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BALLINAGREE WIND FARM RESPONSE TO FURTHER INFORMATION

FURTHER INFORMATION RESPONSE REPORT

Prepared for:

Ballinagree Wind Farm DAC

Ballinagree Wind farm

Date: January 2024

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BALLINAGREE WIND FARM

FURTHER INFROMATION RESPONSE REPORT

REVISION CONTROL TABLE, CLIENT, KEYWORDS AND ABSTRACT

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1. INTRODUCTION: FURTHER INFORMATION RESPONSE

On 2 May 2023, An Bord Pleanála wrote seeking Further Information on a number of points in relation to an application for a wind farm development of 20 turbines with 110kV electrical substation and all related site works and ancillary development (Ref. ABP-312606-22). This request was made in accordance with Section 37(F)(1) of the Planning and Development Act, 2000 (as amended). Fehily Timoney and Company (FT), Core House, Pouladuff Road, Cork makes this response on behalf of the Applicant Ballinagree Wind Farm DAC, 27 Lower Fitzwilliam Street, Dublin 2.

Where necessary, this report will be used to identify clarifications and updates to the initial EIAR and NIS prepared. This report correlates the Request for Further Information (RFI) items with the relevant sections of the EIAR / NIS and where necessary highlights any changes to the various sections of the EIAR / NIS. Elements of the EIAR / NIS that are not altered by the response to the FI will not be commented upon as they remain the same.

This overall report should be read in conjunction with the EIAR submitted and forms part of the EIA Process, it should also be read in conjunction with the NIS, and forms part of the Appropriate Assessment process. It is important to note that Section 172(1G) of the Planning and Development Act 2000 (as amended), requires the competent authority in carrying out of an EIA to consider the following:

- The EIAR;
- Any further information furnished to the planning authority or the Board;
- Any submissions or observations validly made in relation to the environmental effects of the proposed Project.

In carrying out an EIA the competent authority may have regard to and adopt in whole or in part any reports prepared by its officials or by consultants, experts or other advisers and may attach conditions to the grant as it considers necessary to avoid, prevent or reduce and, if possible, offset the significant adverse effects on the environment of the proposed Project.

The planning application was lodged with the Competent Authority, in this instance An Bord Pleanála on 28 January 2022. An Bord Pleanála responded seeking further information via letter dated 2nd of May 2023.

On 20 July 2023, a 3 month extension to the deadline for submission of the Response to the Further Information Request to the Board was submitted to allow for further consideration of the responses to the request as such ensure that a fully detailed response can be furnished to the Board. The Board confirmed that this request for a 3 month extension was granted via email dated 21st of July 2023 with a further extension granted in October 2023. Accordingly, the revised deadline for submission of the Further Information Response is 24th of January 2024. Copies of the above correspondence and is included in Appendix 1.

1.1 Report Structure

This RFI Response Report is structured as follows:

- Section 1 - Introduction;
- Section 2 - Responses to Request for Further Information;
- Section 3 - Conclusion;
- Appendices.

1.2 Report Contributions

This report has been prepared by the team responsible for the preparation of the EIAR and Natura Impact Statement submitted with the planning application for Ballinagree Wind Farm.

Table 1-1: Report Contributors

Organisation	Abbreviation	Team Members Responsible	Role	Response Text Prepared
Fehily Timoney and Company	FT	Jim Hughes, Director Trevor Byrne, Principal Engineer Conor Auld, Senior Planner Maureen Marsden, Project Acoustic Engineer Pablo Delgado, Senior Project Engineer Roberto Mione, Senior Project Engineer Sinead Lynch, Graduate Engineer	Lead planning and environmental consultant for the Project	Responses to FI Items 1, 3, 4, 5 and 6 as well as overall co-ordination and compilation of FI Response Report.
Ecology Ireland	EI	Dr Gavin Fennessy, Director and Principal Ecologist with inputs from Dr Katherine Kelleher, Principal Ecologist and Director - Kelleher Ecology Services Ltd	Ecology lead consultant for the Project	Preparation of response to ecology comments in FI Item 4.
Macroworks	MWRKS	Richard Barker, Director Cian Doughan, Associate Director	Landscape and visuals lead consultant for the Project	Response to FI Item 2 and Photomontage booklet appendix.
John Cronin and Associates	JCA	Tony Cummins, Senior Archaeologist	Archaeology and cultural heritage lead consultant for the Project	Preparation of response to archaeological comments in FI Item 4.
Futurenergy Ireland (Formerly Coillte) -	FEI	Sinead O'Malley, Planning Manager David Heelan, Project Developer	Joint developer and Applicant for the Project	Response to Item 5

Organisation	Abbreviation	Team Members Responsible	Role	Response Text Prepared
Ballinagree Wind Farm DAC		Emmet McLaughlin, Project Manager		
Orsted	Orsted	Fiona Maxwell, Portfolio Development Manager	Joint developer and Applicant for the Project	Response to Item 5

Details of EIAR Team member competencies can be found in Appendix 1.1 of the EIAR.

2. EXECUTIVE SUMMARY

2.1 Introduction

This executive summary has been prepared to briefly outline the content of this report which responds to the further information requested on 2 May 2023 by An Bord Pleanála on a number of points in relation to an application for a wind farm development of 20 turbines with 110kV electrical substation and all related site works and ancillary development (Ref. ABP-312606-22). This request was made in accordance with Section 37(F)(1) of the Planning and Development Act, 2000 (as amended).

There are a total of 6no. Further Information Request Items, these can be summarised as follows:

1. Respond to 2022 - 2028 Cork County Council Development Plan
2. Additional Photomontage from Macroom Bypass and visual impact assessment of same
3. Response to matters raised in Office of Public Works submission
4. Response to submission by Cork County Council
5. Biodiversity Enhancement Management Plan implementation
6. Response to other issues raised in submissions made

In Section 2.2 below we summarise the general content of the detailed responses to these 6no. items. This is not intended to provide specific details, and the Board should read the specific responses as well as appended documentation for the full, detailed response to the Further Information Requested.

2.2 Summary of Further Information Response

2.2.1 Item 1 - Cork County Council Development Plan 2022 - 2028

This response outlines that there have been no discernible changes between the 2014 and 2022 Cork County Development Plans which would alter the acceptability of the proposed development.

2.2.2 Item 2 - Photomontage

This response provides a landscape visual impact assessment of additional views prepared by Macroworks from the now completed Macroom Bypass.

2.2.3 Item 3 - Matters Raised by Office of Public Works

This response relates to matters raised by the OPW in their submission on the application.

2.2.4 Item 4 - Response to Cork County Council Submission

This response relates to specific items of the Cork County Council submission on the application, under the following summary headings:

- Ecology
- Air Quality and Climate
- Traffic and Transport
- Noise and Vibration
- Hydrology, Water Quality and Flood Risk
- Archaeology, Architectural and Cultural Heritage

2.2.5 Item 5 - Biodiversity Enhancement Management Plan

This response relates to the Biodiversity Enhancement Management Plan and associated lands. The Response provides the Board with information on how the plan and ongoing land management measures can and will be achieved over the lifetime of the proposed wind farm development.

2.2.6 Item 6 - Response to Other Issues Raised in Submissions

This response relates to other submissions received in relation to the proposed development. We have responded to key points in the submissions received by the following:

- Inland Fisheries Ireland
- Transport Infrastructure Ireland
- Geological Survey Ireland
- Irish Aviation Authority
- Office of Public Works
- Department of Transport
- Irish Water

3. RESPONSE TO REQUEST FOR FURTHER INFORMATION

In this section of the Report, we describe the Further Information Request items as listed in the Board's letter dated 2nd of May 2023 which can be found in Appendix 1 of this report. This is followed by the Applicant's Response.

3.1 Item 1: Cork County Council Development Plan 2022 - 2028

> *It is noted that the Cork County Development Plan 2022 - 2028 has been adopted since the lodgement of the application. You are requested to address the implications, if any, of the new Development Plan for the proposed development.*

3.1.1 Response

It is acknowledged that the Cork County Council Chief Executive's Report dated 28 March 2022 and submitted to ABP as part of the Council's observation in relation to the proposed Project stated:

> *"the new draft County Development Plan does not include any significant change to the approach of the County Council regarding Windfarm development."*

Since time of writing of the above comment, and indeed the lodgement of this application, the 2022 – 2028 County Development Plan has come into effect (Monday 6 June 2022).

Chapter 4 of the EIAR as submitted with the initial planning application described the relevant policy considerations. This considered the then current Cork County Development Plan 2014 and the then draft 2022 – 2028 Cork County Development Plan. Notwithstanding that the Cork County Council Chief Executive's Report stated that the then draft Development Plan does not include significant changes to the approach regarding Windfarm development, it is considered prudent to cross-check the proposed Project and site location against the Development Plan now in effect.

3.1.1.1 Principle of Development

The proposed turbines remain within an area outlined as 'Open to Consideration' on the Cork County Council Wind Strategy Maps. A small part of the southwestern end of the red line boundary is in an area identified as 'Normally Discouraged'. It is, however, noted that this is only a portion of the overall site, and does not contain proposed wind turbines. This wind strategy remains unchanged in this area as per the previous 2014 Development Plan.

Accordingly, it is respectfully submitted that the principal of development at the proposed site location remains the same as previously proposed in the Cork County Development Plan 2014.

3.1.1.2 Development Plan Policy

From a review of the 2022 - 2028 Development Plan carried out; it is noted that there is no new policy which would alter the appropriateness of the proposed Project on this site. Whilst it is noted that key objectives relevant to the proposed Project have slightly altered text / objective numbers, the content as relevant to the proposed development remains predominantly as per the 2014 Development Plan in terms of Energy policy, Biodiversity and Environment policy, Transport policy and Built and Cultural Heritage Policy. For example, in the 2014 Development Plan Objective ED 3-5 dealt with open to consideration wind energy developments, the same text is found in the 2022 - 2028 Development Plan under Objective ET 13-7. As such, it is not considered necessary to outline the content of each individual objective from the current Development Plan which relates to the proposed Project.

Accordingly, it is respectfully submitted that the 2022 - 2028 Development Plan does not have any implications for the proposed Project subject of this planning application.

3.1.1.3 European and National Policy

Since the application was originally submitted there have been significant changes to National and European Energy related policies. These are summarised below.

3.1.1.3.1 European Regulation

Council Regulation (EU) 2022/2577[1] was adopted by the Council of the European Union on 22 December 2022, has direct effect in Member States and came into force on 30 December 2022 for a period of 18 months. This introduces a new temporary emergency regulation to accelerate the deployment of renewable energy sources. Article 3 provides:

> *"1. The planning, construction and operation of plants and installations for the production of energy from renewable sources, and their connection to the grid, the related grid itself and storage assets shall be presumed as being in the overriding public interest and serving public health and safety when balancing legal interests in the individual case, for the purposes of Article 6(4) and Article 16(1)(c) of Council Directive 92/43/EEC[2], Article 4(7) of Directive 2000/60/EC of the European Parliament and of the Council[3] and Article 9(1)(a) of Directive 2009/147/EC of the European Parliament and of the Council[4]. Member States may restrict the application of those provisions to certain parts of their territory as well as to certain types of technologies or to projects with certain technical characteristics in accordance with the priorities set in their integrated national energy and climate plans.*

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022R2577.

[2] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.7.1992, p. 7).

[3] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (OJ L 327, 22.12.2000, p. 1).

[4] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (OJ L 20, 26.1.2010, p. 7).

> *2. Member States shall ensure, at least for projects which are recognised as being of overriding public interest, that in the planning and permit-granting process, the construction and operation of plants and installations for the production of energy from renewable sources and the related grid infrastructure development are given priority when balancing legal interests in the individual case. Concerning species protection, the preceding sentence shall only apply if and to the extent that appropriate species conservation measures contributing to the maintenance or restoration of the populations of the species at a favourable conservation status are undertaken and sufficient financial resources as well as areas are made available for that purpose".*

In recognition of the pressing need to accelerate the deployment of renewable energy in light of the threat to the security of the supply of energy within the EU arising from the war in Ukraine, the Regulation introduces a number of measures aimed at streamlining and prioritising the permit granting processes relating to renewable energy developments and associated infrastructure.

In particular, Article 3(1) establishes a presumption that renewable energy developments and associated infrastructure is "in the overriding public interest and serving public health and safety" when balancing the pressing need for such development with the environmental and species conservation objectives deriving from the Habitats Directive, the Birds Directive and the Water Framework Directive.

Article 3(2) goes on to place a positive obligation on the competent authorities of Member States engaged in the permit-granting process to ensure that renewable energy development is "given priority when balancing legal interests in the individual case". However, where the development would have a negative impact on species protection the competent authority must be satisfied that appropriate species conservation measures contributing to the maintenance or restoration of the populations of the species at a favourable conservation status are undertaken and sufficient financial resources, as well as areas, are made available for that purpose.

Article 1 provides that the *"Regulation applies to all permit-granting processes that have a starting date within the period of its application"* and *"Member States may also apply this Regulation to ongoing permit granting processes which have not resulted in a final decision before 30 December 2022, provided that this shortens the permit granting process and that pre-existing third party legal rights are preserved".* The above is a clear indication of the direction of European renewable energy policy.

These regulations emphasis the urgency of delivering renewable energy in member states since the lodging of the Ballinagree Wind Farm planning submission.

3.1.1.3.2 National Policies and Legislation

Ireland is one of the most *''energy import-dependent''* countries in the European Union. For the year 2020, Ireland's import dependency was 72% (while an improvement on the previous 2013 figure, Ireland is still one of the most import-dependent countries in the EU), and the SEAI estimates that the cost of all energy imports to Ireland for the year 2018 was approximately €5.0 billion. This makes Ireland particularly vulnerable to future energy crises and fluctuations given its location on the periphery of Europe. The international fossil fuel market is growing increasingly volatile and affected by international politics. It is evident that any steps to reduce dependence on imported fossil fuels will add to financial autonomy and stability in Ireland.

The proposed Project will assist in meeting Ireland's EU targets and combating climate change by providing an estimated Maximum Export Capacity (MEC) ranging from 118 to 132 MW energy produced by renewable methods, further lessening reliance on energy produced by fossil fuels and energy imports .

Irelands Climate Action Act 2021

The Climate Action and Low Carbon Development (Amendment) Act 2021, signed into law 23rd July 2021, is an Act to provide for the approval of plans by the Government in relation to climate change for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by the end of the year 2050. It establishes a legally binding framework with clear targets and commitments set in law, and ensures the necessary structures and processes are embedded on a statutory basis to ensure we achieve our national, EU and international climate goals and obligations in the near and long term. The Act amends the Climate Action and Low Carbon Development Act 2015 to significantly strengthen the framework for governance of climate action by the State in order to realise our national, EU and international climate goals and obligations.

Climate Action Plan 2023

At a national level, the key driver on policy is the Climate Action Plan (CAP). The Government published the latest CAP in December 2022. The CAP identifies how Ireland will achieve targets for 51% reduction in overall greenhouse gas emissions from 2021 to 2030, and will reach net zero emissions no later than 2050. This includes for an increased reliance on renewable electricity to 80% by 2030.

The 2019 and 2021 Climate Action Plans saw a big step-up in the program of engagement with citizens and communities. The Climate Action Plan 2023 (CAP 2023) identifies how Ireland will achieve its targets for carbon emissions throughout various sectors such as the energy system, building sector, transport system and food production with an associated number of actions listed.

CAP 23 outlines six vital high impact sectors, of which one is “Powering Renewables”, where it intends to have a 75% reduction in emissions by 2030. The driving force behind this aim is the intention to facilitate a large-scale deployment of renewables that will be critical to decarbonizing the power sector as well as enabling the electrification of other technologies.

The CAP 2023 shows how Ireland is putting climate solutions at the very heart of our social and economic development. Among the most important measures in the plan is to increase the proportion of renewable electricity to up to 80% by 2030 and a target of 9 GW from onshore wind, 8 GW from solar, and at least 5 GW of offshore wind energy by 2030.

CAP 2023 has outlined measures which it intends to impose in order to meet the new ambitious targets. Such measures relate to the acceleration of renewable energy. Such measures are as follows:

- Accelerate the delivery of onshore wind, offshore wind, and solar through a competitive framework to reach 80% of electricity demand from renewable energy by 2030;
- Target **6 GW of onshore wind** and up to 5GW of solar **by 2025**;
- Target **9 GW onshore wind**, 8 GW solar, and at least 5 GW of offshore wind by 2030 (and an additional 2 GW offshore wind for green hydrogen production);
- Complete a revised version of Shaping our Electricity Future to define the required new construction and reinforcement of the electricity transmission and distribution system across the country required to achieve sectoral ceilings and carbon budgets;
- Having regard to the interaction between the planning and grid consenting systems and the overall timeframes for permitting, deliver a streamlined electricity generation grid connection policy and process and remove barriers for installation of renewables and flexible technologies without the need to build new grid, including hybrid (wind/solar/storage) connections and private wires;

- Align the relevant constituent elements of the planning and permitting system to support accelerated renewable energy development, supported by national policy and associated methodologies to inform regional and local planning policies, noting that Development Plans are obliged to set out objectives to facilitate energy infrastructure;
- In line with the emerging EU frameworks, ensure that renewable energy generation projects, and associated infrastructure, will be considered to be in the overriding public interest;
- All relevant public bodies to carry out their functions to support the achievement of the 80% renewable electricity target;
- Support at least 500 MW of local community-based renewable energy projects and increased levels of new micro-generation and small-scale generation

(emphasis added)

The proposed development is of appropriate scale in a location well suited to generating wind power. It is considered that, when brought online it would support reaching the 2030, 9 GW onshore wind target set in the CAP 23. The proposed wind farm is expected to have an estimated Maximum Export Capacity (MEC) ranging from 118 to 132 MW energy, therefore will contribute approximately 1.3% - 1.4% of the 9GW target set in the Cap 23.

Security of Supply

The Government has identified constraints and issues in maintaining security of electricity supply whilst transitioning towards a net zero emissions future. In particular, in recent years the Government, and key statutory bodies such as the Commission for Regulation (the CRU) and the Transmission System Operator, EirGrid plc, have identified immediate security of supply issues that require emergency steps to be taken in the coming years. The Department of the Environment, Climate and Communications published the National Energy Security Framework on 13 April 2022[5] which provides an "*overarching and comprehensive response to Ireland's energy security needs in the context of the war in Ukraine.*"

The National Energy Security Framework sets out how the Government will speed up the shift in Ireland to increased energy efficiency and indigenous energy systems to reduce dependency on imported energy sources.

The share of renewable energy within a country's energy mix has an important bearing on its energy security of supply. As set out in Review of the Security of Energy Supply of Ireland's Electricity and Natural Gas Systems Consultation Paper dated 19 September 2022[6] prepared by the Department of the Environment, Climate and Communications states:

> *"In order to reduce its import dependency, Ireland must increase the level of energy from a diverse number of renewable energy sources. In addition to having a diverse renewables portfolio, the development of storage, demand side response and interconnection will support Ireland's decarbonisation and energy security agenda".*

The proposed wind farm will provide a significant amount of renewable energy into the Irish network once in operation. This will assist in reducing the reliance on imported fossil fuel energy sources and thus increase the energy security in the country as a whole. It will also assist in creating diversification of the renewable energy portfolio in Ireland and support further decarbonisation in Ireland.

[5] gov.ie - National Energy Security Framework (www.gov.ie)

[6] https://www.gov.ie/pdf/?file=https://assets.gov.ie/234682/eafcea48-fd3f-4748-a9db-945c8e3e2c8f.pdf#page=null

Ireland's Greenhouse Gas Emission Projections, 2018 - 2040

The National Climate Change Strategy, published in October 2000 by Government of Ireland designated the Environmental Protection Agency (EPA) with responsibility for developing annual national emission projections for greenhouse gases for all key sectors of the economy, including transport. The EPA publishes greenhouse gas emission projections on an annual basis and submits emission projections to the Commission as required under Monitoring Mechanism Regulation 525/2013.

The EPA's publication entitled Ireland's Greenhouse Gas Emission Projections (2019) provides an updated assessment of Ireland's projected greenhouse gas emissions out to 2040 which includes an assessment of progress towards achieving its emission reduction targets to 2030 set down under the EU Effort Sharing Decision (Decision No 406/2009/EC). Ireland's 2020 target was to achieve a 20% reduction of non-Emission Trading Scheme (non-ETS) sector emissions (i.e. agriculture, transport, the built environment, waste and non-energy intensive industry) on 2005 levels with annual binding limits set for each year beyond 2020. 2030 targets for EU Member States were adopted by the European Council in 2018. Ireland's 2030 target under the Effort Sharing Regulation is a 30% reduction of emissions compared to 2005 levels by 2030. There will be binding annual limits over the 2021-2030 period to meet that target. The EPA state that greenhouse gas emissions in Ireland decreased in 2022, a change of - 1.9% since 2021[7], with emissions from electricity generation decreasing - 1.8% due to the reduction in coal, oil and peat use and the increase in use of renewable energy for electricity production.

During its operation, the estimated 361,788 MWh (megawatt hours) of electricity produced by the proposed Ballinagree Wind Farm annually would be sufficient to supply approximately 86,140 Irish households with electricity per year, based on the average Irish household using 4.2 MWh of electricity (this figure is available from the March 2017 CER Review of Typical Consumption Figures Decision).

