to avoid the release of wastewater at the Wind Farm site include:

- It is proposed to manage wastewater from the staff welfare facilities in the control buildings/substation by means of a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. It is not proposed to treat wastewater on-site.

4.3.1.6 Mitigation Measures to Prevent the Release of Cement-Based Products

Best practice methods for cement-based compounds:

- No batching of wet-concrete products will occur on site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place;
- Where possible pre-cast elements for culverts and concrete works will be used;
- Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water practicable. No discharge of concrete contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water will be undertaken at lined concrete washout ponds;
- Weather forecasting will be used to plan dry days for pouring concrete; and,
- The pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event.

4.3.1.7 Mitigation Measures to Prevent Morphological Changes to Surface Water Crossing and Drainage Patterns

The proposed mitigation measures include:

- All proposed new stream crossings will be bottomless or clear span culverts and the existing banks will remain undisturbed.
- No in-stream excavation works are proposed;
- Where the proposed underground cabling route follows an existing road or road proposed for upgrade, the cable will pass over or below the culvert within the access road;
- All guidance / mitigation measures proposed by the OPW or the Inland Fisheries Ireland¹ (IFI) is incorporated into the design of the proposed crossings;
- As a further precaution, near stream construction work, will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works according to the Eastern Regional Fisheries Board (2004) guidance document "Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites", i.e., May to September inclusive.
- During the near stream construction work double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction phase.
- All new river/stream crossings will require a Section 50 application (Arterial Drainage Act, 1945). The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent.

With respect to the collector cable watercourse crossings, 4 possible construction crossing methods are proposed that will avoid in-stream works and these are:

- Method 1 - Where no crossing culvert currently exists, the cable will pass over the watercourse on a new bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement;

¹ Inland Fisheries Ireland (2016): *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*

- Method 2 - Where the required depth above the culvert to accommodate the standard trench is achieved in the road, the cabling will pass below the road surface; and,
- Method 3 - Where the required depth above the culvert to accommodate the standard trench cannot be achieved in the road, the cabling will pass over the culvert in a flatbed formation.
- Method 4 - In the event that none of the above methods are appropriate, directional drilling will be utilised. Mitigation Measures relating to the use of a mixture of a natural, inert and fully biodegradable drilling fluid such as Clear Bore™ and water for directional drilling include:
 - The area around the Clear Bore™ batching, pumping and recycling plants shall be banded using terram and sandbags in order to contain any spillages;
 - One or more lines of silt fences shall be placed between the works area and adjacent rivers and streams on both banks;
 - Accidental spillage of fluids shall be cleaned up immediately and transported off site for disposal at a licensed facility; and,
 - Adequately sized skips will be used for temporary storage of drilling arisings during directional drilling works. This will ensure containment of drilling arisings and drilling flush.

4.3.1.8 Mitigation Measures to Protect Groundwater Quality

The potential pollution of groundwater during the construction phase will be mitigated by the provision of appropriate controls and working methods. These include best practice methods for storage and handling of fuels and chemicals and wastewater outlined in Sections 4.3.1.4, 0 and 4.3.1.6 above.

4.3.1.9 Mitigation Measures to Protect Water Quality along the Turbine Delivery Route

Proposed Mitigation Measures:

- Silt traps will be temporarily placed in all drains intercepted by the works prior to works commencing;
- Silt fence perimeters will be placed downslope of the works before excavations begin;
- At the Breeda Bridge proposed access road temporary drains (interceptor and collector drains) and settlement ponds will be put in place to deal with surface water runoff.

4.3.2 Operational Phase

4.3.2.1 Increased Site Runoff and Hydromorphology Effects

The operational phase drainage system of the Proposed Development will be installed and constructed in conjunction with the road and hardstanding construction work as described below:

- Interceptor drains will be installed up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader;
- Swales/road-side drains will be used to collect runoff from access roads and turbine hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to settlement ponds for sediment settling;
- On steep sections of access road transverse drains ('grips') will be constructed in the surface layer of the road to divert any runoff off the road into swales/road side drains;
- Check dams will be used along sections of access road drains to intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock;
- Settlement ponds, emplaced downstream of road swale sections and at turbine locations, will buffer volumes of runoff discharging from the drainage system during

- periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses; and,
- Settlement ponds have been designed in consideration of the greenfield runoff rate.

4.3.2.2 Mitigation Measures to Protect Surface Water Quality

The mitigation measures to protect against poor quality runoff during the operational phase of the proposed development are the same as those outlined in **Section 4.3.1.2** above.

Mitigation measures for oils and fuels during the operational phase of the proposed development are the same as those outlines in **Section 4.3.1.4** above.

4.3.2.3 Mitigation Measures to Protect Groundwater Quality

It is proposed to manage wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants.

4.3.1 Decommissioning Phase

The potential impacts associated with decommissioning of the proposed development will be similar to those associated with the construction phase but of a reduced magnitude, due to the reduced scale of the proposed decommissioning works in comparison to construction phase works.

During decommissioning, it will be possible to reverse or at least reduce some of the potential effects caused during construction, and to a lesser extent operation, by rehabilitating constructed areas such as turbine bases and hard standing areas. This will be done by covering with vegetation to encourage vegetation growth and reduce run-off and sedimentation.

The wind farm site roadways will be kept and maintained following decommissioning of the wind farm infrastructure, as these will be utilised by ongoing forestry works and by other participating landowners.

The electrical cabling connecting the site infrastructure to the on-site substation will be removed, while the ducting itself will remain in-situ rather than excavating and removing it, as this is considered to have less of a potential environmental impact, in terms of soil exposure, and thus on the possibility of the generation of suspended sediment which could enter nearby watercourses.

The turbines will be removed by disassembling them in a reverse order to their erection. This will be completed using the same model cranes as used in their construction. They will then be transported off-site along their original delivery route. The disassembly and removal of the turbines will not have an impact on the hydrological/hydrogeological environment at the wind farm site.

Other potential impacts such as possible soil contamination by fuel leaks will remain but will be of reduced magnitude than the construction phase because of the smaller scale of the works and reduced volumes on-site. Similar mitigation implemented during the construction phase will be utilised during the decommissioning phase to ensure no impacts on receiving waters.

Some of the potential impacts on water bodies will be avoided by leaving elements of the proposed development in place where appropriate. The substation will be retained by EirGrid as a permanent part of the national grid. The turbine bases will be rehabilitated by covering with local topsoil in order to regenerate vegetation which will reduce runoff and sedimentation effects. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures.

With the implementation of the mitigation measures outlined above no significant effects on the hydrological and hydrogeological environment will occur during the decommissioning stage of the proposed development.

4.3.2 Potential Effects with the Implementation of Mitigation

In all instances, the mitigation measures described in **Section 4.3** are sufficient to meet the WFD Objectives. The assessment of WFD elements for the WFD waterbodies is summarised in **Table M** below.

Table M: Summary of WFD Status for Unmitigated and Mitigated Scenarios

SWB	WFD Code	Current Status	Assessed Potential Status Change - Unmitigated	Assessed Status with Mitigation Measures
Glenaboy_010	IE_SW_18G050200	Good	Moderate	Good
Glenaboy_020	IE_SW_18G050600	Moderate	Moderate	Moderate
Bride(Blackwater)_070	IE_SW_18B050820	Good	Good	Good
Glendine(Blackwater)_010	IE_SW_18G070300	Good	Moderate	Good
Tourig_010	IE_SW_18T030300	Good	Moderate	Good
Tourig_020	IE_SW_18T030700	Good	Good	Good
Glenville GWB	IE_SW_020_0100	Good	Moderate	Good

5. WFD ASSESSMENT CONCLUSION

WFD status for SWBs (Surface Water Bodies) and GWBs (Groundwater Bodies) hydraulically linked to the Proposed Development Site are defined in **Section 2** above.

The proposed development does not involve any abstraction of groundwater or alteration of drainage patterns. Therefore, the quantitative status (i.e., the available quantity (volume) of groundwater and surface water locally) to the receiving waters will remain unaltered during the construction and operational phase of the proposed development.

There is no direct discharge from the development site to downstream receiving waters. Mitigation for the protection of surface water during the construction, operation and decommissioning phases of the development will ensure the qualitative status of the receiving waters will not be altered by the proposed development.

There is also mitigation proposed to protect groundwater quality within the proposed development scheme during the construction, operational and decommissioning phases of the development. These mitigation measures will ensure the qualitative status of the underlying GWB will not be altered by the proposed development.

There will be no change in GWB or SWB status in the underlying GWB or downstream SWBs resulting from the proposed development. There will be no change in quantitative (volume) or qualitative (chemical) status, and the underlying GWB and downstream SWBs are protected from any potential deterioration.

In the event where the current status of the waterbody is Moderate (i.e. Glenaboy River) or unassigned (i.e. Lackaroe (Glendine) Estuary) the proposed development will not prevent them from achieving Good Status in the future.

As such, the Proposed Development:

- will not cause a deterioration in the status of all surface and groundwater bodies assessed;
- will not jeopardise the objectives to achieve 'Good' surface water/groundwater status;
- does not jeopardise the attainment of 'Good' surface water/groundwater chemical status;
- does not jeopardise the attainment of 'Good' surface water/groundwater quantity status;
- does not permanently exclude or compromise the achievement of the objectives of the WFD in other waterbodies within the same river basin district;
- is compliant with the requirements of the Water Framework Directive (2000/60/EC); and,
- is consistent with other Community Environmental Legislation including the EIA Directive (2014/52/EU), the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC).