Thus, this energy will be used to offset the same amount of energy that would otherwise be generated from burning of fossil fuels at power stations.

[7] https://www.epa.ie/our-services/monitoring--assessment/climate-change/ghg/

3.2 Item 2: Photomontage

You are requested to provide an additional photomontage from a suitable viewpoint on the recently opened section of the Macroom Bypass and an assessment of the visual impact from said viewpoint.

3.2.1 Response

As a part of this RFI response, two additional representative viewpoints were captured to understand the potential visual impact of the proposed wind farm along the new N22 Macroom Bypass located in the wider southern half of the study area. The associated photomontages can be found in Appendix 4 of this report. The nearest section of the N22 Macroom Bypass passes just over 8 km to the south of the proposed turbines at its nearest point. The Zone of Theoretical Visibility (ZTV) mapping for the proposed wind farm identifies the potential for intermittent visibility of the proposed turbines, ranging from views of all 20 proposed turbines to entirely screened views of the proposed wind farm (Figure 3.1 below). It is important to note that the potential visibility patterns identified in the ZTV below are theoretic and do not account for screening in the form of hedgerows, treelines and existing built development. Furthermore, the ZTV does not account for the more intricate anthropogenic embankments and areas of cut and fill in the immediate surrounds of the newly constructed N22 Macroom Bypass corridor.

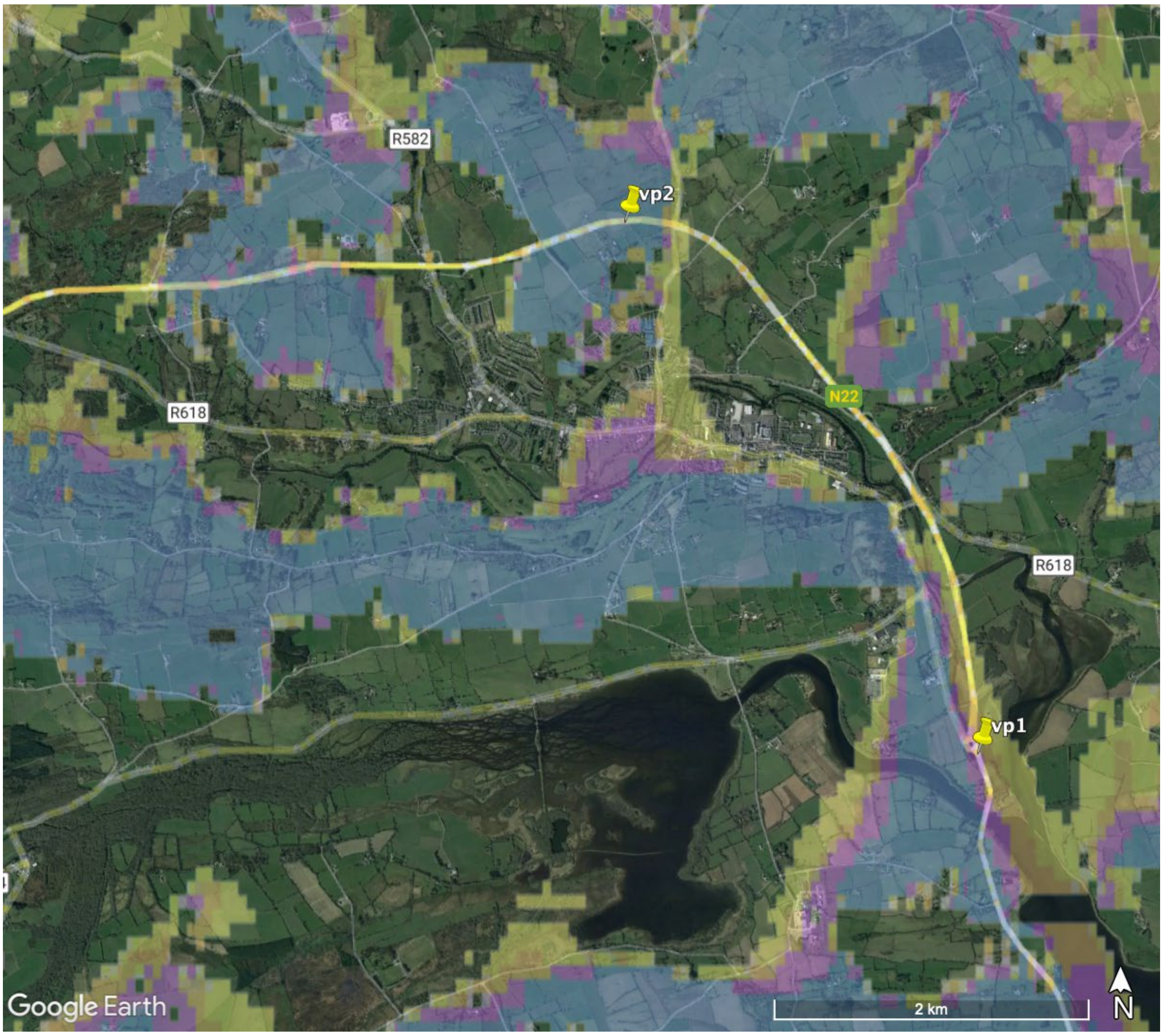

Figure 3-1: Excerpt from the ZTV Map (Tip Height) for Ballinagree Wind Farm showing the potential for visibility along the N22 Macroom Bypass and two additional representative viewpoint locations

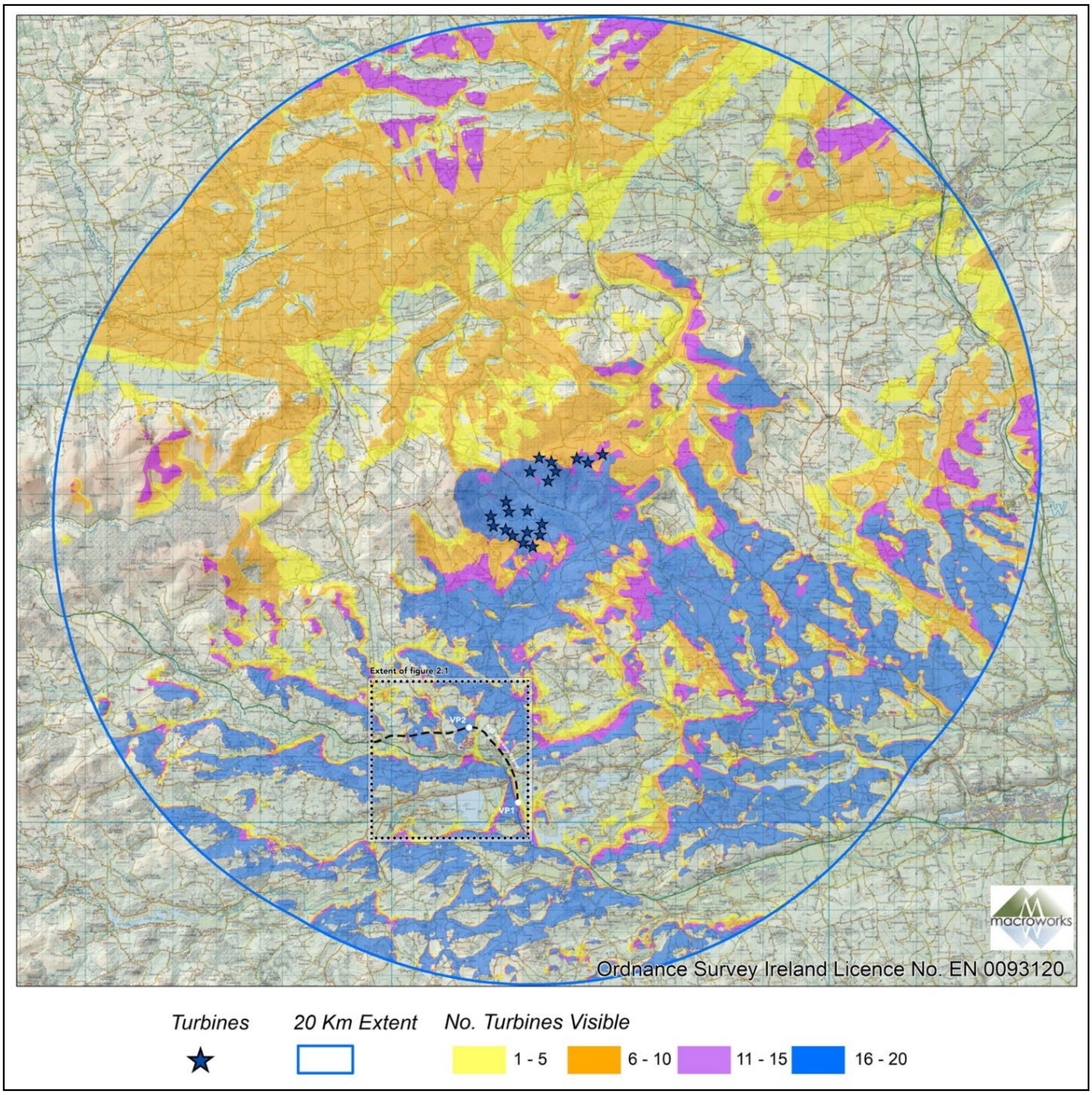

Figure 3.-3-2: Extent of full study area showing location of Figure 3.1 above in the context of the proposed turbines

With regard to the existing visual context of the N22 Macroom Bypass corridor, large proportions of the new road carriageway are heavily contained by a combination of surrounding vegetation and areas of cut and fill. Furthermore, existing wind turbines form part of the existing visual context of the road corridor. The existing Bawnmore turbines are visible and partially visible to the north of sections of the N22, whilst northwest of Macroom along locally elevated sections of the N22, views of distant turbines in the uplands along the Cork - Kerry County bounds are also visible.

An assessment of the visual impact of the proposed Ballinagree wind farm turbines on the N22 Macroom Bypass is included below. Both viewpoints were selected based on fieldwork during June 2023 and represent the most potential for actual visibility. This was identified by driving the new N22 bypass route to identify potential visibility in the site's direction.

Whilst the ZTV identifies some large areas of comprehensive ZTV visibility (blue colour pattern), in reality, the newly constructed road is bound by large embankments and enclosed by intervening mature vegetation, which heavily limits the actual degree of visibility in the direction of the proposed turbines. Thus, viewpoints VP1 and VP2 were selected on the basis that they represent the worst-case scenario in terms of potential turbine visibility. In terms of the receptor sensitivity, VP1 is classified with a medium receptor sensitivity, whilst VP2, is classified with a medium-low receptor sensitivity. The sensitivity of VP1 is slightly heightened as it is situated immediately adjacent to the River Sullane corridor.

Table 2-1: Visual Impact Assessment on N22 Macroom Bypass - VP1

Viewshed Reference Point			Viewing distance	Direction of View
RFI - VP1	N22 (Macroom Bypass) at Coolcower Roundabout		11.6km	N
Representative of:	Major route			
Receptor Sensitivity:	Medium			
Existing View:	This is a view from the newly constructed roundabout intersection of the N22 national route and the R584 regional road. The depicted view is oriented to the north and is located adjacent to a section of the meandering Sullane River and its surrounding marsh and wetlands. The view is partially contained to the north by low rolling ridges cloaked in a patchwork of pastoral farmland and surrounding areas of mature vegetation. The view is contained in the distance by the distinctive Musheramore ridgetop summit cloaked in extensive areas of moorland.			
Visual Impact of proposed wind farm	The nacelles and blade sets of up to three turbines will be visible from this distance of over 11km, whilst partial views of the blade sets of up to four other turbines also have the potential to be afforded from here. The proposed turbines will present relatively small-scale features in the distance and area partially viewed backed by the sky with a low degree of visual contrast. In the context of this busy view, which is already heavily influenced by the existing national road corridor, the proposed turbines are considered to have a sub-dominant visual presence. In terms of aesthetics, some sense of visual ambiguity is generated in relation to the actual location of the proposed wind turbines due to their heavily screened nature. There will be some degree of visual clutter and visual irritation generated by the partial views of turbines and turbine blade sets rotating along the vegetated skyline ridge. Nonetheless, any notable negative aesthetic effects are strongly diluted by the considerable viewing distances involved and the limited visual exposure of the overall wind farm development. Overall, the turbines will contribute to a marginal increase in the intensity of built development in this anthropogenic scene, and the magnitude of visual impact is deemed to be Low-negligible.			
Summary	Based on the assessment criteria and matrices outlined at Section 15.2 of the submitted LVIA, the significance of residual visual impact is summarised below.			
	Visual Receptor Sensitivity	Visual Impact Magnitude	Significance of Visual Impact	
	Medium	Low-negligible	Slight-imperceptible	

Table 2-2: Visual Impact Assessment on N22 Macroom Bypass - VP2

<table>
<tr><th colspan="3">Viewshed Reference Point</th><th>Viewing distance</th><th>Direction of View</th></tr>
<tr><td>RFI - VP2</td><td colspan="2">N22 (Macroom Bypass) at Kilnagurteen</td><td>8.7km</td><td>NE</td></tr>
<tr><td>Representative of:</td><td colspan="4">Major route</td></tr>
<tr><td>Receptor Sensitivity:</td><td colspan="4">Medium-low</td></tr>
<tr><td>Existing View:</td><td colspan="4">This is a brief window of visibility afforded from a locally elevated section of the N22 Macroom Bypass in the townland of Kilnagurteen. The depicted view is oriented to the northeast across the N22 corridor towards an area of low rolling terrain cloaked in a mix of pastoral farmland and areas of mature vegetation, which partially contain the view further to the east and directly to the north towards Musheramore Mountain. The view is contained in the distance by further rolling ridges cloaked in areas of conifer forestry, whilst several of the existing Bawnmore turbines are partially visible, rotating along the vegetated skyline ridge to the east.</td></tr>
<tr><td>Visual Impact of proposed wind farm</td><td colspan="4">More than half of the proposed turbines will be clearly visible in this brief window of visibility from this distance of just under c.9km. The proposed turbines present a notable lateral extent, the majority of which are viewed in silhouette against the sky with a low degree of visual contrast. Whilst the proposed turbines have the potential to be noticed here, they are viewed oblique to the line of travel and present at a modest scale and are considered to have a sub-dominant visual presence.

Aesthetically, the proposed turbines present with some sense of visual clutter due to the overlapping of the proposed turbine blade sets. Nonetheless, this is a relatively legible view of a wind energy development that does not appear out of place in the context of the surrounding working rural landscape, where views of existing turbines are already afforded. Overall, the proposed turbines will generate an increase in the quantum of built development in this view but will not appear incongruous in this robust landscape context. Overall, the magnitude of visual impact is deemed Low.</td></tr>
<tr><td>Summary</td><td colspan="4">Based on the assessment criteria and matrices outlined at Section 15.2 of the submitted LVIA, the significance of residual visual impact is summarised below.</td></tr>
<tr><td></td><th>Visual Receptor Sensitivity</th><th colspan="2">Visual Impact Magnitude</th><th>Significance of Visual Impact</th></tr>
<tr><td></td><td>Medium-low</td><td colspan="2">Low</td><td>Slight</td></tr>
</table>

In summary, whilst views of the proposed wind farm have the potential to be afforded from intermittent sections of the new N22 Macroom Bypass, the proposed turbines will be visible from distances further than c. 8km and will only be briefly and intermittently visible. Indeed, whilst the turbines have the potential to draw the eye along some locally elevated sections of the route, they present in a relatively clear manner and will be viewed in conjunction with other existing wind turbines. Thus, although the proposed wind farm will notably increase the intensity of wind energy development along some sections of the route, the proposed turbines will not appear out of place. Overall, the proposed wind farm will only contribute to visual impacts in the lower order of magnitude along the N22 Macroom Bypass. Thus, **it is not considered that the proposed wind farm will generate significant visual impacts at the N22 Macroom Bypass.**

3.3 Item 3: Matters Raised by Office of Public Works

You are requested to address the matters raised in the submission made by the Office of Public Works. In particular, your response should include:

(a) Submission of a site-specific flood risk assessment.

(b) Address contended errors/contradictory information in EIAR.

(c) Address the contended issues with regard to flow estimation calculations and swale volumes.

(d) Confirm whether the design of watercourse crossings WF-HF5 and WF-HF8 complies with OPW requirements.

3.3.1 Response

3.3.1.1 Item 3 (a) - Site Specific Flood Risk Assessment

As noted in the submission report by the Office of Public Works (OPW), the flood risk assessment (FRA) in the EIAR has not been reviewed by the OPW however they did make comment on some items which are addressed here.

3.3.1.1.1 OPW Observation 9 (i)

Observation:

It is noted that in Section 10.5.2, 'Flood Risk Identification' it is indicated that the identification of flood zones has been carried out for the FRA by relying on the Preliminary Flood Risk Assessment (or PFRA). This is entirely inappropriate. The PFRA was carried out for the purpose stated in Section 10.5.2 (opening paragraph) and it should not be relied on for any other purpose including site specific flood risk assessment.

Response:

A Site-Specific Flood Risk Assessment (SSFRA) has been carried out to accurately identify the flood zones in the area. The SSFRA confirms the conclusion of the flood risk assessment in Chapter 10 of the EIAR in that the proposed Project will not increase the risk of flooding within and downstream of the site. The SSFRA is contained in Appendix 5 and confirms that the proposed wind farm site complies with the core principles of the Planning System and Flood Risk Management Guidelines.

3.3.1.1.2 OPW Observation 9 (ii)

Observation:

The identification of the proposed substation and other elements of the development as being in Flood Zone C, on the basis of the PFRA, is not valid, and a Site Specific flood risk assessment should be carried out to support this application.

Response:

The only elements of proposed infrastructure located within indicative flood zones based on Cork County Council County Development Plan flood mapping (Cork County Council Development Plan 2022 - 2028) are the proposed clear span bridge crossing WF-HF4 and a short section of proposed internal access track (approximately 25 m either side of the proposed bridge crossing) as shown in the revised flood map in Figure 3-5.

A site-specific flood risk assessment (SSFRA) has been carried out to accurately identify the flood zones in the area. The SSFRA confirms the conclusion of the flood risk assessment in Chapter 10 of the EIAR in that the proposed Project will not increase the risk of flooding within and downstream of the site. The SSFRA is contained in Appendix 5. It is confirmed that the substation is not located in Flood Zone A and B.

3.3.1.1.3 OPW Observation 9 (iii)

Observation:

> *The Board should consider of the calculation of the Swale Volume as noted in Section 10.5.3 takes appropriate account of the fact that the swales will be in many cases at gradients with check dams, and that immediately downstream of the check dams, there will be little, or no depth of water stored in them.*

Response:

The calculation of volume takes into account the fact that the swales will often have gradients with check dams. Immediately downstream of the check dam, there will be little, or no water depth stored in swales. The figure below illustrates the estimated volume in the swale.

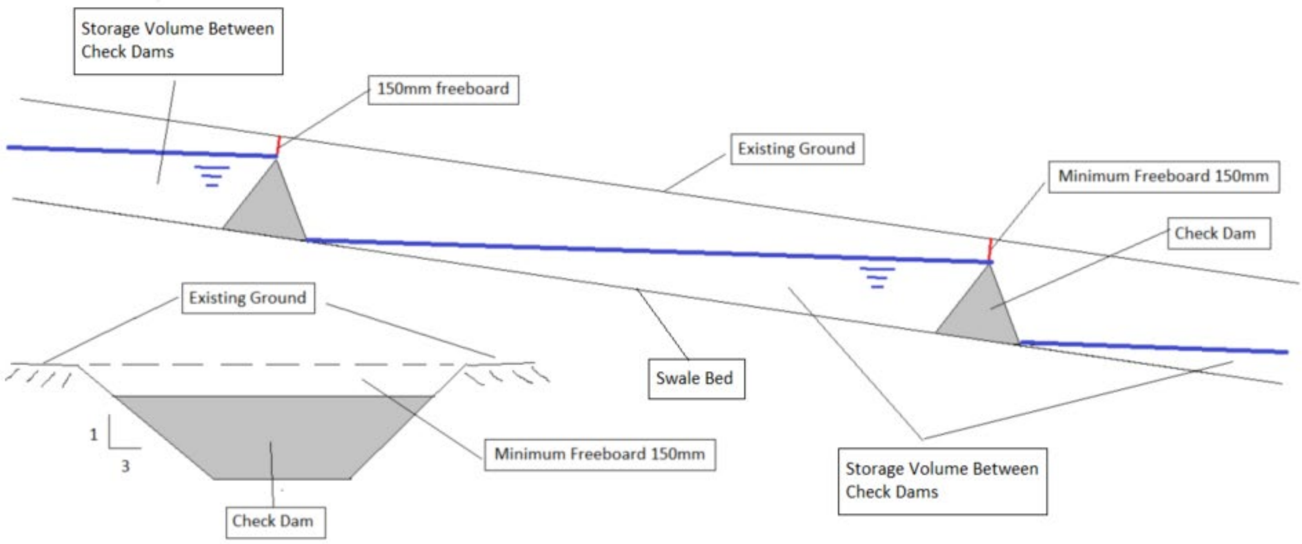

Figure 3-3: Storage Volume Between Check Dams

The design of the of the swales and associated check dams have been examined in detail as part of this response with a view to identifying the exact dimensions that would be required to accommodate a minimum freeboard of 150 mm between the crest of the check dam and the top of the swale.