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APPENDIX 3

FI ECOLOGY REPORTS

Appendix 3 Further Information Response - Ecology

Lyrenacarriga Windfarm





DOCUMENT DETAILS

Client: **Churns Energy**

Project Title: **Lyrenacarriga Windfarm**

Project Number: **170749e**

Document Title: **Appendix 3 Further Information Response - Ecology**

Document File Name: **Appendix 2 Ecology Response**

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1. INTRODUCTION

This report responds to a request for Further Information issued by An Bord Pleanála under ABP-309121-21 on the 8th of April 2022. The request for Further Information is being made in relation to the proposal for a wind farm development located in Lyrenacarriga, County Waterford and Lyremountain, County Cork.

This report deals specifically with parts a, b, e and f of Further Information Item No. 2 as set out below:

1.1 Further Information Item No. 2 – Wording

Biodiversity

Submissions received from the Development Applications Unit of the Department, from the Ecology Unit of Cork County Council and the Heritage Officer of Waterford County Council in relation to Biodiversity. In particular, you are requested to address the following:

- a) The potential impact of the proposal on the aquatic environment and associated fauna of the Tourig River, particularly at those sections of the river associated with crossing points.
- b) You are requested to provide further information in relation to the presence of Giant Hogweed within the site (Section 7.5.2.7 EIAR) in relation to the location of same and an assessment of the likely impacts and effects of the spread of this species been provided. Measures which may be required to control/eradicate the species should be specified.
- c) Further detail is required in respect of the detailed design of the settlement pond structures
- d) You are requested to respond to concerns expressed in respect of the geochemistry of the borrow pit near the entrance, especially in relation to pyrite and/or marcasite and risk of acid drainage.
- e) You are requested to review and address the in-combination collision risk for golden plover for all wind turbines in the range (12km) of this species from the Blackwater Estuary SPA.
- f) Concern has been expressed that a hedgerow in proximity to turbine 16 remains within the 50m buffer zone for bats with the potential for increased mortality rates for bats at this location. Please address.

This report responds to points a, b, e and f. Points c and d are addressed separately in the report by Hydro Environmental Services.

1.2 Response to Point A

a) The potential impact of the proposal on the aquatic environment and associated fauna of the Tourig River, particularly at those sections of the river associated with crossing points.

In preparation of the EIAR, survey efforts were carried out on watercourses within and adjacent to the proposed development site. These watercourses included the Glendine, Gortnafira, and Tourig streams. These streams were classified and surveyed for protected habitats and species. Kick samples were also taken from the Glendine and Gortnafira streams to carry out biological water quality assessments. In preparation of this FI response, additional survey efforts were carried out at all proposed water crossings associated with the proposed development and included stream characterizations, as per *A Guide to Habitats in Ireland* (Fossitt, 2000), surveys for protected habitats and species, identification of suitable habitats for protected species, and kick sampling. These additional surveys were carried out on the 7th and 8th of June 2022 by Pádraig Desmond (B.S., QCIEEM) of MKO.

Further information is provided in relation to the nature of the watercourses on the site, including the Tourig stream, with baseline surveys undertaken at each of the points where the proposed infrastructure crosses these watercourses. There are both proposed new water crossings and proposed upgrades to existing water crossings associated with the Tourig stream and its tributaries. The additional survey results and locations of these proposed water crossings, as well as all other proposed water crossings associated with the proposed development site, are discussed in the Stream Characterization Report which accompanies this FI response (Appendix 1).

The Stream Characterization report details the results of the additional surveys mentioned above and provides the background information that further supports the conclusions of the EIAR. The report also provides an up to date base line against which any potential effects on the aquatic environment can be monitored. It details the results of the additional field surveys including the faunal surveys, characterization of the watercourses and associated biological water quality assessments. It classifies the habitats at each survey station (or water crossing) as per 'A guide to the habitats of Ireland' (Fossitt, 2000) and assigns them Q-Values. Maps of the proposed water crossings and survey stations are provided in Section 1 of the report. The otter and other faunal surveys carried out at each survey station are detailed in the report which can be summarized as: Though suitable habitat for otter was identified and spraint recorded, no indications of breeding otter, or other protected species, were recorded.

As per the Ecological Impact Assessment within the Biodiversity chapter of the EIAR (section 7.6), there is potential for the proposed water crossing works to result in significant effects on aquatic habitats and their associated fauna as a result of deterioration in water quality via the runoff of pollutants. As per Section 7.6.4.1.1 of the EIAR, following the implementation of mitigation, there will be no significant effect on aquatic habitats or species of the Tourig stream as a result of the Proposed Development at any geographic scale.

1.3

Response to Point B

b) You are requested to provide further information in relation to the presence of Giant Hogweed within the site (Section 7.5.2.7 EIAR) in relation to the location of same and an assessment of the likely impacts and effects of the spread of this species been provided. Measures which may be required to control/eradicate the species should be specified.

Multi-disciplinary ecological walkover surveys were undertaken in accordance with NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes (NRA, 2009) on the 7th and 8th of July 2022. The multi-disciplinary ecological walkover survey comprehensively covered the entire study area. The aim of this survey was firstly to confirm that giant hogweed (*Heracleum mantegassianum*) was present on the site and secondly to ground truth and if necessary, update any surveys that were undertaken to inform the EIAR.

Reference to giant hogweed in Table 7-1 of Section 7.5.2.7 in the EIAR was made in error and no giant hogweed was recorded on the site during the comprehensive survey that was undertaken, and no significant changes to the habitats within the site were recorded.

Despite the fact that giant hogweed was not recorded on the site, as specified in section 7.5.2.7 of the EIAR, a pre-commencement invasive species survey of the entire site will be undertaken to confirm the conditions predicted and, should any invasive species be recorded at that time (including the known presence of rhododendron), appropriate measures will be put in place to prevent the spread of any invasive species during construction or operation of the proposed wind farm. In addition, all necessary precautions will be taken to prevent the introduction of invasive species to the site from elsewhere.

1.4

Response to Point E

This section (1.4) of the response to the further information request relates solely to ornithology and herein sets out the response to the matters raised in part (e) of the Biodiversity Section of the FI issued

by An Bord Pleanála on the 8th of April 2022. The response to this issue has been prepared by Senior Ornithologist, Mr. Padraig Cregg (BSc., MSc.) of the MKO Ornithology team who prepared the Ornithology Sections of the EIAR.

e) You are requested to review and address the in-combination collision risk for golden plover for all wind turbines in the range (12km) of this species from the Blackwater Estuary SPA.”

It is noted that the wording of the Development Application Unit (DAU) submission is very similar to the above, therefore to avoid duplication these overlapping topics are both addressed below in this section of this FI Ecology Response. The DAU wording is as follows:

“In-combination collision risk for golden plover, for all wind-turbines in the range (12km) of this species from the Blackwater Estuary SPA.”

1.4.1 Golden Plover Cumulative Collision Risk

It is noted that an impact assessment of cumulative effects including collision risk¹ is provided in Section 8.13 of the EIAR as submitted. Section 8.13.2 of the EIAR states that no potentially significant cumulative habitat loss, disturbance displacement or collision risk effects on any of the Key Ornithological Receptors (KORs) has been identified with regard to the development proposal. For a list of all KORs please refer to Section 8.6 of the EIAR.

Notwithstanding the above and as it has been requested by An Bord Pleanála, a further review has been undertaken of available information to address the potential for in-combination collision risk to result in significant effects acting on golden plover within a 12km radius of the Blackwater Estuary SPA.

A review of the Planning Register for Cork and Waterford County Council shows that there have been several planning applications lodged within the vicinity of the EIAR study area. Many of the existing/proposed developments within the EIAR study area relate to one-off housing or are agricultural in nature. Owing to the scale, and primarily the nature of these developments, significant cumulative collision risk impacts are not predicted. There are several planning applications for wind farm development and associated infrastructure within 12km of the Blackwater Estuary SPA. Other wind farm developments have the potential to give rise to cumulative collision risk effects. Further details on these applications are available below.

There are three other wind farm developments within a 12km radius of the Blackwater Estuary SPA: two in Co. Waterford (Woodhouse Wind Farm and Knocknamona Wind Farm) and one in Co. Cork (Knocknagappagh Wind Farm).

➤ Woodhouse Wind Farm (existing)

Woodhouse is c. 8km from the Blackwater Estuary SPA. This wind farm consists of eight turbines in two parts, one with five turbines and one with three turbines. The EIS was consulted to determine cumulative impacts from the proposed development site. The EIS reported no golden plover activity at the site². The EIS concluded that, given the low ecological interests at the site, “impacts on the ecology by the proposed development will not be significant”.

No significant residual effects on avian receptors were identified.

¹ All scenarios within the Turbine Range have been assessed in the assessment of the potential for the proposed development to result in significant collision risk. For further discussion please refer to Section 2.1.1 of the FI Response document.

² <https://www.eplanning.ie/WaterfordCCC/AppFileRefDetails/041788/0>

In addition, no operational phase bird monitoring was conditioned with any of the granted permissions for this development.