These dimensions are as follows:

- Swale Base Width: 0.5m.
- Swale Depth: 0.5m.
- Swale Side Slopes: 1v:3h.
- Check Dam Height: 0.35m.

The storage volume obtained between check dams, for gradients larger than 0.2%, is approximately 69186,918 m^3. This volume exceeds the required storage volume by 32.5%, amounting to 52215,221 m^3. The space between the check dams will vary depending on the gradient of the swale.

In order to calculate the storage volume between check dams, it is necessary to estimate the cross-sectional area of the swale at a depth of 0.35 m, which corresponds to the height of the check dam. The cross-sectional area of the swale at this depth is approximately 0.543 m^2. When multiplied by the total length of the (25500mproposed internal access tracks (25,500m), it results in a volume of 13,833.75 m^3. To determine the storage volume between check dams, the obtained volume needs to be halved, resulting in a value of 6,918 m^3.

3.3.1.1.4 OPW Observation 9 (iv)

Observation:

> *It is indicated in Section 10.5.4 that the flow estimation for the new crossings is based on FSU methodology and FSU catchment descriptors. This information (FSU methodology and descriptors) are quite unsuitable for flow estimation for small catchments of the size indicated in table 10-11. For Section 50 consent purposes, the flows should be estimated using a suitable range of methods, and modified to an appropriate confidence level, based on risk, before being used for Hydraulic assessment in support of a Section 50 application.*

Response:

Flow calculations have been re-examined as part of this response and have been estimated using a range of methods as described in the Site Specific Flood Risk Assessment. Please see Appendix 5 for details.

As part of this process, a consultation meeting took place between FT and the OPW on the 1st of December 2023. Feedback from this consultation directly informed the flow estimation methodology used in the final flood model.

See Appendix 5 for further details on calculation methodology.

3.3.1.1.5 OPW Observation 9 (v) & (vi)

Observation:

> *(v): The flows indicated in Table 10-11 for the various proposed crossings seem low to very low for the catchment sizes indicated and are quite unlikely to be acceptable for Section 50 consent purposes. The growth curve (1.96) indicated in Section 10.5.4 is possibly inappropriate for use with the index flood indicated.*

(vi): The Board should consider, further to the previous point, if the flows estimated for use in the FRA are appropriate for the purpose.

Response:

Flow calculations have been re-examined as part of this response and have been estimated using a range of methods as described in the Site Specific Flood Risk Assessment. Please see Appendix 5 for details.

As part of this process, a consultation meeting took place between FT and the OPW on the 1st of December 2023. Feedback from this consultation directly informed the flow estimation methodology used in the final flood model.

See Appendix 5 for further details on calculation methodology.

3.3.1.1.6 OPW Observation 9 (vii)

Observation:

> Figure 10.3 is entitled 'OPW Flood Data'. The main flood information shown in this figure is the flood extent information as estimated in the PFRA, as referred to above. It is also noted that the watercourses are shown in a very similar colour to the flood extent information that was produced in the PFRA, leading to the possible misleading understanding that the flood extents shown on this drawing are more extensive than they should be. The PFRA information on the figure is completely in-appropriate for use in this context, as noted above, and further, the potentially misleading nature of the presentation of the information is a cause for concern.

Response:

A copy of Figure 10.3 of the EIAR is included overleaf. As part of this response, a new flood data figure has been prepared showing indicative flood extents based on current indicative river flood extents from floodinfo.ie. See Figure 3-5.

As can be seen in the above reference figure, existing watercourses are clearly discernible from the indicative flood zones A and B. In addition to this, a site-specific flood risk assessment (SSFRA) has been carried out to accurately identify the flood zones in the area. The SSFRA confirms the conclusion of the flood risk impact assessment in Chapter 10 of the EIAR in that the proposed Project will not increase the risk of flooding within and downstream of the site. The SSFRA is contained in Appendix 5.

Path: R:\Map Production\2019\P2114\Workspace\EIAR\P2114_GIS_Fig10-3_OPWFloodData_Overview_A3.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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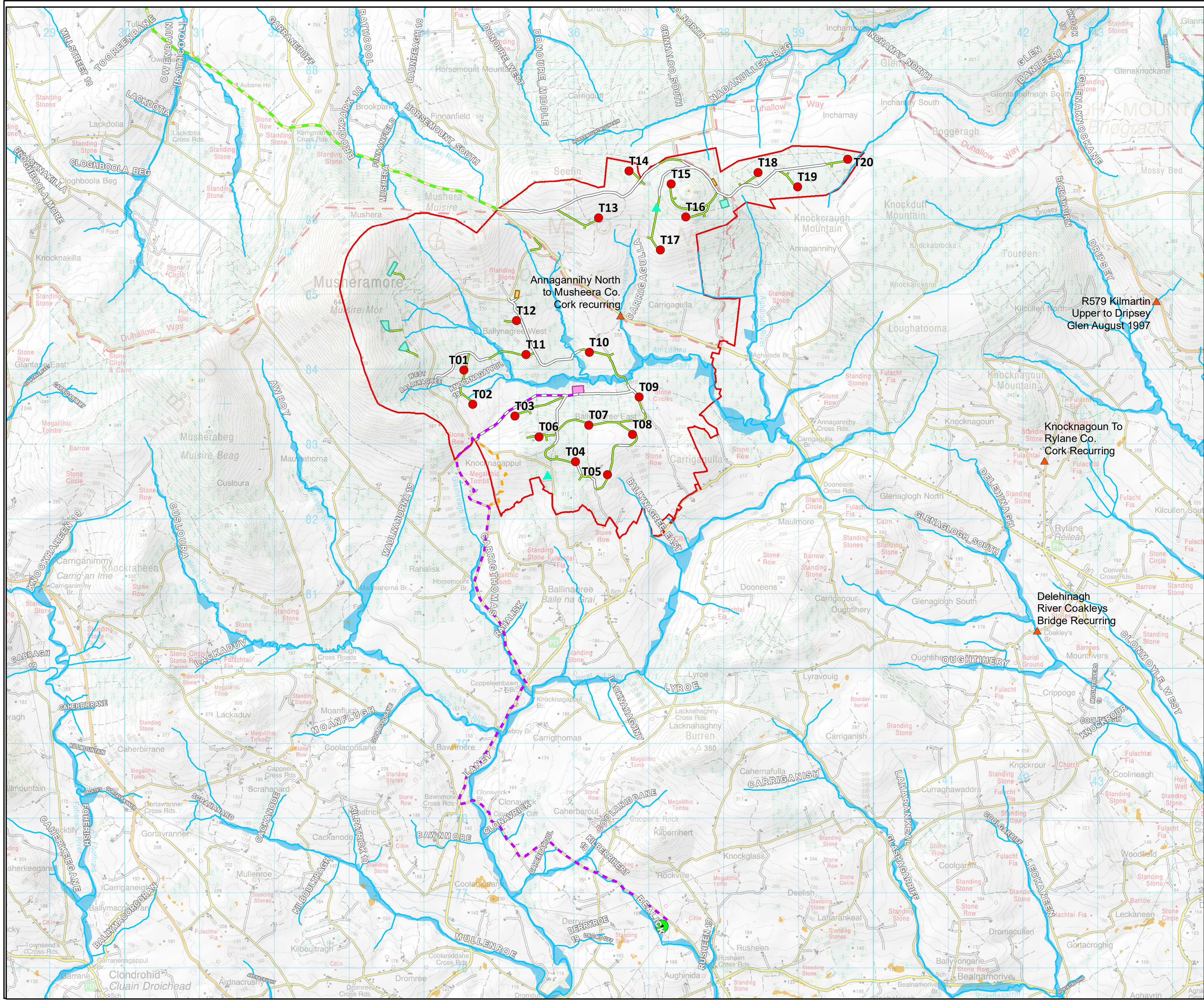

- OPW Historic Flood Points
- Substations (110-220kV)
- Met Mast
- Proposed Turbine Layout
- Grid Connection
- Grid Connection Route Variant
- Rivers
- Turbine Delivery Route
- Existing Track Upgrade
- New Access Track
- PFRA 1% AEP Pluvial Flood Extent
- PFRA 1% AEP Fluvial Flood Extent
- Temporary Construction Compound
- Proposed Wind Farm Site
- Substation Compound
- Proposed Borrow Pits

0 0.5 1 2 Kilometers

TITLE:	OPW Flood Data		
PROJECT:	Ballinagree Wind Farm		
FIGURE NO:	10.3		
CLIENT:	Coillte & Brookfield		
SCALE:	1:50000	REVISION:	0
DATE:	11/05/2021	PAGE SIZE:	A3

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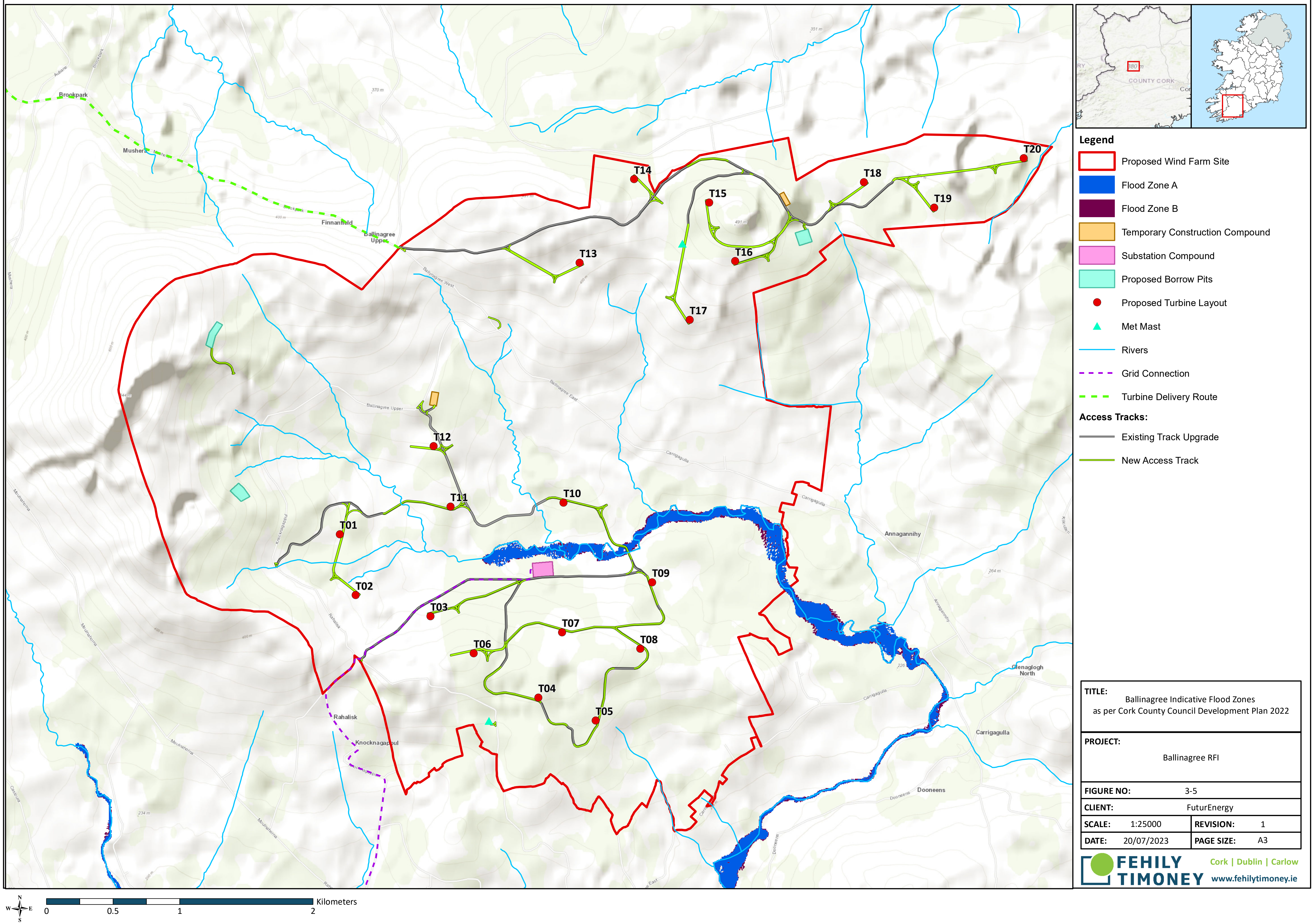
Path: R:\Map Production\2023\P23-129\Workspaces\P23_129_GIS_Fig3-5_Indicative_Flood_Maps_A3.mxd



TITLE: Ballinagree Indicative Flood Zones as per Cork County Council Development Plan 2022	
PROJECT: Ballinagree RFI	
FIGURE NO: 3-5	
CLIENT: FuturEnergy	
SCALE: 1:25000	REVISION: 1
DATE: 20/07/2023	PAGE SIZE: A3

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3.3.1.2 Item 3 (b) - Contended Errors / Contradictory Information in EIAR

3.3.1.2.1 OPW Observation 11 - Turbine Delivery Route

The OPW report notes that at TDR Node POI 38 there is an indication on the EPA website that there is a watercourse potentially crossing the site where it is proposed to carry out temporary accommodation works to facilitate turbine component deliveries.

The site in question is a paved forecourt associated with the Dairygold Co-op store at Millstreet at the junction between the R583 and L112. As described in Section 3.3.5.2 of Chapter 3 of the EIAR, the works at this location involve the following:

> *Relocation of utility poles and overhead lines. Removal of walls. Temporary removal of street furniture. Placement of load bearing surface on third party land. Overrun and oversail of public road footpaths. Suspension of parking.*

During site surveys as part of the EIAR , the stream in question ('FINNOW (BLACKWATER)_040') was found not to cross the area in question as indicated on EPA mapping. It is possible that this stream was diverted and/or culverted in the past when developing the public road and surrounding urban environment. See figures below illustrating.

The nearest open waterbody associated with this location is the 'MILLSTREET_18' stream to the west of the above site and there is no interaction with this stream.

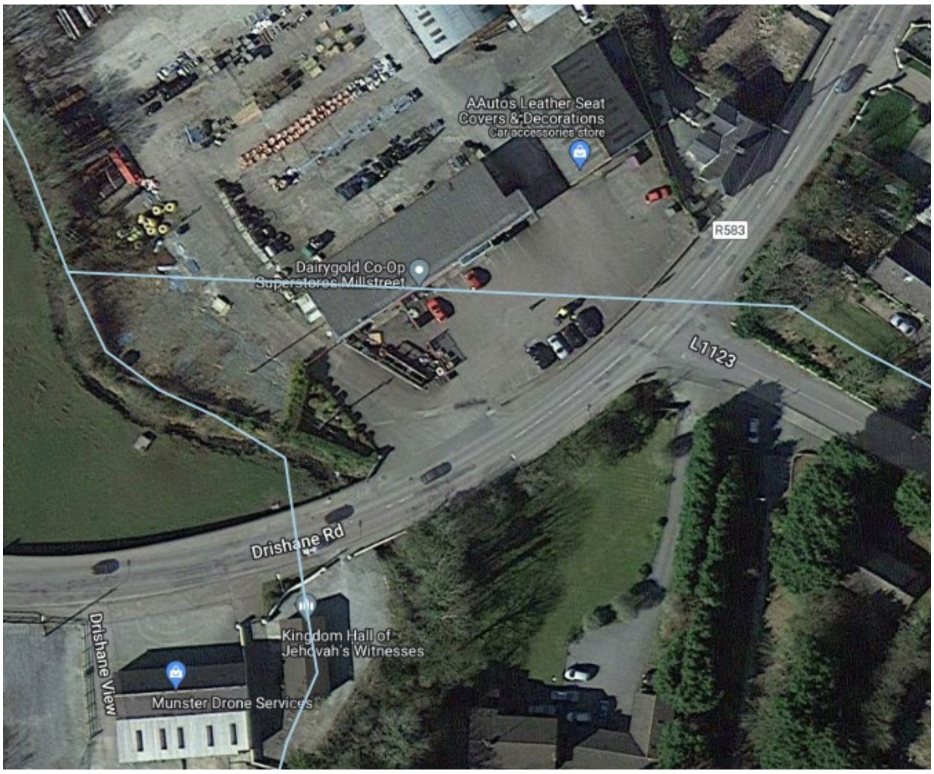


Figure 3-6: Figure Showing Watercourse Crossing Dairygold Co-Op Entrance and Car Park as Indicated on EPA Mapping

Figure 3-7: View of Dairygold Co-op Store Entrance and Car Park (POI-38)

3.3.1.2.2 OPW Observation 13 - Locations of Hydrology Features

The OPW report states that the co-ordinates of existing hydrology features are given in Table 10-7 but not given in Table 10-11 for new crossings.

Table 10-7

Following a review of Table 10-7, discrepancies were noted with respect to the feature coordinates shown. These were typographical errors. A revised Table 10-7 has been included here which includes the correct ITM coordinates for all features listed.

Table 2-3: Revised Table 10-7 - Existing Hydrology Features

Feature ID	ITM_X	ITM_Y	General description
WF-HF1	535201.42	583555.62	Cross drain, 450mm dia. pipe
WF-HF2	535872.40	583699.56	Forestry pipe drain, 450mm dia.
WF-HF3	536174.22	583720.06	Cross drain, 450mm dia. pipe
WF-HF7	534024.55	583792.69	Pipe culvert, 1000mm dia. pipe
WF-HF8	535351.81	585631.49	Bridge
WF-HF9	535968.55	584260.95	Ford
WF-HF10	535672.57	586172.37	Cross drain, 450mm dia. pipe
WF-HF11	536277.94	586388.27	Cross drain, 450mm dia. pipe
WF-HF12	536860.02	586589.36	Cross drain, 450mm dia. pipe
WF-HF13	538070.76	586369.22	Cross drain, 450mm dia. pipe
WF-HF14	537922.59	586405.21	Cross drain, 450mm dia. pipe

Feature ID	ITM_X	ITM_Y	General description
WF-HF15	537459.04	586737.52	Cross drain, 450mm dia. pipe
WF-HF16	536621.14	583891.98	Ford

Table 10-11

A revised Table 10-11 has been included here which includes ITM coordinates for all features listed.

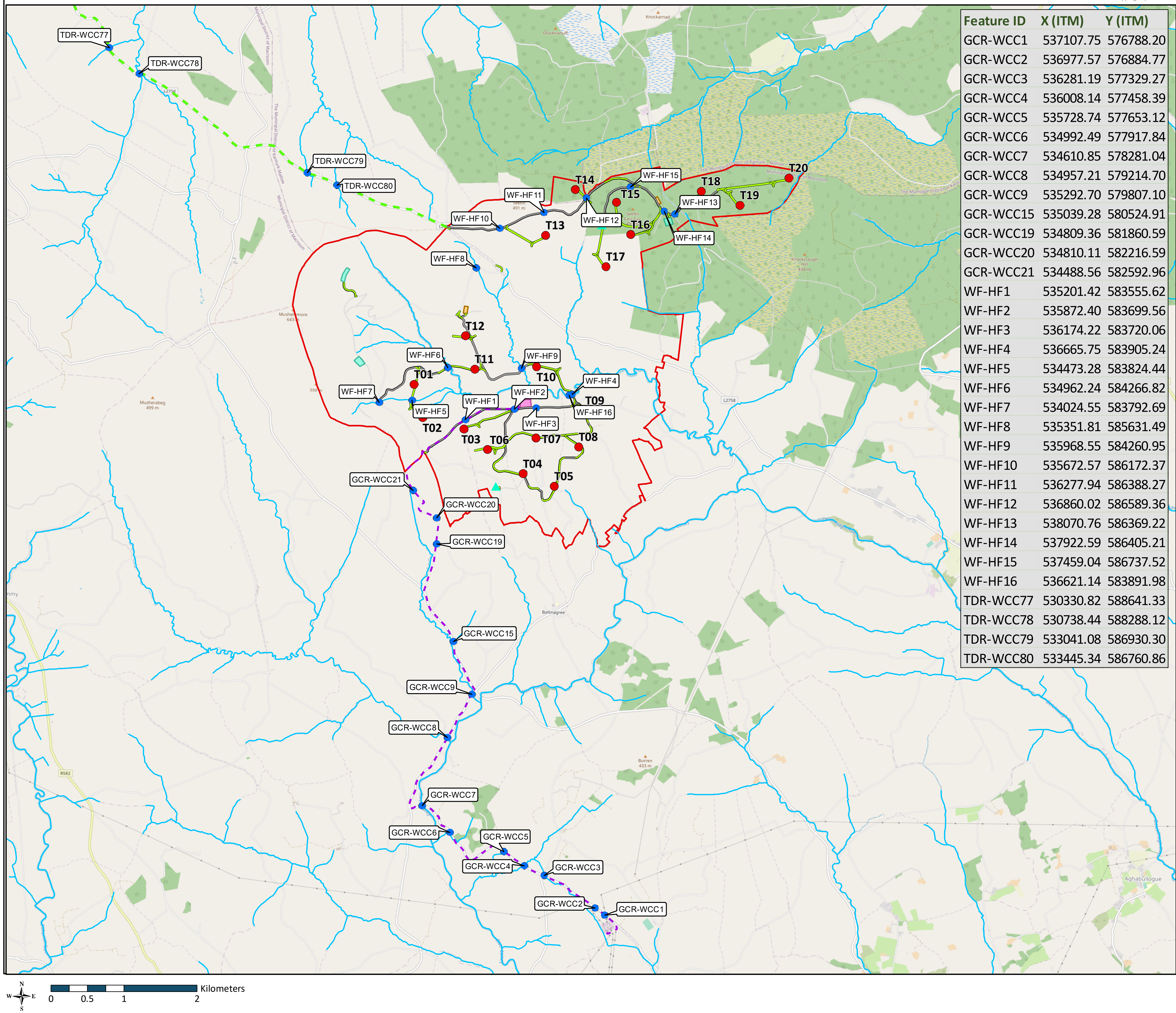
Table 2-4: Revised Table 10-11 - Sizing of Crossing Structures

ID	ITM_X	ITM_Y	Catchment Area (km²)	1%AEP (m3/s)	1%AEP MRFS (m3/s)	Proposed Structure
WF-HF4	536665.75	583905.24	9.79	10.8	12.96	Single span bridge
WF-HF5	534473.28	583824.44	0.54	0.99	1.19	Pre-cast box culvert – 2000mm x 1100mm
WF-HF6	534962.24	584266.82	3.2	4.61	5.53	Pre-cast box culvert – 2500mm x 1700mm
WF-HF8	535351.81	585631.49	0.43	0.19	0.64	Single span bridge
WF-HF9	535968.55	584260.95	2.31	2.88	3.46	Pre-cast box culvert – 2000 x 1700mm

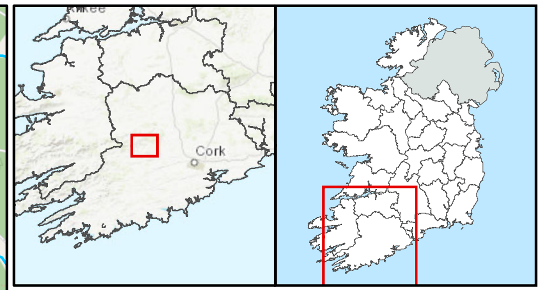
Figure 10-5

A revised Figure 10-5 has been included here which includes cross references to the locations of structures listed in Table 10-7. The revised figure includes ITM coordinates for all hydrological features shown.