➤ Knocknamona Wind Farm (amendments proposed)

Knocknamona is c. 6.5km from the Blackwater Estuary SPA. The most recent bird survey information that is available is included in the EIAR for the amendments to Knocknamona Windfarm previously authorised under An Bord Pleanála Ref No. PL93.24400 (Status: Refused 14/01/2021 Appealed 15/06/2021 Ref No. PL 93.309412). The EIAR was consulted to determine cumulative impacts from the proposed development site. The EIAR³ reported the following concerning golden plover activity:

There is only two flight observations of this species [golden plover] in the vicinity of the wind farm site. The results of surveys for the area indicate that golden plover do not rely on the wind farm site and surrounding area, are not resident or regularly occurring in the area and that the potential for interactions between the proposed larger turbines and golden plover will be negligible. Based on the negligible potential for interactions between the proposed larger turbines, potential significant impacts to golden plover can be ruled out and therefore this species is not identified as a key sensitive receptor and is not considered further in the assessment.

No significant residual effects on avian receptors were identified.

In addition, no operational phase bird monitoring was conditioned with any of the granted permissions for this development.

➤ Knocknagappagh Wind Farm (planning permission expired)

Knocknagappagh is c. 5km from the Blackwater Estuary SPA however, the planning permission has since expired and the development was never built. The development consists of a wind farm that includes two no. 1 MW wind turbines. Operational phase bird monitoring was conditioned with the granted permission for this development.

This development cannot, therefore, contribute to any cumulative effects. Having reviewed the best available information, a golden plover (collision risk) cumulative impact assessment was undertaken with reference to the above information

1.5

Response to Point F

f) Concern has been expressed that a hedgerow in proximity to turbine 16 remains within the 50m buffer zone for bats with the potential for increased mortality rates for bats at this location. Please address.

Turbine 16 is located in the Western envelope (Figure 6-1 of the Bat Survey Report that accompanies the EIAR and provided again below). There is approximately 80.2m of hedgerow located to the east of this turbine that falls within the 50m felling buffer of the blade width. This hedgerow is not proposed to be felled as it runs along the site boundary. It is the opinion of MKO that it would be premature to remove this section of hedgerow, based on the potential for its retention to result in bat fatalities. An image of this section of hedgerow is provided in Plate 1-1 below and its location in relation to T16 is shown in Figure 6-1 of the EIAR bat survey (provided below).

³ <https://www.eplanning.ie/WaterfordCCC/AppFileRefDetails/20845/0>



Plate 1 | Hedgerow habitat adjacent to the proposed Turbine 16, south aspect

As specified in the EIAR, the turbine will be monitored post construction. Monitoring will be completed in line with the post construction monitoring proposal for the site, as detailed in section 6.2.1 of the Bat Survey Report that accompanies the EIAR. Monitoring will be conducted in line with SNH guidelines and comprise of static monitoring at turbine bases and at nacelle level. Carcass searches, to monitor and record bat fatalities shall take place at each turbine. If significant bat fatalities are recorded, adaptive mitigation in the form of bespoke curtailment or removal of the hedgerow will be undertaken.

However, in the light of the concerns raised in the Further information request, it is recognised that An Bord Pleanála may determine that it is more appropriate to remove the hedgerow and therefore to minimise any associated potential for effects on bat species as a result of collision with T16.

To facilitate the Environmental Impact Assessment of this alternative scenario, a revised impact assessment is provided below. This shows amended impact assessments relating to loss of treeline and hedgerow (Amended Tables 7-14 and 7-17) and bats (Amended Table 7-20) of the impact assessment of the EIAR to account for the additional loss of hedgerow habitat and mitigations required. These amended tables are provided below.



Figure 2 Proposed Monitoring Hedgerow at T16 (Fig 6-1 EIAR Chapter 6)

Table 1 Amended Table 7-14 Extent of habitat lost to the proposed development footprint

Habitat	Area (ha)/length (km) to be lost
KER Habitats	
Wet willow-alder-ash woodland (WN6)	0.02ha
Hedgerow (WL1)/Treelines (WL2)	Approx. 316 linear meters
Depositing/lowland rivers (FW2)	0
Non KER Habitats	
Improved agricultural grassland (GA1)	2.3ha
Wet grassland (GS4)	0
Scrub (WS1)	0.042ha
Conifer plantation (WD4) /Eucalyptus plantation	18.8ha
Spoil and bare ground	NA
Buildings and other artificial surfaces (Roads)	0.037ha
Arable crop (BC1)	1.4ha

Table 2 Amended Table 7-17 Assessment of effects in relation to Hedgerows and Treelines

Description of Effect	The proposed development will result in the loss of approximately 316 metres of hedgerow and tree line as a result of the proposed development. This is predominantly associated with the incorporation of mitigation for bats around each turbine in order to reduce their occurrence in close proximity to the turbines, and ultimately to avoid mortality.
Characterisation of unmitigated effect	The loss of 316 metres of hedgerow constitutes a permanent negative effect on these habitats respectively. This would be reversible following the decommissioning of the proposed development.
Assessment of Significance prior to mitigation	In the absence of mitigation, the loss of these linear landscape features is considered to be a long-term slight significant effect on a receptor of Local Importance (Higher Value) at the local geographic scale only. This not considered to be significant at any other geographic scale.