Path: R:\Map Production\2023\P23-129\Workspaces\P23_129_GIS_Fig10-5_HydrologyFeatures_New_A3.mxd



Feature ID	X (ITM)	Y (ITM)
GCR-WCC1	537107.75	576788.20
GCR-WCC2	536977.57	576884.77
GCR-WCC3	536281.19	577329.27
GCR-WCC4	536008.14	577458.39
GCR-WCC5	535728.74	577653.12
GCR-WCC6	534992.49	577917.84
GCR-WCC7	534610.85	578281.04
GCR-WCC8	534957.21	579214.70
GCR-WCC9	535292.70	579807.10
GCR-WCC15	535039.28	580524.91
GCR-WCC19	534809.36	581860.59
GCR-WCC20	534810.11	582216.59
GCR-WCC21	534488.56	582592.96
WF-HF1	535201.42	583555.62
WF-HF2	535872.40	583699.56
WF-HF3	536174.22	583720.06
WF-HF4	536665.75	583905.24
WF-HF5	534473.28	583824.44
WF-HF6	534962.24	584266.82
WF-HF7	534024.55	583792.69
WF-HF8	535351.81	585631.49
WF-HF9	535968.55	584260.95
WF-HF10	535672.57	586172.37
WF-HF11	536277.94	586388.27
WF-HF12	536860.02	586589.36
WF-HF13	538070.76	586369.22
WF-HF14	537922.59	586405.21
WF-HF15	537459.04	586737.52
WF-HF16	536621.14	583891.98
TDR-WCC77	530330.82	588641.33
TDR-WCC78	530738.44	588288.12
TDR-WCC79	533041.08	586930.30
TDR-WCC80	533445.34	586760.86



Legend

- Proposed Wind Farm Site
- Temporary Construction Compound
- Substation Compound
- Proposed Borrow Pits
- Proposed Turbine Layout
- Met Mast
- Hydrological Features New
- Rivers
- Grid Connection
- Turbine Delivery Route

Access Tracks:

- Existing Track Upgrade
- New Access Track

TITLE: Hydrology Features	
PROJECT: Ballinagree Wind Farm	
FIGURE NO: 10.5	
CLIENT: Coillte (Future Energy Ireland) and Ørsted	
SCALE: 1:50000	**REVISION:** 1
DATE: 28/06/2023	**PAGE SIZE:** A3

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3.3.1.2.3 OPW Observation 14 - Consultation

According to the OPW report, it was indicated in Section 10.5.4 of the EIAR that a consultation meeting took place with an OPW representative on site. This is a typographical error, and the meeting was in fact with a representative of Inland Fisheries Ireland (IFI).

In Section 10.2.5 of Chapter 10 of the EIAR in the context of consultation to inform the assessment the following is stated:

> *On-site meeting with IFI was carried out in April 2021 during which watercourse crossing methods at key locations was discussed, and the proposed approach to the drainage design, water crossings and in-stream works was agreed in principle.*

The EIAR section referenced by OPW in their observation contains the following:

> *The proposed culverts will be embedded 500mm into the riverbed as instructed by the OPW representative during the site meeting*

In a previous paragraph on the same page (page 45), the following is stated with respect to the OPW and IFI.

> *Prior to the commencement of the construction stage, a Section 50 application for consent from the Commissioners of Public Works will be made to the OPW for the replacement of this existing bridge and new crossing structures listed in Table 10-11.*
>
> *This exercise has been carried out to provide a sizing of the proposed crossing structures. At hydrology features WF-HF4 and WF-HF8 a single span bridge and at WF-HF5, WF-HF6 and WF-HF9 a pre-cast box culvert is proposed and agreed with the IFI representative during the site meeting.*

3.3.1.3 Item 3 (c) - Contended Issues with Regard to Flow Estimation Calculations and Swale Volumes

Please refer to Section 3.3.1.1 where this item is addressed.

3.3.1.4 Item 3 (d) - Design of Watercourse Crossings WF-HF5 and WF-HF8 and Accordance with OPW Requirements

OPW have made observations on the design of the proposed watercourse crossings WF-HF5 and WF-HF8 and queried whether or not they will be acceptable for Section 50 consent in accordance with OPW requirements. The following provides clarification on the design of these structures and confirms that, in both cases, the proposed crossings are compliant with Section 50 requirements.

<u>Proposed culvert crossing WF-HF5.</u>

As described in Chapter 10 of the EIAR, it is proposed to install a pre-cast concrete culvert at this location. The design of the proposed crossing is shown on planning drawing P2114-0300-0015 and described in Table 10-11 of the EIAR. A copy of the above drawing is contained in Appendix 3 of this report.

OPW have interpreted, following a review of the above drawing, that the bed level of the watercourse may need to be altered to facilitate the crossing. This will not be the case. The leader showing 'Existing Ground Level' on the drawing indicates the existing ground level at the top of the stream bank according to topographic data. The leader showing 'Stream/Drain Bed' on the drawing indicates the existing bed levels measured from site which will not be altered. The existing horizontal and vertical alignments of the watercourse will not be interfered with to accommodate the new culvert.

The above clarification is applicable to all 0300-Series planning application detail drawings showing proposed watercourse crossing structures. Namely drawings numbered:

- P2114-0300-0014: Proposed Watercourse Crossing Detail - WF-HF4
- P2114-0300-0015: Proposed Watercourse Crossing Detail - WF-HF5
- P2114-0300-0016: Proposed Watercourse Crossing Detail - WF-HF6[8]
- P2114-0300-0017: Proposed Watercourse Crossing Detail - WF-HF8[9]
- P2114-0300-0018: Proposed Watercourse Crossing Detail - WF-HF9[10]

As described in Chapter 10 of the EIAR and CEMP (Appendix 3.1 of the EIAR), proposed box culvert crossings shall be embedded 500 mm into the riverbed as agreed with IFI and suitable bedding material in the form of clean round gravel between 10-100 mm diameter, shall be laid in the base of the pipe in accordance with *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Watercourses* from Inland Fisheries Ireland, 2016. In all cases, crossings are designed to convey 1% AEP storm event with 20% climate change allowance and a minimum 300 mm freeboard elevation as described in Chapter 10 of the EIAR.

Proposed bridge replacement WF-HF8

As described in Chapter 10 of the EIAR, it is proposed to replace an existing bridge at this location. The design of the proposed crossing is shown on planning drawing P2114-0300-0017 and described in Table 10-11 of the EIAR. A copy of the above drawing is contained in Appendix 3 of this report.

The structure and bank of the watercourse has been designed to be safe against the effects of scour and erosion in accordance with Section 50 requirements.

A construction methodology is contained in Section 3.3.1.9 of the CEMP in Appendix 3.1 of the EIAR. This includes the installation of bank protection to ensure that disturbance to the existing stream banks are minimised during construction.

Impact of SSFRA on Proposed Internal Watercourse Crossing Designs

Following completion of the SSFRA as part of this RFI process, internal watercourse crossings with potential for interaction with modelled fluvial flood zones were re-examined in detail, with design recommendations made to be incorporated into the designs of 4 no. crossings to confirm compliance at this stage with Section 50 requirements. For details of the proposed SSFRA design recommendations please refer to Appendix 5.

[8] Incorrectly references watercourse crossing WF-HF8 on planning drawing index (sheet 2 of 2).

[9] Incorrectly references watercourse crossing WF-HF9 on planning drawing index (sheet 2 of 2).

[10] Incorrectly references watercourse crossing WF-HF6 on planning drawing index (sheet 2 of 2).

3.3.1.5 Other Observations Raised by OPW

3.3.1.5.1 Observation 12 - Maintenance

The OPW Observation states:

> *It is noted that the FRA identifies a number of features to be constructed as part of the development. It is recommended that a regular maintenance regime should be adopted for the inspection and maintenance of these features to the as-designed condition, for the duration of the project and not just the construction period.*

The content of this observation is noted. It is respectfully requested that the Board add a condition to agree the maintenance regime for these features prior to commencement of development in the event of a grant of permission.

It should be noted that the proposed SuDs based drainage design approach will ensure that existing drainage patterns will be maintained throughout the site as described in Chapter 10 of the EIAR. Additionally, an operation and maintenance plan will be implemented throughout the proposed wind farm operational phase.

3.3.1.5.2 Observation 15 - Landslides

The OPW Observation states:

> *It is understood that there is a history of landslides associated with developments of this nature in the past and therefore this should be assessed and addressed by the designers to the satisfaction of the planning authority.*

We refer the Board to Volume 2, Chapter 9 - Land, Soil, Hydrogeology and Geology of the EIAR submitted with the original application.

Comprehensive slope stability and peat stability assessments were carried out as part of the project including a detailed site investigation campaign. There was no evidence of active or historical slope instability observed across the site during the site walkover. There are no historical records of landslide activity within or close to the site, according to the GSI database.

The site walkover and ground investigations including trial pits and boreholes, peat probing, and shear vane testing were all carried out across the site along with a detailed slope stability assessment that resulted in the Factor of Safety across the site to be above the minimum recommended limit, indicating a low risk of slope instability. Both peat stability and general slope stability are included in this assessment.

The Land, Soil, Hydrogeology and Geology assessment concluded in Section 9.8 that,

> *The proposed development site is not a sensitive site in terms of land, soil hydrogeology & geology and poses a low risk for peat slippage.*

3.4 Item 4: Response to Cork County Council Submission

You are requested to provide a detailed response to the matters raised in the submission made by Cork County Council. In particular, this should include a response to the list of items contained in Appendix B of said submission.

3.4.1 Response

3.4.1.1 Ecology Submission

It is noted that there are a number of detailed ecology related items within the Cork County Council submission. All items are addressed in detail in Appendix 6 of this document through the ecology submission prepared by Ecology Ireland Limited.

It is noted that there are comments raised by the Cork County Ecologist relating to the positioning of a number of turbines on the site, with a suggestion to remove T2, T3, T13 and T17 to avoid impacts on upland peatland habitats of biodiversity value. In the following two sections we respond to this, setting out how the proposed development was designed with the siting of the turbines determined by an iterative process and also how the comments made in respect of turbines in upland peat areas are at odds with precedent examples within the County. This section concludes that Cork County Council's objection in principal to locating turbines in upland peat areas is not consistent with European Council Regulation (EU) 2022/2577[11] which is discussed in Section 3.1.1.3.1 above, in particular by seeking to afford strict protection to all habitats it is not proportional or balanced and ignores the principles identified in the Habitats Directive.

3.4.1.1.1 Policy and Precedent

It is noted that the Cork County Council Ecologist sets out the rational for the omission of the 4no. proposed wind turbines. It is submitted that Cork County Council in its Ecological report goes beyond what is required under the Cork County Development Plan 2022 and attempts to establish an impractical standard which is inconsistent with accepted conservation practice. For example, the Habitats Directive does not afford Annex I habitat strict protection, this is reserved for Annex IV species. The system for protecting Annex I habitat (for example peatlands) is the identification and designation of SAC's in a balanced way to achieve the conservation of these habitats in a balanced way having regard to wider *"economic, social and cultural requirements"* (Art 2(3)).

In the first instance, we would highlight that the proposed wind farm site remains designated as an area where wind energy is open to consideration on the Cork County Council Wind Strategy Map. Accordingly, it is submitted that the request to remove a number of turbines due to their location is not in accordance with the Policies and Objectives of the Development Plan.

[11] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022R2577.

Section 13.6.7 of the Cork Development Plan states with regard to the Open to Consideration designation:

> *" Within these areas there are locations that may have potential for wind farm developments but there are also some environmental issues to be considered. This area has variable wind speeds and some access to the grid. Urban areas, metropolitan/town green belts, and Natural Heritage Areas (NHA's) within this area are not generally considered suitable for wind farm developments. The area excludes Natura 2000 sites. Any proposals within Freshwater Pearl Mussel Sub Basin Catchments or in other sensitive catchments must be able to demonstrate that they have been designed in a manner which prevents any risk of peat slippage or erosion; and ensures the ongoing protection of water quality and the maintenance of natural hydrological processes. The cumulative effect of wind energy developments with regard to landscape and visual impacts and also impacts on Natura 2000 sites will also be a consideration. High design standards in terms of environmental protection measures are likely to be required to be included in projects located in sensitive catchments."*

Further to this Objective ET 13-7: Open to Consideration states:

> *"Commercial wind energy development is open to consideration in these areas where proposals can avoid adverse impacts on:*

- Residential amenity particularly in respect of noise, shadow flicker and visual impact;
- Urban areas and Metropolitan/Town Green Belts;
- Natura 2000 Sites (SPA's and SAC's), Natural Heritage Areas (NHA's), proposed Natural Heritage Areas and other sites and locations of significant ecological value.
- Architectural and archaeological heritage;
- Visual quality of the landscape and the degree to which impacts are highly visible over wider areas.

> *In planning such development, consideration should also be given to the cumulative impacts of such proposals."*

Part c) of Policy BE- 15-2: Protect sites, habitats and species is also noted, this states:

> *"Protect and where possible enhance areas of local biodiversity value, ecological corridors and habitats that are features of the County's ecological network. This includes rivers, lakes, streams and ponds, peatland and other wetland habitats, woodlands, hedgerows, tree lines, veteran trees, natural and semi-natural grasslands as well as coastal and marine habitats. It particularly includes habitats of special conservation significance in Cork as listed in Volume 2 of the Plan."*

As evidenced in the EIA submitted as part of the planning application (e.g. Section 9.8 of Chapter 9 - of the EIAR), and further bolstered by this Further Information Response Report and associated appendices, the proposed Project is not considered to result in peat slippage or injure the water quality or natural hydrological processes.

Within Section 8A.3.2 of Volume 2, Chapter 8A - Biodiversity of the EIAR submitted with the application it is stated that:

> *…historic cut-over bog PB4 and wet heath HH3 and cutover bog PB4 mosaic are also found to the north and south of the study area. These habitats are highly degraded or disturbed and while at least some pockets of wet heath HH3 Annex 4010 may persist within these habitat areas, through the process of constraints led design any potential higher quality habitat was as far as possible avoided and as such the proposed development works footprint is confined to very degraded peatland habitats of lower local importance.*

Accordingly, whilst the site is in an upland area, it is located on degraded peatland as well as agricultural lands. The Development Plan policy is not considered to specifically relate the proposed development, as the peatlands which are sought to be protected are Annex 1 peatlands, not present in the location of proposed turbines. Specific information on the habitats on site can be found within Volume 2, Chapter 8A - Biodiversity of the EIAR as well as Appendix 6 of this Report.

It would appear that the Cork County Ecology report opposes the location of turbines on upland peatland on grounds of principle rather than site specific circumstances. FT carried out a mapping exercise to ascertain if there is precedent where wind farm developments have been permitted, and implemented, in areas of upland peatland habitats.

We refer to Appendix 3 of this Report which shows a series of maps which have been prepared showing Wind Farms as of June 2022 using information from SEAI. The subject site is located in an area classified in the Cork County Council Development Plan as Ridged and Peaked Upland landscape character area. There are currently 3no. wind farms in similar character areas in County Cork. The Character Area detail has been included for completeness and to allow for the full context of precedent of development in areas classed as upland.

To provide further information regarding this, we have mapped wind farms as per SEAI which intersect peatlands based on the CORINE land cover data sheet. This intersection occurs in 9 instances in County Cork. Using the GIS Soils datasheet, this rises to 16 instances in County Cork where wind farms are present on peatland. These maps are also replicated in Figure 3-9 and Figure 3-10 below, however we recommend that the appendices are also viewed to enable the Board to see the full detail of these.

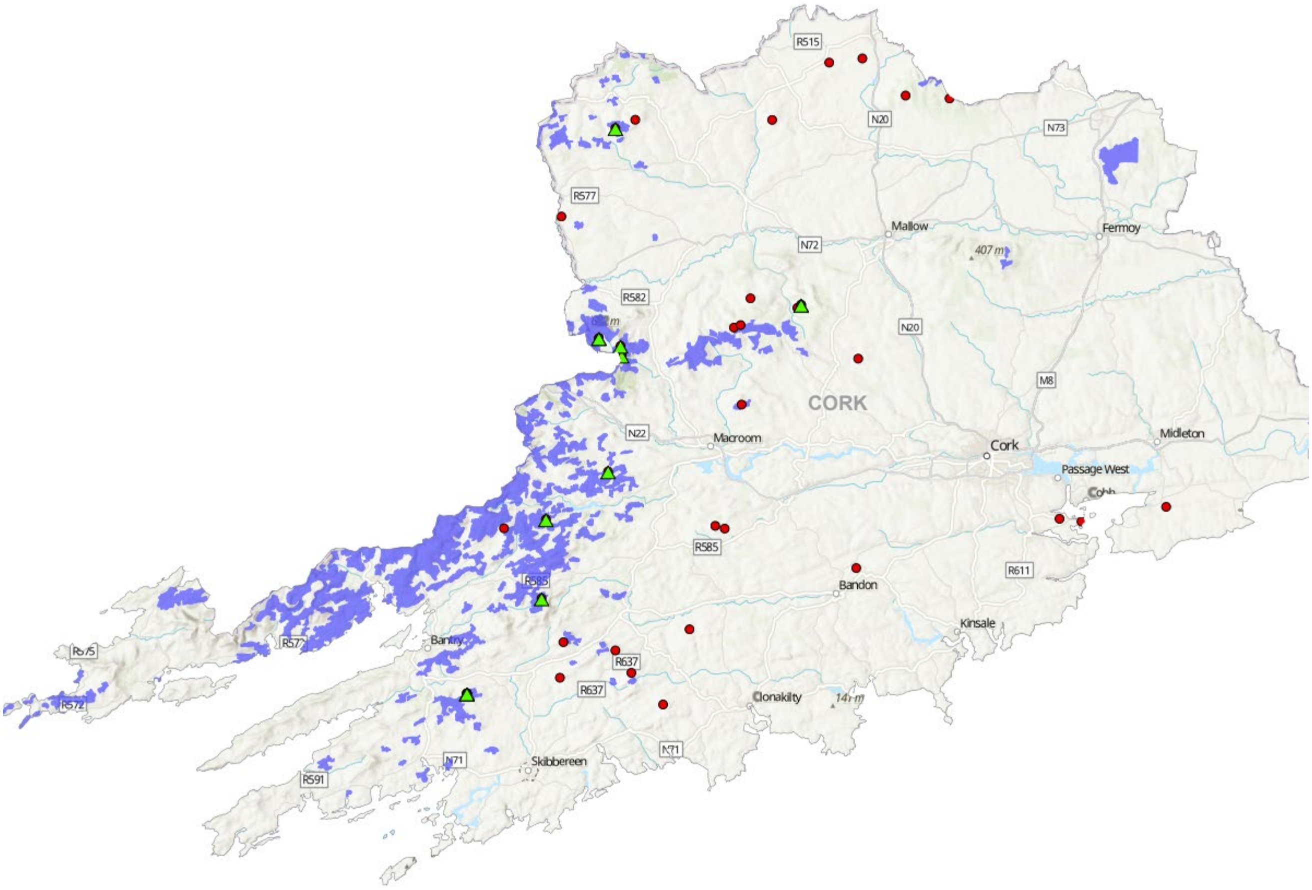

Figure 3-9: Windfarms Intersecting Peat Bogs based on CORINE Land Cover Datatset (Green Triangle)

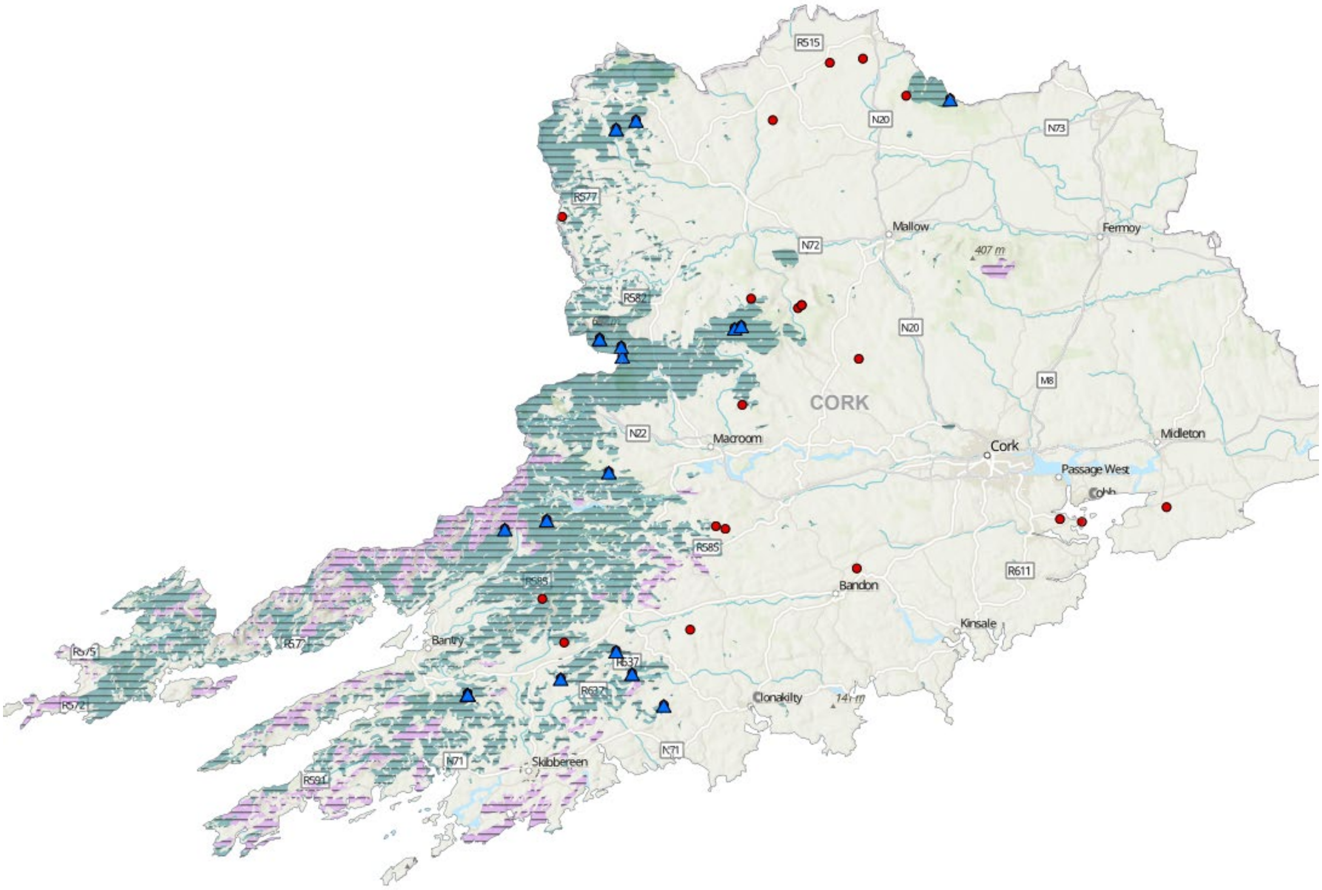

Figure 3-10: Windfarms Intersecting Peat Soil Type based on GSI Soils Dataset (Blue Triangle)

The key takeaway from this for the Board, is that the proposed development is not a 'one-off' wind farm located within an upland peat area, rather it has been accepted in numerous instances throughout the County. We respectfully request the Board to recognise that the layout and design of the project has avoided the most sensitive habitat and has avoided Annex 1 habitat and therefore the removal of turbines simply due to the fact that there are located in upland peat areas is not warranted and is not supported by the policies set out in the Cork County Development Plan 2022.

It is worth noting again that the Habitats Directive does not afford Annex I habitat strict protection, this is reserved for Annex IV species. The system for protecting Annex I habitat (for example peatlands) is the identification and designation of SAC's in a balanced way to achieve the conservation of these habitats in a balanced way having regard to wider *"economic, social and cultural requirements"* (Art 2(3)).

Outside of the SACs Member States are asked to ***'endeavour to encourage'*** *"management of features of the landscape which are of major importance for wild fauna and flora" being features which "by virtue of their linear and continuous structure… or their function as stepping stones are essential for the migration, dispersal and genetic exchange of wild species"* (Art 10).

As confirmed by Ecology Ireland, Section 8A.3.2 of Chapter 8A of the EIAR, the constraints led design approach ensured that confirmed/potential Annex I habitat features (including peat habitats) were located outside of the proposed development works footprint. The constraints led design approach also ensured that pockets of higher quality habitat potentially present within highly degraded or disturbed heath and/or bog habitats (i.e. peat habitats, e.g. Annex I 4010 wet heath HH3) were also avoided such that the proposed development works footprint is confined to very degraded peatland habitats of lower local importance (see Section 8A.3.2 of Chapter 8A of the EIAR).

Furthermore at a National Level, Appendix 4 of both the June 2006 Planning Guidelines for Wind Energy and 2019 Draft Revised Wind Energy Development Guidelines outline 'Best Practice for Wind Energy Development in Peatlands'. It is of note that these ***do not*** preclude wind energy proposals in peatland areas, rather they outline construction guidelines to reduce impacts.

It is also of note that other Local Authorities do not preclude wind energy outright on peatlands, instead having regard to potential impacts, in line with the national level wind energy guidelines. For example Section 3.4.1 of Chapter 3 of the 2021 - 2027 Offaly County Development Plan recognises:

> *"Offaly's extensive area of peatlands also offer considerable potential to accommodate the needs of the emerging and early deployment technologies for renewable energy and future energy storage on a regional scale such as data centres and battery energy storage."*

This further supported by Policy CAEP-16 of the 2021 - 2027 Offaly County Development Plan.

Similarly, from a review of other Development Plans in Ireland (Donegal, Mayo, Galway), it is noted that they do not appear to specifically preclude wind developments from areas of peat, and instead require the inclusion of a Peat Stability Assessment with wind energy proposals.

It is respectfully submitted that the request to remove a number of turbines due to their location in this carefully considered and designed scheme to avoid impacts on peatland is inconsistent with precedent wind farm developments in County Cork, the Cork County Development Plan and national guidelines for wind energy. It has been demonstrated that the proposed Project will not negatively impact on the surrounding peatland, and as such it is not considered necessary or reasonable to require the omission of turbines T2, T3, T13 and T17 from this scheme.

It is important also to reiterate European policy in the context of how the protection of habitats should be and are protected under the Habitats Directive. In essence the level of protection sought by Cork County Council in seeking to remove turbines T2,T3, T13 and T17 is akin to seeking to extend an SAC designation to all areas of upland peatland within the County which is unreasonable and contrary to the Habitats Directive.

Annex I habitats and Annex II species are identified as requiring the designation of sites to protect, maintain and restore these habitats and species. These SACs are identified having regard to the criteria set out in Annex III and having regard to wider "economic, social and cultural requirements". Member States are required to establish management plans for these sites to protect, maintain and restore the habitats and species within these sites which the sites have been designated for.

Outside these SACs Member States are asked to endeavour to encourage the "management of features of the landscape which are of major importance for wild fauna and flora" being features which "by virtue of their linear and continuous structure… or their function as stepping stones are essential for the migration, dispersal and genetic exchange of wild species" (Art 10).

Only those species identified in Annex IV are afforded strict protection from deliberate disturbance or destruction and even then, Art 16 recognises that this strict protection should be waived in specified circumstances - IROPI which renewable energy development is presumed to be under Council Regulation 2022/2577.

In order to demonstrate that the layout of the project has been optimally designed, Section 3.4.1.1.2 below clearly sets out how the design of the Project has adhered to the above principles by avoiding areas of Annex 1 Habitat and designed with regard to the 'Open to Consideration' designation of the site. It is also worth noting that the design has had regard to pre-planning advice provided by Cork County Council where it was advised that; *"…the site should be designed to avoid direct intervention within intact peat habitats and on other habitats of high natural value.".* A record of the advice is contained in Appendix 7.

3.4.1.1.2 Design Process as Pertains to T2, T3, T13 and T17 Areas

With respect to Cork County Council's suggestion to remove T2, T3, T13 and T17 to avoid impacts on upland peatland habitats of biodiversity value, significant consideration was made throughout the iterative design process to ensure that no significant effects on upland peatland habitats would occur as a result of the wind farm design.

As described in Section 2.3.4 of Chapter 2 of the EIAR, a constraints - led design philosophy was used to avoid environmental sensitivities and minimise potential negative environmental impacts. The design led philosophy was mitigation by avoidance in the first instance..

As described in Section 2.3.4.1 of Chapter 2 of the EIAR, the design has been carried out in accordance with industry guidelines and best practice, namely the Department of Environment, Heritage and Local Government’s (DoEHLG) Wind Energy Development Guidelines (2006) and the Irish Wind Energy Association Best Practice Guidelines (2012). The design process of the project has had regard to the Department of Housing, Planning and Local Government’s (DoHPLG) Draft Revised Wind Energy Development Guidelines (2019).

The constraints-led design approach consisted of the identification of environmental sensitivities within the project development study area by the design team with a view to identifying suitable areas in which wind turbines may be located. Mitigation by design utilised in the design with respect to habitats and peat areas included:

- Avoidance of designated sites;
- Avoidance of impact to sensitive species and habitats;
- Avoid areas of deep peat and steep gradient.

Once the developable area was established, the first design iteration of the Project was developed. The developable area was then further refined as additional constraints were identified throughout the environmental impact assessment process. The project design team worked closely with the EIAR Team including the project ecologists. This included data from detailed site surveys and habitat mapping by the project ecologist to determine suitable areas to locate infrastructure.

The design approach and evolution of design iterations is described in detail in Section 2.3.4 of Chapter 2 of the EIAR. Following initial constraints assessment and identification of developable areas within the site which included buffers to designated sites as well as other environmental sensitive receptors described in Section 2.3.4.1 of Chapter 2 of the EIAR, more detailed assessments and site surveys took place including habitat surveys, hydrological walkovers, peat probing and geotechnical site investigations which fed into the design process and informed decisions with respect to the positioning of turbines and associated civils infrastructure. Some key design decisions with respect to the four turbines in question, are described as follows:

At Design Iteration 1 stage, following initial site surveys and peat probing, 4 no. turbines; T03, T13 (T14*), T15 (T16*) and T16 (T17*)[12] were found to be on steeper slopes with peaty top soil. These turbines were re-located to avoid these areas.

At Design Iteration 2 stage, T02, T12 (T11*), T15 (T14*) and T16 (T15*) were moved following detailed habitat surveys to avoid areas of wet heath and peaty wet grassland. Following geotechnical site investigations T03, T05 (T6*), T13 (T12*), T15 (T14*) and T16 (T15*) were relocated to areas of more stable ground conditions away from steep slopes and areas of surface peat.

In addition to the siting of turbines to avoid encroachment on sensitive peatland habitat, careful consideration was also given to the design of associated internal access roads and hard standings. For example, with respect to turbines T02 and T03, these are approached from the north-west and east respectively through commercial forestry to avoid the placement of infrastructure within the separating area which is made up of a mosaic of habitats including acidic grassland, degraded wet heath and peaty wet grassland. This informed the civils layout design along with other considerations such as topography and slope stability. A turning head was included at each turbine hard standing to allow vehicles to reverse and turn out via the same access road instead of creating a looped arrangement by a connecting between T02 and T03 hard standings.

The final civils arrangement in this part of the site is illustrated in Figure 3-11.

[12] Turbine numbering listed here reflects numbering related to the Design Iteration in question. Refer to EIAR Chapter 2 for relevant figures illustrating same. (T00*) identifies the closest turbine associated with the final design iteration 3 layout numbering.

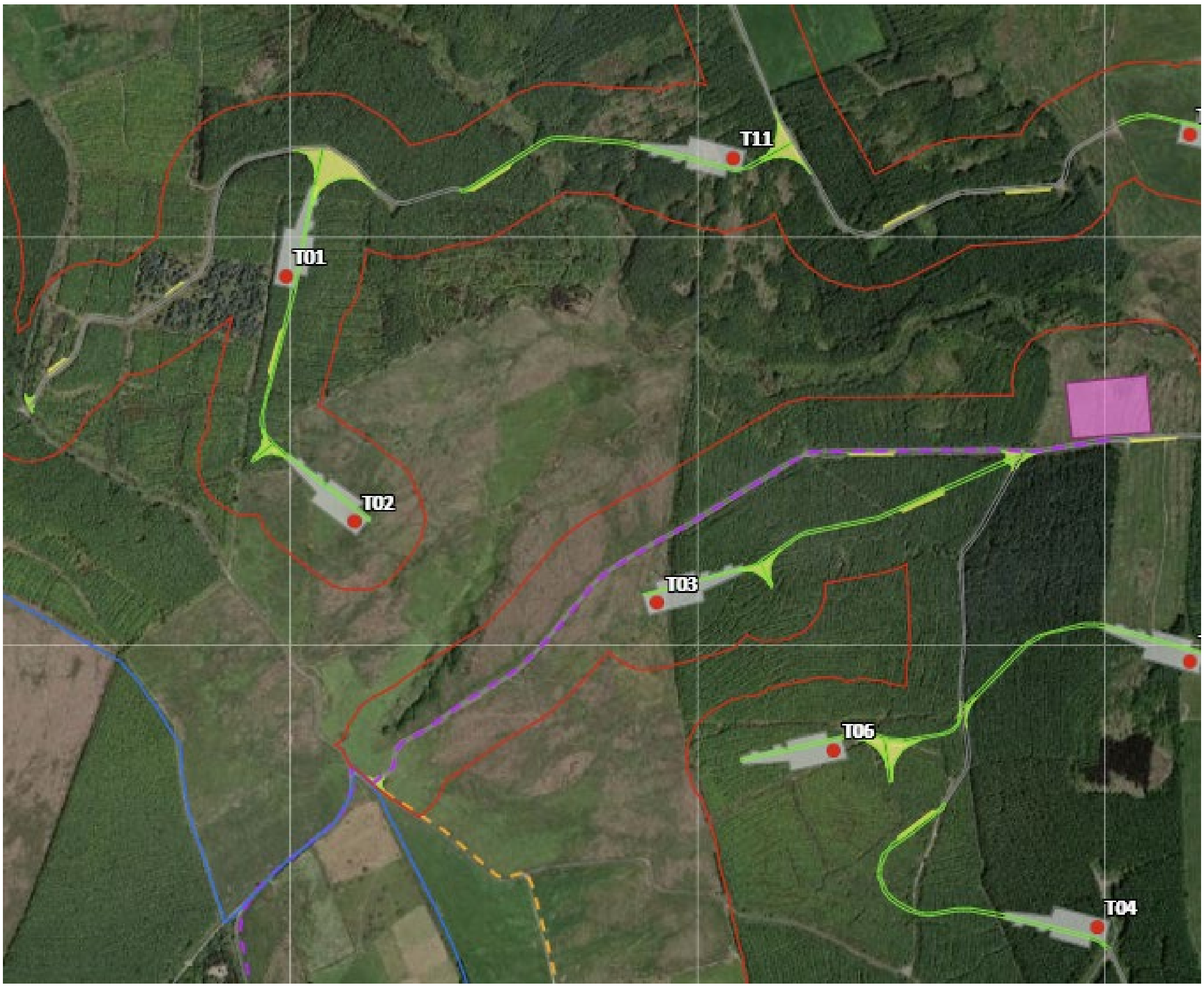

Figure 3-11: T02 and T03 Area Showing Final Civils Layout

For T13 and T17, care was taken in the design of the access roads, hard standings, turning heads and passing bays. In addition to topography and slope stability as well as other constraints, significant consideration was given to the avoidance of sensitive peatland habitat. Following several civils layout options, the final approach to T13 was taken from the north-west from the existing forestry access road. A turning head was included next to the hard standing to allow vehicles to reverse and turn out via the same access road instead of creating a looped connection with the existing access road the north near T14. This was to minimise the amount of road and hard standing infrastructure within this area which is comprised of a mosaic of historic cutover bog and wet heath. A similar 'cul-de-sac' approach was taken with the access to T17 which maximises the amount of proposed road infrastructure in commercial forestry while minimising infrastructure footprint within the lands designated as Wet/Damp HH3 (degraded/damaged). This approach from the north was favoured over a potential option from the east near T16. This option was ruled out due to potential interaction with mapped sensitive habitat to the south-east of T17.

Screenshots of draft designs for the T13 and T17 area as part of the development of the civils layout are shown in Figure 3-12 and Figure 3-13. The final Design Iteration 3 civils arrangement in this part of the site is illustrated in Figure 3-14 below.

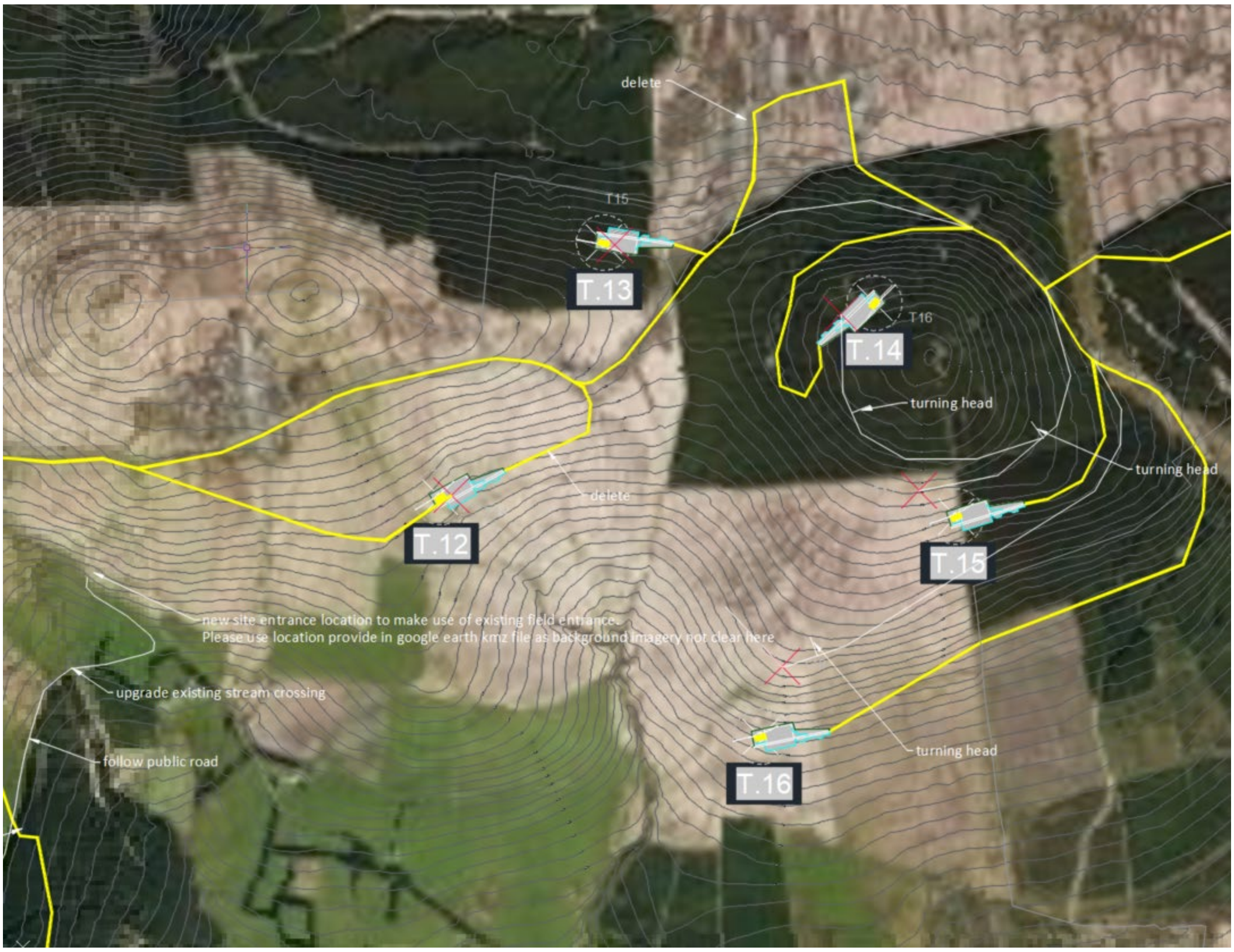

Figure 3-12: Screenshot of Draft Design Iteration 2 Civils Layout Concept for T13 and T17 Area[13]

[13] Turbine numbering in comparison with final numbering at Design Iteration 3 stage: T12 = T13, T16 = T17.