Mitigation	In order to offset for the loss of hedgerow and treeline habitat to the proposed development (predominantly associated with bat mitigation measures), it is also proposed to plant 236 linear metres of new hedgerow within large areas of agricultural/arable lands to increase connectivity locally. The locations in which the proposed planting will be located will be subject to final landowner agreement. However, indicative areas for planting are proposed in Figure 7-13 of the EIAR. The species composition will be similar to that in the surrounding landscape i.e. hawthorn, blackthorn and semi-mature native tree species. There will therefore be no net loss in hedgerow or treeline habitat. In addition, connectivity to the wider landscape will be maintained around turbines where hedgerows and treelines are retained.
Residual Effect following Mitigation	Following the implementation of the mitigation described above, there will be a short-term loss of hedgerow and treeline. Following completion of construction works, this will be replaced with linear features of planted hedging and semi-mature trees. There will be no significant residual effect on linear landscape features at any geographic scale as a result of this development.

Table 3 Amended Table 7-20 Assessment of Potential Impacts on Bats

Description of Effect	<p>The current proposal has been designed to minimise impacts on the receiving environment and maximises the use of existing infrastructure at the site including internal access tracks. Consequently, the Proposed Development footprint is dominated by modified habitats including conifer plantation.</p> <p>As per SNH Guidance, wind farms present four potential risks to bats:</p> <ul style="list-style-type: none"> • Collision mortality, barotrauma and other injuries; (Operational Phase Impact) • Loss or damage to commuting and foraging habitat; • Loss of, or damage to, roosts; • and Displacement of individuals or populations. <p>For each of these four risks, the detailed knowledge of bat distribution and activity within the study area has been utilised to predict the potential effects of the proposed development on bats.</p> <p>Bat surveys undertaken in 2019 form the core dataset for the assessment of effects on bats.</p>
Characterisation of unmitigated effect	<p>Loss or damage to commuting and foraging habitat</p> <p>In the absence of appropriate design, the loss or degradation of commuting/foraging habitat has potential to reduce feeding opportunities and/or displace bat populations. However, the development is predominantly located within a Commercial forestry, agricultural grasslands and linear landscape features such as hedgerows and treelines have been largely avoided.</p> <p>To comply with SNH recommendations in relation to habitat buffering and tree line in proximity to Turbines 7 and 16 (Figures 5-1 and 6-1 in appendix 7.2 of the EIAR bat report). In relation to commuting bats locally, this loss is not considered to be significant as there is an extensive network of linear landscape features in the general area that will be fully retained.</p> <p>Consequently, there will be no significant habitat fragmentation, loss of commuting habitat or loss of foraging habitat associated with the buffering requirement.</p> <p>In addition, the opening up of conifer forestry plantations to facilitate turbine construction will also result in a net gain in linear landscape features available for foraging and commuting bats.</p> <p>No significant effects with regard to loss of commuting and foraging habitat are anticipated.</p> <p>Loss of, or damage to, roosts</p> <p>The development is predominantly located within commercial forestry and agricultural land. No bat roosts were recorded on site.</p> <p>No roosting sites suitable for maternity colonies, swarming or hibernation will be impacted by the proposed development.</p> <p>No significant effects with regard to loss of, or damage to, roosts are anticipated.</p> <p>Displacement of individuals or populations</p> <p>The development is predominantly located within a commercial forestry and agricultural land. In the absence of mitigation, the loss of 236 linear metres of hedgerow features is considered to be a long-term slight negative effect. This is considered to be significant at the local geographic scale only.</p>

	There will be no loss of any roosting site of ecological significance. The habitats on the site will remain suitable for bats and no significant displacement of individuals or populations is anticipated.
Assessment of Significance prior to mitigation	No significant effects with regard to loss of commuting and foraging habitat are anticipated. No significant effects with regard to loss of, or damage to, roosts are anticipated. No significant displacement of individuals or populations is anticipated.
Mitigation	The development is predominantly located in plantation forestry (WD4) and some improved agricultural grassland (GA1) and linear landscape features such as hedgerows and treelines have been largely avoided. Although no significant effects are anticipated, it is proposed to offset hedgerow loss by planting additional hedgerow to ensure that there is a net gain in linear landscape features in the local area, see Figure 7-13 of the EIAR. As described in Section 7.6.4.1.3 of the EIAR, the locations in which the proposed planting will be located will be subject to final landowner agreement. In addition, the opening of conifer forestry plantations to facilitate turbine construction will result in a net gain in linear landscape features available for foraging and commuting bats. Full detail of mitigation for bat is provided in the Bat Report (Appendix 7.2 of the EIAR)
Residual Effect following Mitigation	There is no potential for the construction of the Proposed Development to result in significant effects on the local bat population at any geographic scale.