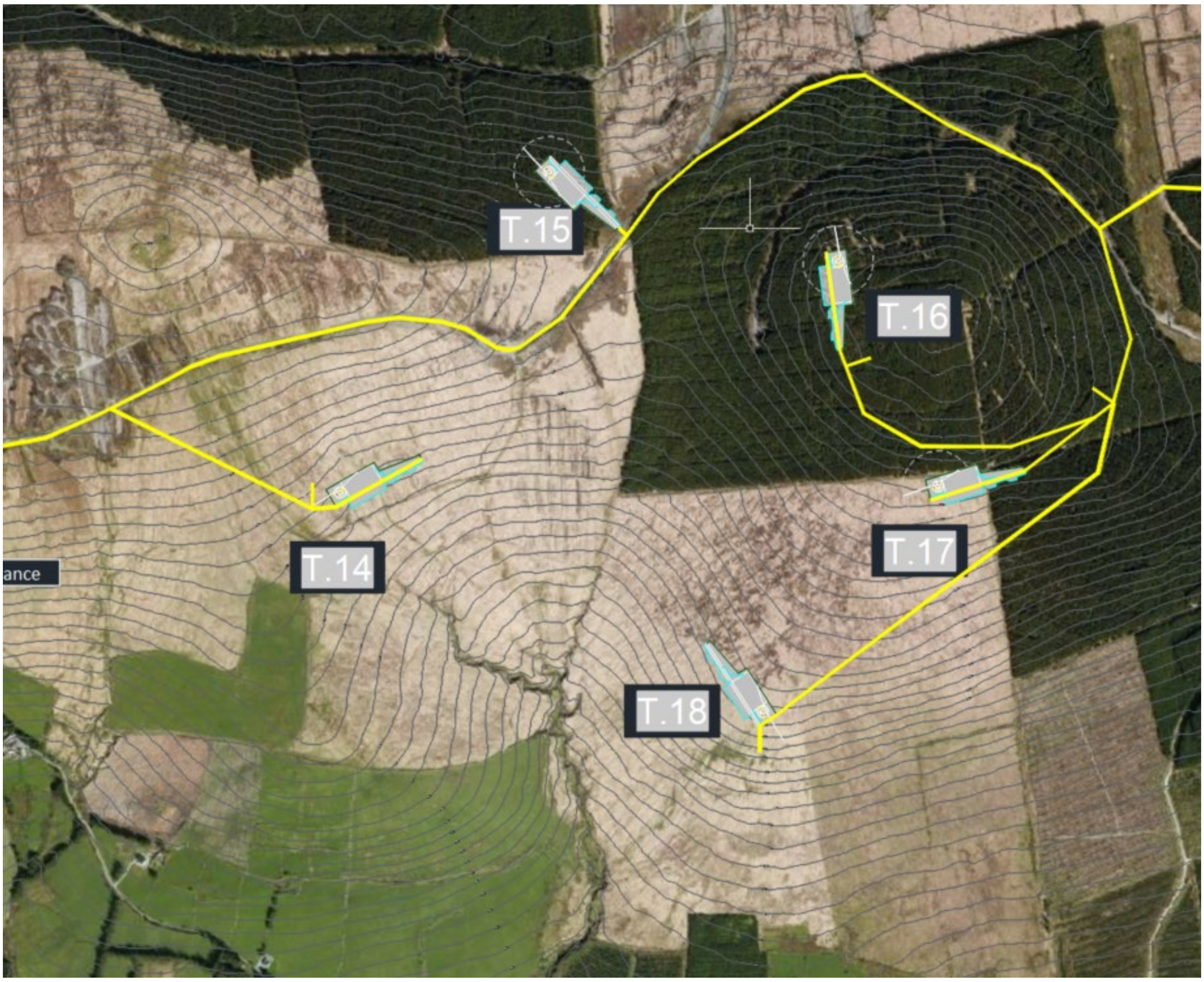

Figure 3-13: Screenshot of Draft Design Iteration 2 Civils Layout Concept for T13 and T17 Area[14]

[14] Turbine numbering in comparison with final numbering at Design Iteration 3 stage: T14 = T13, T18 = T17.

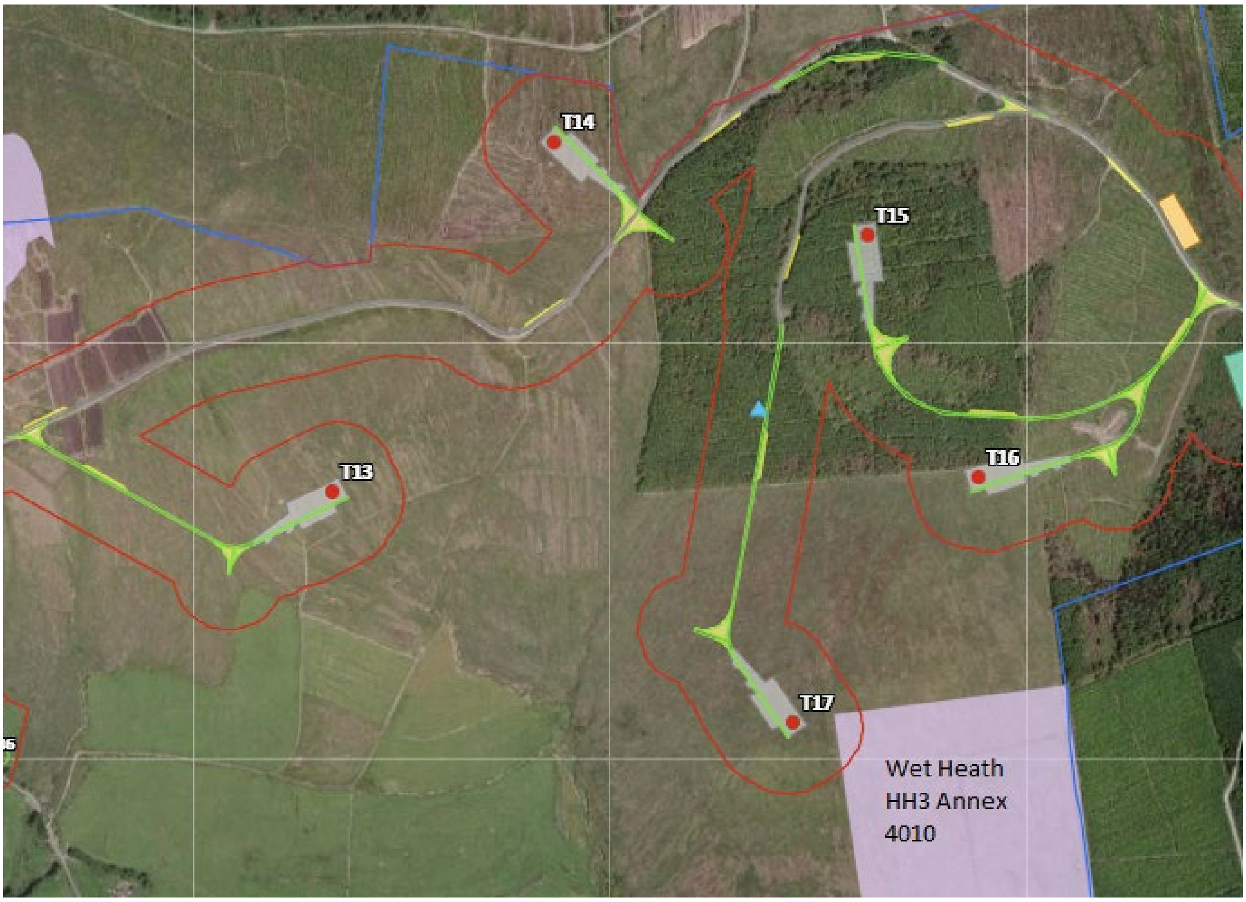

Figure 3-14: T13 and T17 Area showing Final Civils Layout

In summary, the locations of all infrastructure including T2, T3, T13 and T17 were subject to a rigorous design siting process, which avoided Annex 1 habitat.

We refer the Board to Appendix 6 of this document which contains the full, detailed response to various items raised by the Cork County Ecologist in relation to the proposed development, prepared by Ecology Ireland Limited. This concludes with regard to the layout of the project:

> *As outlined above and in Section 8A.3.2 of Chapter 8A of the EIAR, the constraints led design approach ensured that confirmed/potential Annex I habitat features (including peat habitats) were located outside of the proposed development works footprint. The constraints led design approach also ensured that pockets of higher quality habitat potentially present within highly degraded or disturbed heath and/or bog habitats (i.e. peat habitats, e.g. Annex I 4010 wet heath HH3) were also avoided such that the proposed development works footprint is confined to very degraded peatland habitats of lower local importance (see Section 8A.3.2 of Chapter 8A of the EIAR).*
>
> *It is therefore considered that the design approach here took heed of explicit pre-planning advice received from the Cork County Council Ecology Office that "…the site should be designed to avoid direct intervention within intact peat habitats and on other habitats of high natural value."*

Email consultation correspondence between Ecology Ireland and the Cork County Council Ecology Department is contained in Appendix 7.

3.4.1.2 Air Quality and Climate

Appendix B, Item 4 of Cork County Council submission states:

> *"In the context of dust nuisance/soiling impacts on receiving receptors that may have the potential to arise during the construction phase, it should be clarified by the developer if it is proposed or if any background dust monitoring has been conducted in the vicinity of the proposed development. This could be used to quantify the existing Environment and as a baseline for any future monitoring undertaken to support and evaluate the effectiveness of the proposed mitigation measures."*

Background dust monitoring was not conducted in the vicinity of the proposed Project. As described in Section 6.2.1 of Chapter 6 'Air and Climate' of the EIAR, existing air quality monitoring data gathered by the Environmental Protection Agency (EPA) was used to characterise the existing environment in line with standard practice. A summary of findings for Sulphur Dioxide(SO2), Particulate Matter (PM10), Nitrogen Dioxide (NO2) and Carbon Monoxide (CO) is found in Section 6.3.1 of Chapter 6 'Air and Climate' of the EIAR submitted with the initial application.

To assess the potential impacts of construction dust emissions, the NRA's Assessment Criteria for the Impact of Dust Emissions from Construction Activities with Standard Mitigation In Place was used. This table is provided in Appendix 8 of the National Roads Authority (NRA) Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes (NRA, 2011) and reproduced in Table 6.3 of Chapter 6 'Air and Climate' of the EIAR as submitted with the initial planning application.

It is the responsibility of the Contractor to monitor and manage dust generated by construction activities during the construction phase of the Project.

A Dust Management Plan (DMP) can be found in Section 4.3.1.1 of the CEMP submitted with the EIAR which outlines potential sources of dust during the works and identifies measures to manage same.

3.4.1.3 Traffic and Transport

Wind Farm

The Cork County Council Roads Department stated the following:

> *"Turbine T-09 and part of site access track appears shown on or adjacent to public road L-34182-0. The Applicant needs to confirm this is not the case."*

According to a shapefile provided by Cork County Council Roads Department, Turbine T9 and part of the site access track appears to be shown on and adjacent to a public road labelled the L-34182-0 however the Cork County Council mapping is inaccurate. The area in the vicinity of T9 contains only private agricultural and forestry tracks and is not accessible to the public.

The road identified by the Council as the L-34182-0 on their mapping appears to connect to the L-3418 approximately 1.5 km south of T9. The L-34182-0 terminates at an existing gated farmyard entrance located approximately 1.3 km south of T9 and therefore no interaction is present.

Figure 3-15: Existing Farmyard Gated Access and end of Public Road (L-34182-0) South of T9.

Figure 3-16 shows the T9 area in the context of the public road network and in particular the L-3418 and L-34182-0 per Cork County Council mapping.

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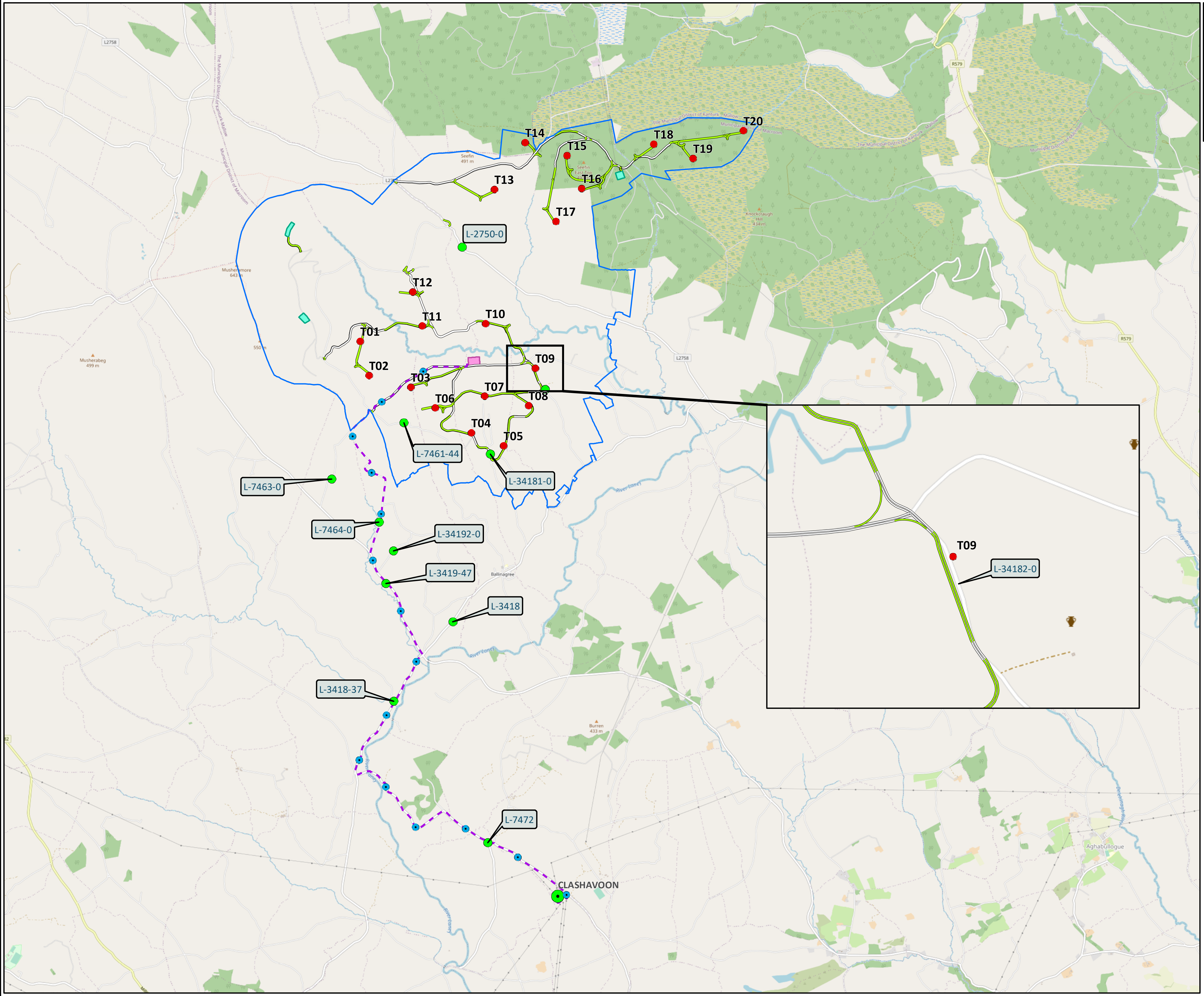

Legend

- Wind Farm Site
- Substation Compound
- Proposed Borrow Pits
- Local Roads
- Proposed Turbine Layout
- Joint Bays
- 220kV Substation
- Grid Connection

Access Tracks:

- Existing Track Upgrade
- New Access Track

TITLE:	Wind Farm Layout
PROJECT:	Ballinagree Wind Farm RFI Report
FIGURE NO:	2.1
CLIENT:	Coillte and Ørsted
SCALE: 1:50000	REVISION: 0
DATE: 20/06/2023	PAGE SIZE: A3

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Cable Route

It is suggested by the Cork County Council Roads Engineer that:

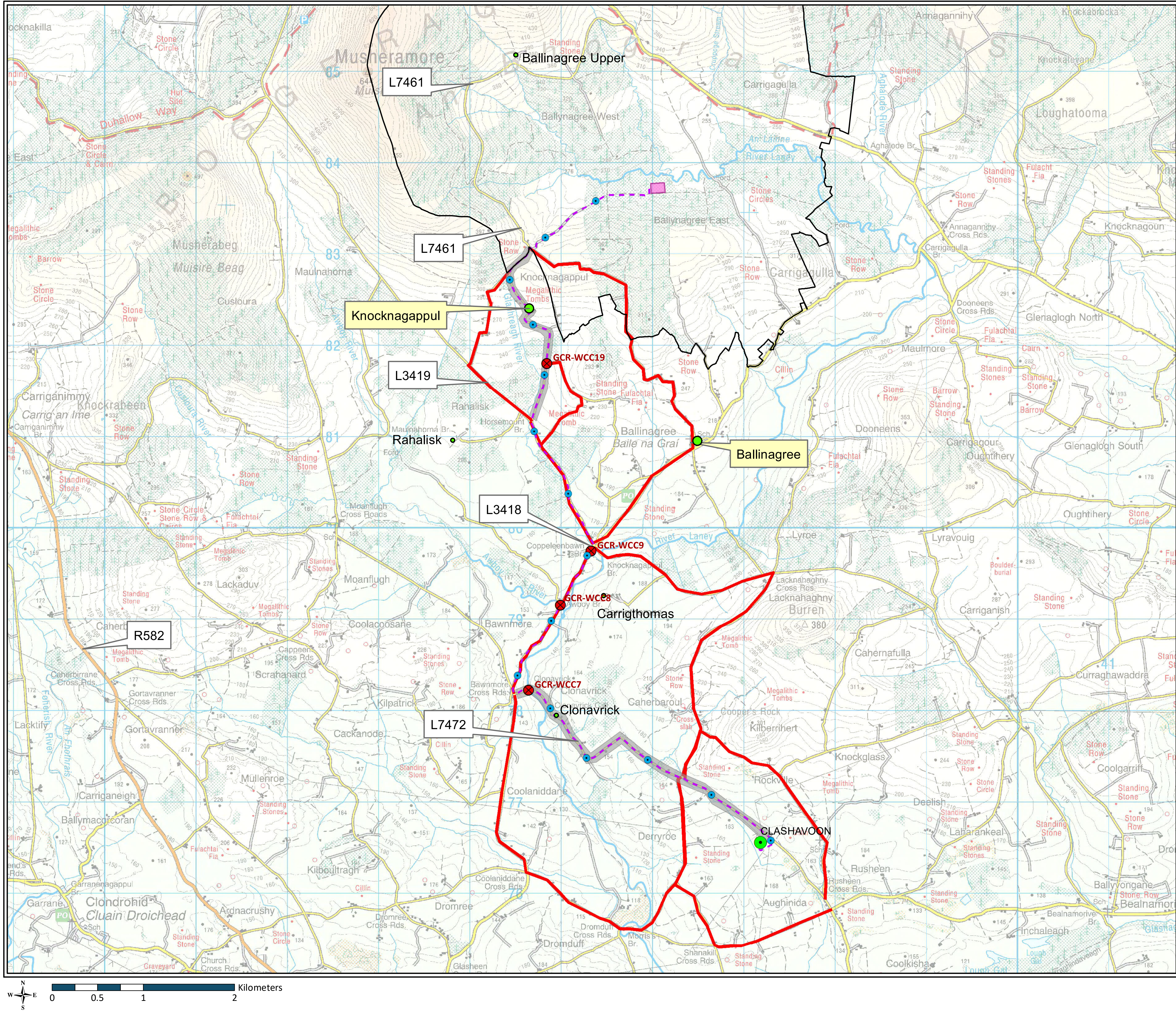
> *All roads where the cable route is installed shall receive full road width regulating and resurfacing. Surface dressing alone will not suffice. The resurfacing type shall match existing surfaced.*

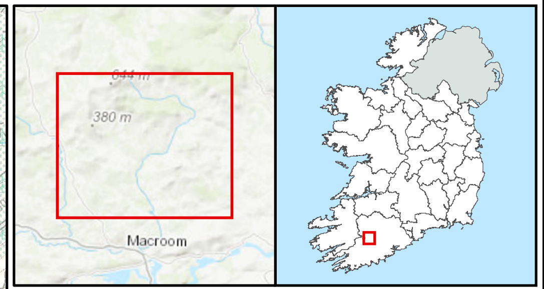
As described in in Section 13.7 of Chapter 13 'Traffic and Transportation' of the EIAR and the Section 4.3.8 of the CEMP (Traffic Management Plan), all roads will be reinstated expeditiously on completion of the construction works. Roads will be reinstated to their pre-works condition or better and to the satisfaction of the roads authority. Following temporary reinstatement of trenches on public roads, sections of the public roads will receive a full surface overlay. Details to be agreed with the roads authority. At a minimum they will be reinstated to their pre-works condition or better and to the satisfaction of the roads authority.

It is proposed that all single lane roads identified in Figure 4.2 of the CEMP as being '*roads requiring temporary road closures during construction stage'* receive a full width regulating and resurfacing with the resurfacing type matching the existing surface in accordance with the above suggested condition. A copy of this figure is shown below (Figure 3-17).

For the remainder of the grid connection route which generally constitutes two-lane roads, it is proposed that the extent of road reinstatement corresponds with the width of cable trenches which shall be reinstated to their pre-works condition or better and to the satisfaction of the roads authority as described in the EIAR and TMP.