To conclude, in relation to the concern expressed over a section of hedgerow to be retained within the 50 meter buffer of Turbine 16, it is the opinion of MKO that it would be premature to remove this section of hedgerow, based on the potential for its retention to result in bat fatalities. However, if An Bord Pleanála deemed it more appropriate to remove the hedgerow to minimise any associated potential for effects on bat species as a result of collision with T16, the appropriate amendments have been made to Tables 7-14, 7-17, and 7-20 of the EIAR and are given above. These amendments account for the additional loss of approx. 80.2 meters of hedgerow.

1.6 Public and Statutory Consultee Submissions

The applicant has reviewed all submissions that have been lodged by third parties and the various statutory consultees. Following this review, it is considered that the initial application documentation combined with this response to the further information request issued by the Planning Authority comprehensively deals with any issues raised. In the interests of completion and clarity, however, the applicant is taking this opportunity to provide further discussion and detail in relation to the items that have been raised in the submissions. As was suggested by An Bord Pleanála the submissions have been addressed by topic.

1.6.1 Bird Monitoring

Cork County Council were largely satisfied that the proposed development would not give rise to significant impacts on the local avian community, however, recommend an adaptive approach to the monitoring proposed in the EIAR. The wording was as follows:

The Heritage Unit of Cork County Council is largely happy that the proposal does not represent a significant threat to protected or qualifying avian species of nearby Special Protection Areas...However, it is considered necessary that the pre and post construction monitoring proposed within the EIAR be conducted and should circumstances change as to the usage of the site either as breeding habitat, foraging habitat or a migration route for avian species listed as qualifying interests of the nearby SPAs or listed under Annex I of the birds Directive, which

could result in significant effects on their populations, then a fluid approach be taken as to avoid any such impacts e.g. ceasing of specific turbine operation during certain seasons.

It is noted that a comprehensive suite of commencement/pre-construction and operational phase monitoring is already proposed in Section 8.11 of the EIAR as submitted. In summary, the following is proposed:

- Pre-commencement surveys will be undertaken prior to the initiation of works at the wind farm. The verification survey will include a thorough walkover survey to a 500m radius of the development footprint and/or all works areas, where access allows. If winter roost sites or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter season or breeding season (respectively) of the construction phase. If it is found to be active during the construction phase no works shall be undertaken within a 500m buffer (Forestry Commission Scotland, 2006; Ruddock & Whitfield, 2007) in line with best practice. No works shall be permitted within the buffer until it can be demonstrated that the roost or nest is no longer occupied.
- In line with best practice measures, a detailed post-construction Bird Monitoring Programme has been prepared for the operational phase of the Proposed Development, please refer to EIAR Appendix 8-7 for further details. The programme of works will monitor parameters associated with a collision, displacement/barrier effects and habituation during the lifetime of the project. Surveys are proposed to be scheduled to coincide with Years 1, 2, 3, 5, 10 & 15 of the lifetime of the wind farm. Monitoring measures are based on guidelines issued by the Scottish Natural Heritage (SNH, 2009).

The proposed programme of monitoring was not proposed in response to any identified significant effect but rather as a best practice measure (SNH, 2009). The monitoring is comprehensive and considered entirely adequate in this regard. The results of this monitoring will be reported to the Planning Authority following each monitoring year and will include recommendations that may inform additional mitigation or adaptation if required.

Adaptive management is an iterative process whereby the results of previous monitoring are analysed to inform future monitoring or mitigation as relevant. As the Bird Monitoring Programme is considered entirely adequate as currently submitted, no change will be proposed unless there is a significant change in the use of the site by the local avian community. Similarly, no requirement for additional mitigation is anticipated. However, if following monitoring, bird usage on the site changes and the potential for negative effects is identified, adaptive mitigation will be employed to avoid any potential for significant effects on avian receptors.

1.6.2 Whooper Swan

Concerns are raised related to the potential for the proposed development to significantly impact whooper swans. For example, one such submission stated:

The wind farm project site is located between the flight paths of Blackwater Callows SPA and Blackwater Estuary SPA, and wind turbines form a collision risk for multiple SCIs of these European sites.

There is a potential risk that the flight of the whooper swans would bring the whooper swans within the vicinity of the wind farm turbines and imminent threat of loss and collision with turbine blades.