Path: R:\Map Production\2019\P2114\Workspace\CEMP\P2114_GIS_Fig4-2_RoadClosures_A3.mxd





Legend

- Proposed Wind Farm Site
- Substation Compound
- Roads requiring temporary road closures during construction stage
- Diversion Route Option
- Proposed Grid Connection Route
- Clashavoon Substation (110-220kV)
- Joint Bay
- Location of horizontal directional drill

TITLE:	Temporary Road Closures and Diversion Routes
PROJECT:	Ballinagree Wind Farm
FIGURE NO:	4.2
CLIENT:	Coillte and Ørsted
SCALE: 1:40000	REVISION: 0
DATE: 10/01/2022	PAGE SIZE: A3

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It is noted that the Cork County Council Roads Engineer stated the following requirements for the proposed Grid Connection cable route:

> *Surface water culverts crossed or exposed during cable trench excavations shall be mapped and notified to planning authority weekly.*
>
> *Surface water culverts crossed by trench excavation shall be replaced in full across entire length unless otherwise agreed. HDPE twin wall pipe or equivalent area or bigger with a minimum size of 225mm shall be used unless otherwise agreed with Cork County Council.*
>
> *Before cable trench works commence all water tables along the route shall be photographed and mapped. These must be submitted to Cork County Council Millstreet Office.*

The following items were also noted by the Cork County Council Roads Engineer relating to structures along the Grid Connection route:

> *"No cable infrastructure shall be affixed to any bridge or culvert structure.*
>
> *All cable infrastructure shall pass beneath surface water culverts*
>
> *Any road level increase adjacent to parapet walls or retaining walls as a result of the works shall require all such elements raised to appropriate standard."*

The Applicant will discharge the above should they be attached as conditions to a grant of planning permission by the Board.

Details of watercourse crossings along the grid connection route are described in detail in Chapter 10 'Hydrology and Water Quality' of the EIAR. A description of construction methodologies for watercourse crossings is presented in in the CEMP (Appendix 3.1), and Chapter 3 'Description of Proposed Development' of the EIAR submitted with the initial application.

No cables will be affixed to bridges or culverts. Horizontal directional drilling operations will be employed at 4 no. locations along the proposed grid connection route as shown on the site layout plans. Where the proposed grid connection encounters minor pipes or pipe culverts, the ducts will be installed above or below the culvert depending on its depth in accordance with construction methodologies described in the CEMP (Appendix 3.1). The cable ducting will be installed so as not to impact the existing culvert.

It is noted by the Cork County Council Roads Engineer that:

> *"At Horsemount Cross, Coppeleen Bawn Cross, Awboy Bridge, Bawnmore Cross, Clonavrick Bridge, specific proposals in relation to line of trenching works, location of directional drill pits, receptor pits and reinstatement to be agreed with Cork County Council Offices, Millstreet before excavations commence."*

As part of the detailed design process, specific proposals in relation to line of trenching works, location of directional drill pits, receptor pits and reinstatement shall be identified and agreed with Cork County Council Offices, Millstreet before excavations commence.

The following conditions were recommended by the Cork County Council Roads Engineer:

> *"Specific locations of joint bay locations are to be agreed on site with Cork County Council. Final level of joint bays must match existing road levels."*

> *"The contractor must maintain any temporary trench surface at all times and provide 24hr phone contact to planning authority for this purpose."*

The Applicant will discharge the above should it be attached as a condition to a grant of planning permission by the Board. The location of joint bays have been identified in Figure 13-4 of Chapter 13 'Traffic and Transportation' of the EIAR. Details of temporary and permanent reinstatement of joint bays are included in Chapter 13 of the EIAR and the CEMP.

The following condition was recommended by the Cork County Council Roads Engineer*:*

> *"The contractor must maintain any diversion routes proposed to facilitate the works. Hedgecutting works must be carried out and passing bays must be provided if so directed by Cork County Council. The cost of all such work will be borne by the contractor."*

The Applicant will discharge the above should it be attached as a condition to a grant of planning permission by the Board.

The following condition was recommended by the Cork County Council Roads Engineer*:*

> *"If directed by Cork County Council a road condition survey shall be carried out on any diversion route before it is used as such."*

The Applicant will discharge the above should it be attached as a condition to a grant of planning permission by the Board.

As described in Section 13.7 of Chapter 13 'Traffic and Transportation' of the EIAR submitted with the initial application and the CEMP, a pre-condition survey will be carried out on all public roads that will be used in connection with the Project to record the condition of the public roads in advance of construction commencing. A post-construction survey will also be carried out after the works are completed. The specification and timing of the surveys will be agreed with the roads authority. Joint surveys (with a Cork County Council engineer) shall be completed if the roads authority requests.

Turbine Delivery Route

The following conditions were recommended by the Cork County Council Roads Engineer regarding the turbine delivery route*:*

> *"Turbine delivery contractor to contact Cork County Council Mallow before any accommodation works necessary for the turbine delivery in the Mallow area are carried out.*
>
> *This section of the public road L-7461-0 from its junction with the L-2750 as far as access point 1 shall be widened and resurfaced prior to turbine delivery. This work shall be agreed with Cork County Council Millstreet office before works commence.*
>
> *The developer shall liaise with Office of Public Works and shall apply for any necessary legal consents required to replace the bridge structure at WF-HF8"*

The Applicant will discharge the above should they be attached as conditions to a grant of planning permission by the Board. The location of accommodation requirements is shown in Figure 13-5 of Chapter 13 'Traffic and Transportation' of the EIAR submitted with the initial application and identified as “Points of Interest (POI’s)”. Details of the accommodation requirements are described in Table 13-4 of Chapter 13 'Traffic and Transportation' of the EIAR.

The Cork County Council Roads Engineer stated the following:

> *"No turbine components shall be delivered through Access Points 3 or 4."*

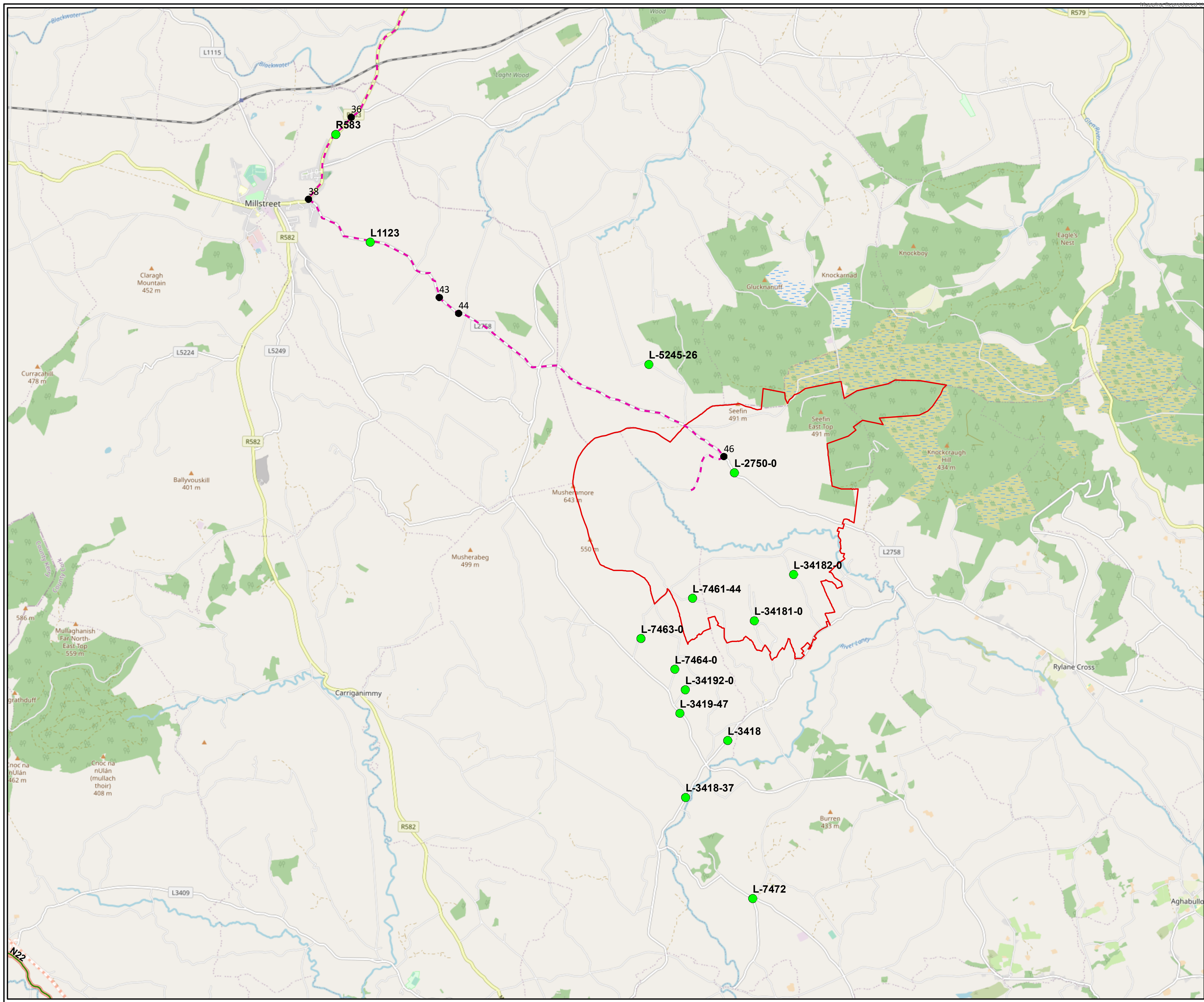
No turbine components will be delivered via access point 3 or 4. Access Point 3 is an existing agricultural and forestry access which provides access to the southern part of the site. This access point will be used for operational access by LGV’s only. Access Point 4 is an existing Coillte forestry access which will be used during the construction phase by LGV’s and HGV’s. This access point will form part of a public road crossing point with Access Point 5 for construction traffic travelling to and from the proposed borrow pits in the west of the site.

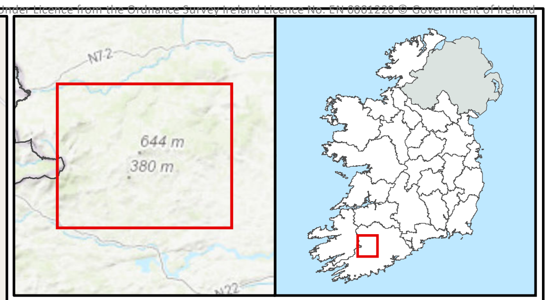
Construction Traffic

The Cork County Council Roads Engineer stated the following in relation to construction traffic:

> *"No construction traffic shall be allowed on public roads; L-7464-0, L-34192-0, L-7463-0, L-34182-0 (except North End), L-34181-0, L-7461-44 (south of site boundary), L-5245-26, L-3418 between Coppeleen Bawn and Annaganihy Cross."*

None of the roads listed above are proposed to be, and therefore will be, utilised during construction of the Project. Figure 3-18 shows the proposed turbine delivery route and haul route. As described in Chapter 13 of the EIAR, turbine components and imported material deliveries shall use the N72, R583 and L2750/L1123 (also known as The Butter Road) as the primary haul route.





Legend

- Wind Farm Site
- Local Roads
- TDR Nodes
- Proposed Haul Route
- National Primary

TITLE:	Transport Routes
PROJECT:	Ballinagree Wind Farm RFI Report
FIGURE NO:	2.2
CLIENT:	Coillte and Ørsted
SCALE: 1:70000	**REVISION:** 0
DATE: 30/06/2023	**PAGE SIZE:** A3

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0 1.25 2.5 5 Kilometers

3.4.1.4 Noise and Vibration

Cork County Council have requested information about four issues with respect to noise and vibration, addressed below.

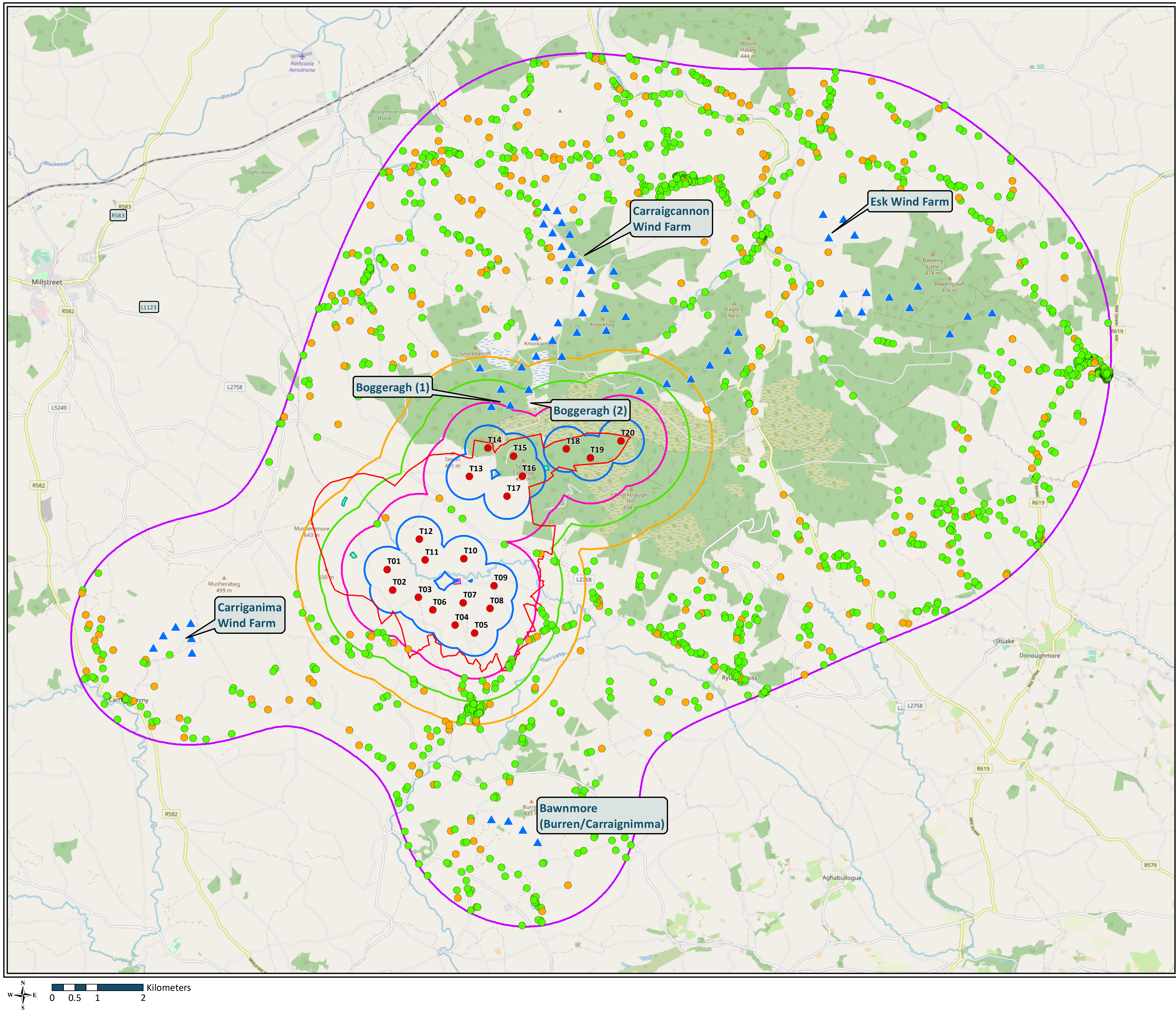
> *1. "Noise contour map detailing the study area relative to proposed turbines. Respective locations and distances of all noise sensitive receptors within 500m, 1000m, 1500m, 2000m of the turbines to be presented and quantified with all occupied, unoccupied and permitted dwellings identified. Dwellings that have a specific interest in the project and associated with it to also be highlighted. The number of receptors identified as farm buildings or unoccupied derelict buildings and not considered as part of impact assessments to be quantified and indicated."*

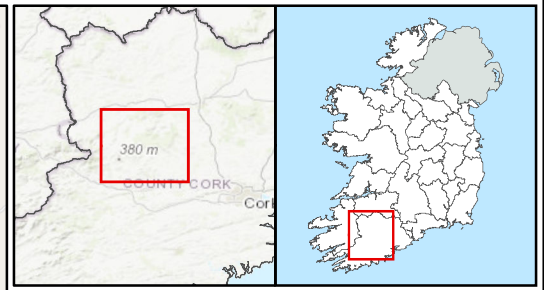
3.4.1.4.1 Response

It is not possible to generate a true contour map as the prediction methodology includes a Valley Correction of +3dB where noise propagation occurs across a valley or a concave profile. This correction, where applied, is added for certain Turbine/Receiver combinations to take account of ground reflection effects as detailed in the IOA Good Practice Guide to the Application of ESTU-R-97 for the assessment and rating of wind turbine noise. Therefore a contour map in accordance with ETSU-R-97 is provided below without the Valley Correction (Figure 3-19). Note that the actual noise level for assessment purposes is identified as being between 0-3dB higher than the contour presented, depending on the ground profiles and Valley Correction. Predicted noise levels, including valley corrections are presented in Table 7.5.1 and 7.6.1 of Appendix 7 within the EIAR.

The noise sensitive locations are identified based on Eircode information verified by a ground truthing survey. In this way all noise sensitive receptors have been identified. These are classed as residential, building (i.e. commercial and residential) or commercial. Commercial properties are not normally considered noise sensitive, unless they are classed as a noise sensitive location, e.g. a hospital, school or hotel. It is not usual to class farm buildings as noise sensitive locations, if these were not classed as residential or buildings, under the Eircode system. Details of Eircode information (location and property type are provided in Appendix 7.3. of the EIAR).

Path: R:\Map Production\2023\P23-129\Workspaces\P23_129_GIS_Fig2-15_Noise_Contour_Map_A3.mxd





Legend

- Wind Farm Site
- 35 dB LA90 contour line Ballinagree Upper - no VC
- Turbine Buffer - 500m
- Turbine Buffer - 1000m
- Turbine Buffer - 1500m
- Turbine Buffer - 2000m
- Substation Compound
- Proposed Borrow Pits
- Proposed Turbine Layout
- Cumulative Wind Farms

Eircode Receptors

- Residential and Commercial
- Residential

TITLE:	Noise Contour Map
PROJECT:	Ballinagree Wind Farm RFI Report
FIGURE NO:	2.15
CLIENT:	Coillte and Ørsted
SCALE: 1:80000	REVISION: 0
DATE: 20/07/2023	PAGE SIZE: A3

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2. "References noise sensitive receptors that each background noise monitoring location is considered representative of to be quantified and shown on a suitably scaled map. Clear trail to be presented and evident between selected background noise monitoring locations, clusters of identified sensitive receptors they are deemed to be representative of and the background noise levels for each monitoring location."

3.4.1.4.2 Response

The prevailing background noise is provided in the EIAR in Table 7.17 and Table 7.18 for the daytime and night time, respectively. Table 2-3 below details the noise monitoring locations and the noise sensitive locations that the monitoring locations represent.

Note that the mitigation scheme is determined by controlling properties, which are normally the closest noise sensitive locations to the proposed wind farm. Therefore the noise monitoring locations were chosen to be representative of the closest receptors to the proposed wind farm.

The noise monitoring locations also included properties to the north of the proposed wind farm site with potential to be impacted by a combination of noise from the proposed Ballinagree Windfarm and the operational Boggeragh 1 wind farm.

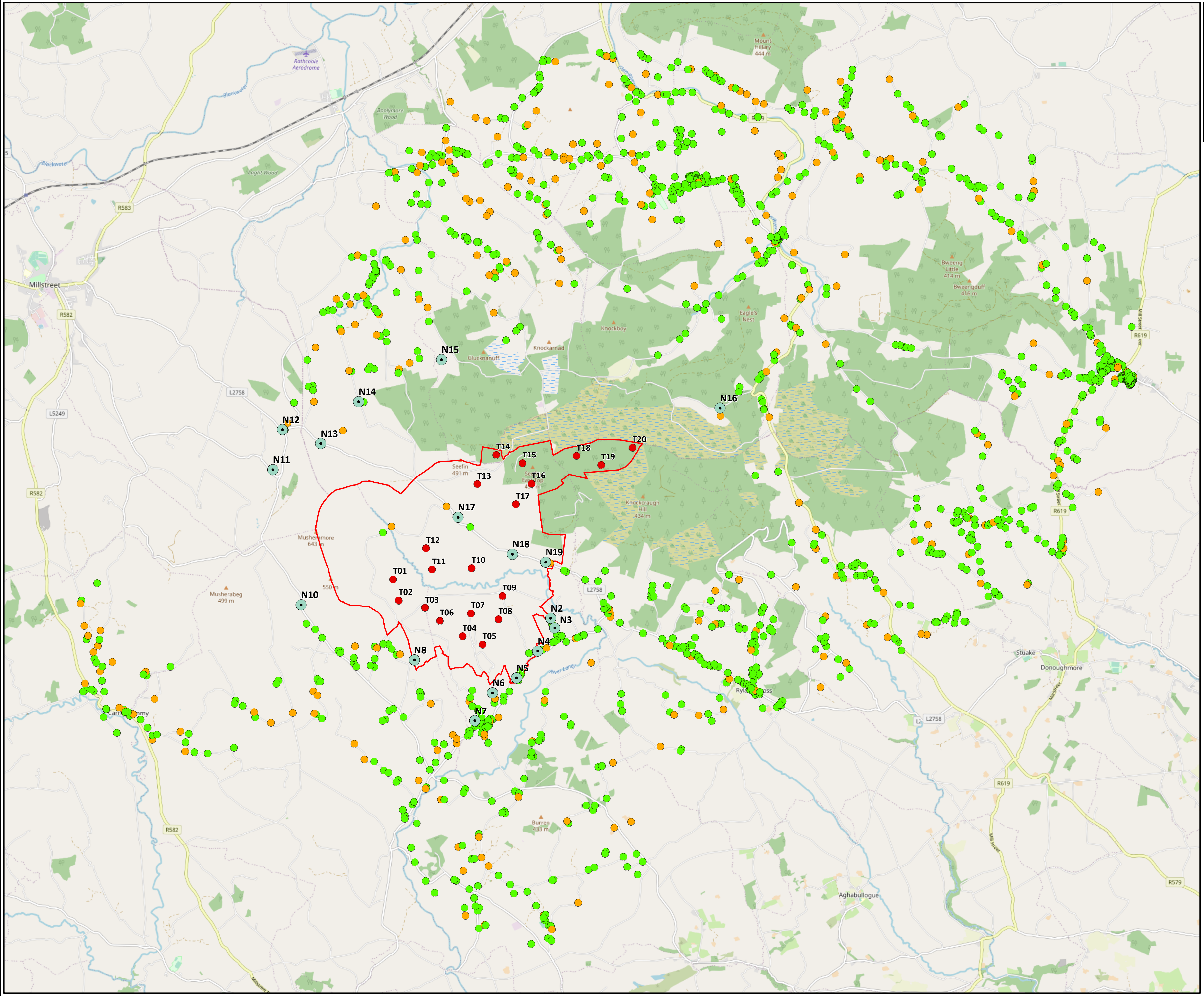
Figure 3-20 shows the noise monitoring locations and corresponding noise sensitive locations.