A regularly used whooper swan commuting corridor as described was not identified during surveys. As is noted in Section 8.4.2 of the EIAR, whooper swans were only recorded once during vantage point surveys. Furthermore, there were no observations of whooper swan during dusk hen harrier winter roost surveys, this is of note given whooper swans are known to commute to roost sites at dusk. There were no other observations within 4.5km of the wind farm site throughout a comprehensive suite of surveys (please

see Section 8.2.4 of the EIAR for survey details). There were 23 observations of whooper swan recorded during dedicated waterfowl surveys, all of which were more than 4.5km from the proposed development site (please see EIAR Appendix 8-3, Table 5). Flock sizes range from five to 209 birds.

Notwithstanding the above, it is acknowledged that the proposed development is located approximately between the Blackwater Callows SPA and Blackwater Estuary SPA and if whooper swans were to travel between these two sites there would be the potential to collide with the proposed turbines in absence of avoidance behaviour. However, following two full years of survey in strict accordance with SNH 2017, this species was only recorded on one occasion.

It is noted in the literature (SNH, 2018⁴) whooper swans show a very high rate of turbine avoidance (99.5% avoidance). That is to say, a whooper swan flying towards a wind farm will avoid a collision 99.5% of the time (SNH, 2018). In the present theoretical scenario, the birds will detect and manoeuvre around the turbines 99.5% of the time on route to/from the Blackwater Callows SPA and Blackwater Estuary SPA.

In the absence of evidence of a regularly used whooper swan commuting corridor that crosses the site and the high rate of turbine avoidance demonstrated by this species and the infrequent occurrence of the species, significant collision risk is unlikely.

In addition, it is noted that an impact assessment of cumulative effects including collision risk is provided in Section 8.13 of the EIAR as submitted. Section 8.13.2 of the EIAR states that no potentially significant cumulative habitat loss, disturbance displacement or collision risk effects on any of the KORs has been identified with regard to the development proposal. In the specific case of whooper swan, there was only a single (90-second flight) observation of this species at the proposed development throughout two years of surveying. As a result of such a low rate of occurrence, no pathway to significant effects was identified. Please see Section 8.6 of the EIAR for further discussion. It is reasonable to conclude that such minimal impacts could not give rise to significant cumulative effects.

Furthermore, while no significant effect has been identified, in line with best practice and following a precautionary approach, a comprehensive programme of operational phase surveys is proposed in the EIAR to monitor for interactions between the proposed development and the local avian community. Please refer to EIAR Appendix 8-7 for further details. The programme of works will monitor parameters associated with collision risk, displacement/barrier effects and habituation during the lifetime of the project. The results of this monitoring will be reported to the Planning Authority following each monitoring year and will include recommendations that may inform additional mitigation if required.

1.6.3 Snipe

Concerns are raised in relation to impacts on snipe.

It is noted in Section 8.8.3.9 of the EIAR that an impact assessment is undertaken for snipe for which no significant effects were identified. It is noted that the majority of the proposed development site is located in commercial forestry. A habitat not favoured by this species.

1.6.4 Barn Owl

Several submissions discuss the potential occurrence of barn owl locally. However, following two full years of survey in strict accordance with SNH 2017, this species was not recorded.

1.6.5 Black-tailed Godwit Collision Risk

Concerns were raised in relation to black-tailed godwit collision risk.

⁴ Scottish Natural Heritage (2018) Avoidance rates for the onshore SNH wind farm collision risk model.

As detailed in Section 8.4.14 of the EIAR, numerous species were recorded at wetlands, at distances up to ten kilometres from the wind farm, but never on or near the proposed development site. This is likely due to a lack of suitable waterfowl habitat onsite. These species included bar-tailed godwit, black-tailed godwit, brent goose, curlew, dunlin, little egret, redshank, ringed plover, shelduck, shoveler and wigeon. The dominant habitat type within the proposed development site is conifer plantation. This habitat does not provide suitable foraging or roosting habitat for any of the species listed above and would therefore not be expected to attract them to the proposed development area. Consequently, it is unsurprising that none of these species were observed flying over the proposed development site during the extensive two-year survey effort.

Significant collision risk is therefore not predicted for black-tailed godwit nor any of the other wetland species that were not recorded on or near the proposed development.

2.

CONCLUSION

BIBLIOGRAPHY

Birds Directive (2009/47/EC) – http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm

Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn.). The Bat Conservation Trust, London.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) and Directive 2009/147/EC (codified version of Directive 79/409/EEC as amended) (Birds Directive) – transposed into Irish law as European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/2011).



APPENDIX 1

STREAM CHARACTERISATION AND OTTER SURVEY

Stream Characterization and Otter Survey

Lyrenacarriga Wind Farm
Further Information
Request





DOCUMENT DETAILS

Client: **Innogy**

Project Title: **Lyrenacarriga Wind Farm Further Information Request**

Project Number: **170749-e**

Document Title: **Stream Characterization and Otter Survey**

Document File Name: **Stream characterization – D1 – 2022.07.12 – 170749-e**

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Planning and
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