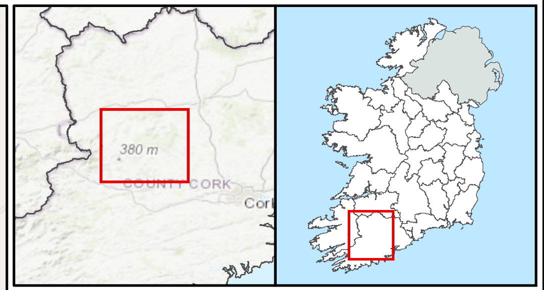
Table 2-5: Noise monitoring locations and representative locations

Noise Monitoring Location	Representative Properties
N2	This represents locations R1048 and R1049, the nearest properties east of the proposed wind farm site.
N3	This represents a single property R777, east of the proposed wind farm site.
N4	This represents a group of properties (approximately 10No.) east of the site along the local road.
N5	This represents a group of approximately 10 properties south east of the proposed wind farm site, along the local road.
N6	This represents a group of 5 properties south east of the proposed wind farm site. (R571, R709, R710, R1042, R1043 and R1044)
N7	This represents the properties at Ballinagree Village, south of the proposed wind farm site (approximately 40No properties).
N8	This represents a group of properties along a local road to the south west of the proposed wind farm site. (R369, R45, R149, R150, R370 and R404).
N10	Group of properties west of the proposed wind farm site, along a straight local road (R144, R145, R383, R384, R385, R386 and R409)
N11	This represents a group of properties north west of the proposed wind farm site approximately 3.5km from the proposed wind farm site (the closest of which is R180)
N12	This represents properties approximately 4km north west of the proposed wind farm site. (The closest of which are R90 and R438)

Noise Monitoring Location	Representative Properties
N14	This represents a single property (R433) north west of the proposed wind farm site and also close to the Boggeragh 1 wind farm)
N15	This represents a single property (R1087) north west of the proposed wind farm site and also close to the Boggeragh 1 wind farm)
N17	This location represents properties along the road between the northern and southern section of the proposed wind farm site. N17 is at location R745. This location also represents locations 1053 and 1052 also on this road.
N18	This location represents a single property R 721, which is along the road that bisects the proposed wind farm site, slightly east of N17.
N19	This location represents properties at R0150 and R1052. This represents the background noise at approximately 7no properties east of the proposed wind farm site. Again, this is slightly east of location N18

Path: R:\Map Production\2023\P23-129\Workspaces\P23_129_GIS_Fig2-16_Noise_Monitoring_and_Noise_Sensitive_Locations_A3.mxd





Wind Farm Site

Proposed Noise Monitoring Locations

Proposed Turbine Layout

Eircode Receptors

Residential and Commercial

Residential

TITLE:	Noise Monitoring and Noise Sensitive Locations
PROJECT:	Ballinagree Wind Farm RFI Report
FIGURE NO:	2.16
CLIENT:	Coillte and Ørsted
SCALE: 1:80000	**REVISION:** 0
DATE: 20/07/2023	**PAGE SIZE:** A3

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4." Potential number and location of dwellings impacted by instances of noise levels from construction exceeding adapted noise limit of 65dB Laeq 1 hour to be confirmed. Same for site traffic per page 25 of 67 of the submission (night criteria potentially exceeded at properties within 40m of the road edge). "

Number and location of dwellings impacted of instances of noise levels from construction exceeding 65 dB to be clarified.

3.4.1.4.3 Response

As stated in the EIAR, the predicted noise level is below the 65 dB noise limit during the main Wind Farm construction works. This includes tree felling works, borrow pit works, preparation of access roads, hardstandings and drainage, wind turbine foundations, installation of wind turbines, and substation works construction. In addition, as stated in the EIAR, cumulative works during the busiest period which includes construction activities from access roads construction, turbine hard standing and foundation construction, turbine installation and substation construction are also predicted to be below the 65 dB noise limit.

During grid connection works, in some instances, the maximum predicted noise levels from grid connection works may be above the noise limit of 65 dB $L_{Aeq,1hr}$. However, these elevated noise levels will only occur for short durations (less than three days) at a limited number of dwellings. Given the nature of the grid connection works, construction activities will not occur over an extended period at any one location.

As stated in the EIAR, there are six dwellings within 10 m of the grid connection works, nine dwellings between 10 – 25m, eight dwellings between 25 – 50 m and five dwellings between 50 - 100 m. Figure 3-21 identifies the properties where the noise limit of 65 dB $L_{Aeq,1hr}$ is likely to be exceeded briefly during grid connection works.

Page 25 of the EIAR addresses the issue of night time deliveries on noise sensitive locations along the turbine delivery route. The EIAR identifies a temporary significant impact at properties within 40m of the turbine delivery route while the vehicles are passing properties. Figure 3-22 identifies the properties within 40m of the route, where the noise limit may be exceeded briefly during the turbine delivery.

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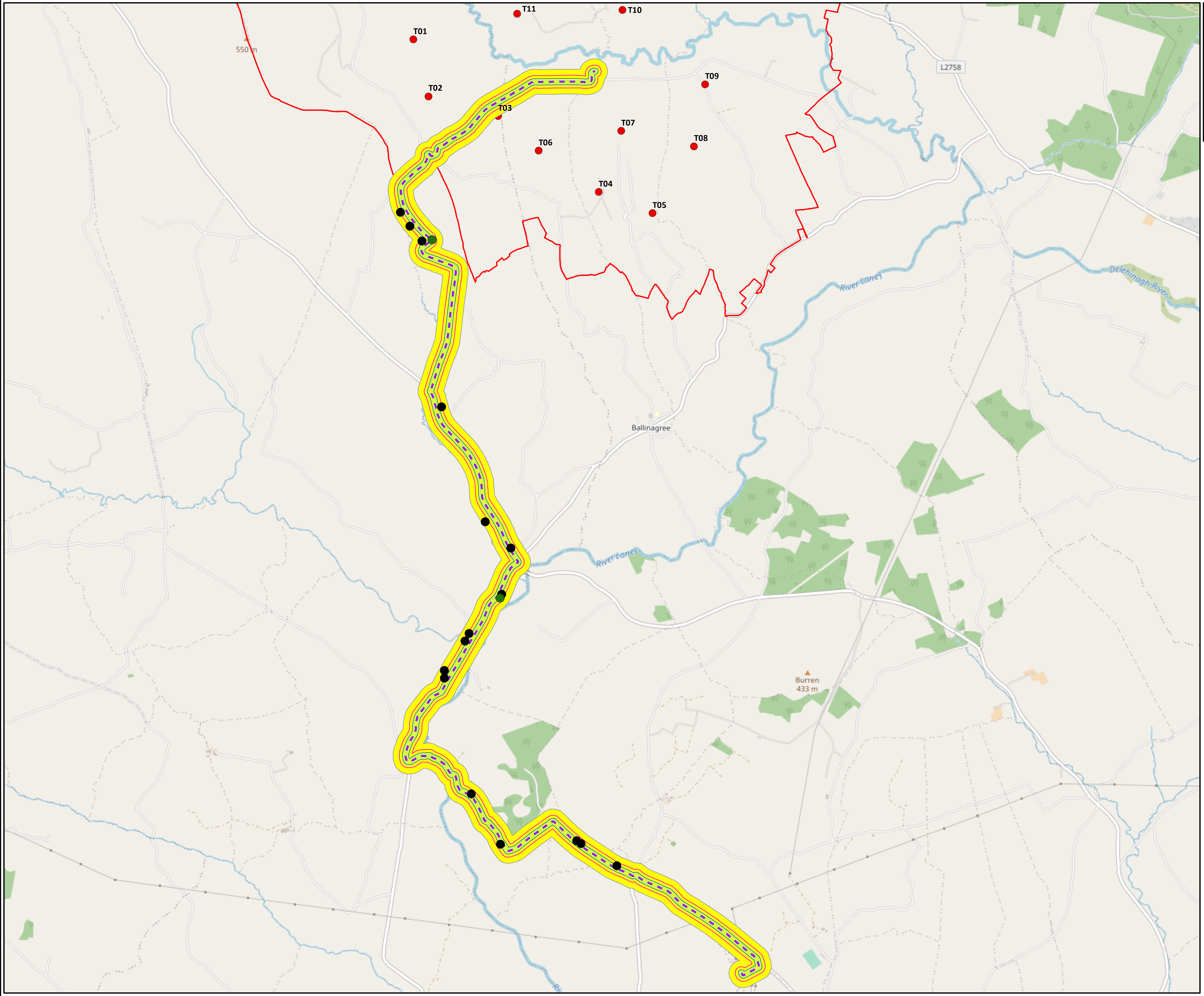

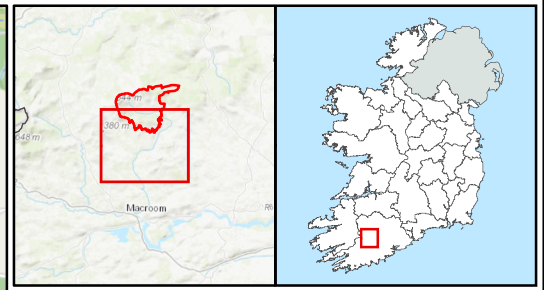

Legend

- Wind Farm Site
- Grid Connection Route - 10m Buffer Zone
- Grid Connection Route - 25m Buffer Zone
- Grid Connection Route - 50m Buffer Zone
- Grid Connection Route - 100m Buffer Zone
- Proposed Turbine Layout

Eircode Receptors

- Residential and Commercial
- Residential

TITLE:	Noise Sensitive Locations within Grid Connection Route
PROJECT:	Ballinagree Wind Farm RFI Report
FIGURE NO:	2.17
CLIENT:	Coillte and Ørsted
SCALE: 1:30000	**REVISION:** 0
DATE: 20/07/2023	**PAGE SIZE:** A3

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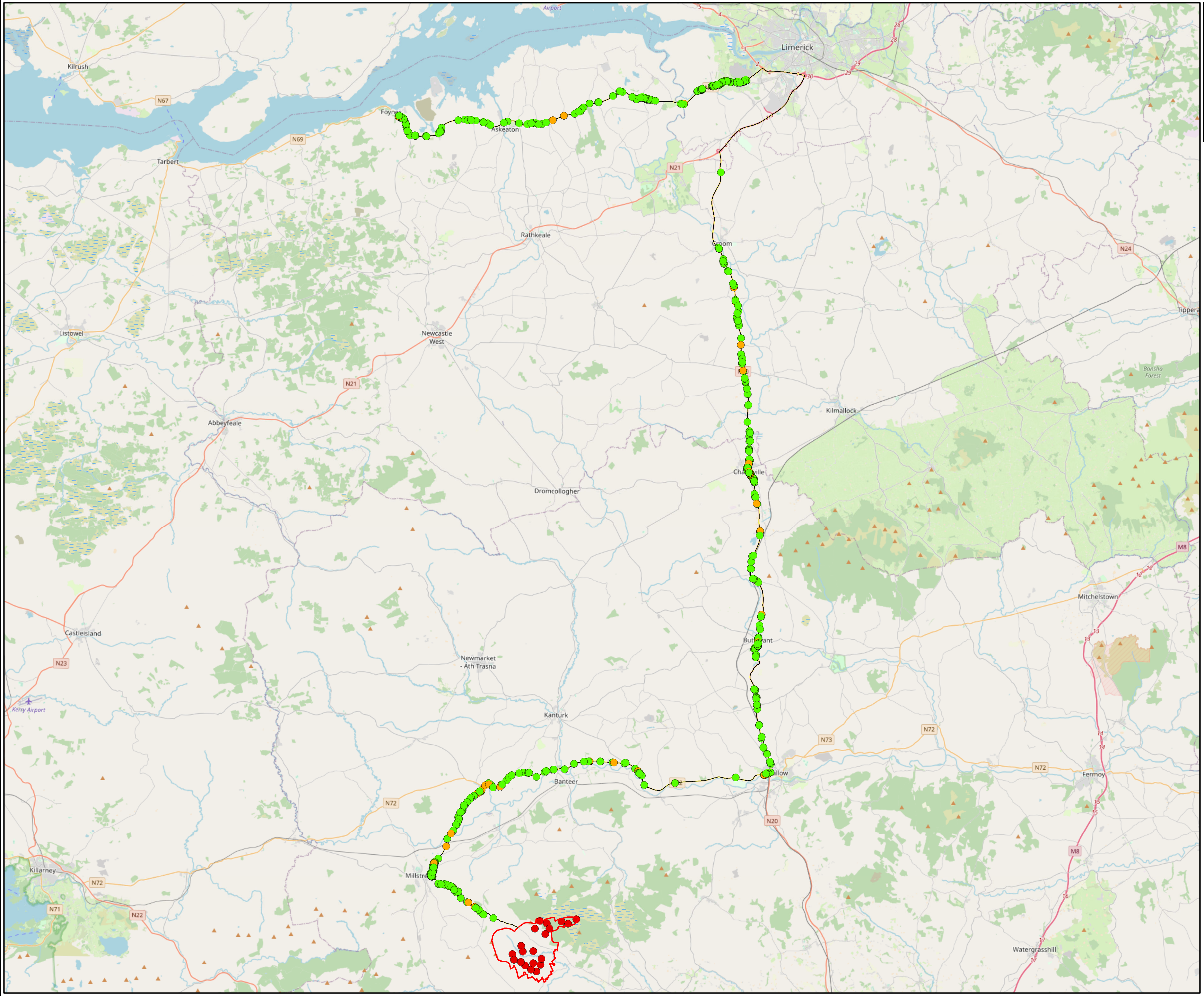
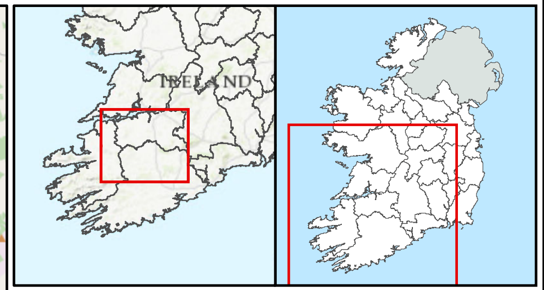
Path: R:\Map Production\2023\P23-129\Workspaces\P23_129_GIS_Fig2-18_Noise_Sensitive_Locations_within_40m_of_TDR_A3.mxd





Wind Farm Site

Proposed Turbine Delivery Route (TDR) - 40m Buffer

Proposed Turbine Delivery Route (TDR)

Proposed Turbine Layout

Eircode Receptors

Residential and Commercial (134)

Residential (683)

TITLE:	Noise Sensitive Locations within 40m of TDR
PROJECT:	Ballinagree Wind Farm RFI Report
FIGURE NO:	2.18
CLIENT:	Coillte and Ørsted
SCALE: 1:300000	**REVISION:** 0
DATE: 20/07/2023	**PAGE SIZE:** A3

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3.4.1.5 Hydrology, Water Quality and Flood Risk

The Applicant has submitted detailed proposals to protect water quality during the construction, operational and decommissioning stages of the proposed Project. As described in Section 1.1 of the CEMP and Section 4.3.5 of the Surface Water Management Plan submitted with the initial application, both will be finalised following appointment of the contractor for the main construction works.

The Cork County Council Environmental report which identified potential impacts on surface water and ground water does not raise any queries or issues, however the following conditions were recommended:

> *The construction of the development shall be managed in accordance with a Construction and Environmental Management Plan, which shall be submitted to, and agreed in writing with Cork County Council prior to commencement of development. This plan shall include a detailed Surface Water Management Plan.*
>
> *During the construction phase operations on site shall be carried out in such a manner that no pollution material, rubble, waste material or contaminated surface water enters any adjacent water courses or public roadway around the site. No burning of waste materials shall take place on site.*
>
> *All water courses in or adjacent to the works area shall be monitored on a daily basis by the Environmental Clerk of Works, or designate, to ensure that they are not being impacted by silt/sediment laden storm water runoff from work areas. A record of this monitoring shall be maintained on site.*
>
> *All over ground tanks containing hydrocarbons shall be contained in a waterproof bunded areas, the capacity of the bund is to be greater of the following; 110% of the largest tank size or 25% of the total volume stored in the bunded area. All valves on the tank shall be contained within the bunded area. The bunded area shall be fitted with a locking valve that shall be opened only to discharge storm water. The developer shall ensure that this valve is locked at all times.*
>
> *Hydrocarbon spill kits shall be in place on all sites of vehicles/plant. Suitable interceptor drip trays shall be used when refueling vehicles/plant and when vehicles/plant are parked. No servicing of vehicles/plant shall be carried out on site.*
>
> *All drainage and sediment/silt traps shall be in place before any other works are undertaken on site. All work shall be carried out in favourable weather conditions to minimise the generation of silt and fines.*
>
> *Silt fencing shall be constructed to protect watercourses on site from runoff of silt laden water prior to commencement of development. This silt fences shall be maintained as required during the construction phase, and on an ongoing basis, until the site is fully vegetated, and the risk of silt runoff is minimised.*
>
> *The service roads shall be cambered to deflect surface water to the adjoining lands for attenuation. Service roads shall not discharge directly to open drains on site.*
>
> *Instream works shall only take place during the period July to September. All instream work shall take place in a written agreement with the IFI.*

The Applicant will discharge the above should they be attached as conditions to a grant of planning permission by the Board.

3.4.1.6 Archaeology, Architectural and Cultural Heritage

3.4.1.6.1 Introduction

This section was compiled by John Cronin and Associates (JCA) at the request of Fehily Timoney in relation to the Archaeology Report included as an Appendix to the Cork County Council (CCC) submission on the proposed Ballinagree Wind Farm development (Ref. ABP 312606-22).

JCA compiled EIAR Chapter 14 (Archaeology, Architectural and Cultural Heritage) for the proposed Project and the following sections present collated information relevant to elements of the CCC Archaeology Report.

It is noted that the CCC Archaeology Report states that the EIAR assessment has satisfactorily demonstrated that there will be no direct impacts on any archaeological monuments. The report also concurs, with some minor amendments, with the archaeological mitigation measures presented in the EIAR, which include advance archaeological investigations within suitable lands and construction phase monitoring of other elements of the proposed Project.

The CCC Archaeology Report does request clarity in relation to proposed turbine delivery staging works in the Drishane Castle property near Millstreet and recommends consideration of the use of Horizontal Directional Drilling (HDD) at a road culvert on the turbine delivery route. It also recommends the omission of two turbines (Turbines 8 and 9) within the proposed wind farm due to negative impacts on the settings of a number of cited archaeological monuments.

The following sub-sections present clarifications in relation to the turbine staging area and the proposed use of HDD at the location of the road culvert located on the turbine delivery route. Contextual information on the recorded archaeological sites within the wider environs of Turbines 8 and 9 is also provided, which includes details on their settings, sightlines between their locations and the modern disturbance of a number of sites referred to in the CCC Archaeological Report.

3.4.1.6.2 Turbine Delivery: Drishane Castle Turbine Temporary Staging Area

The CCC Archaeology Report concurs with the EIAR archaeological mitigation measures for this location but states that clarification is required to establish if the temporary staging area is to be removed on completion of the Project and if the area is to be returned to green field.

Section 3.3.5.2 of Chapter 3 of the EIAR (Project Description) describes the temporary accommodation works at Drishane Castle as follows:

> *"Construction of a temporary staging area comprising aggregate hard standing and associated access track to and from the public road R583 in the grounds of Drishane Castle. Removal of masonry wall to facilitate temporary access from public road R583. Overrun and oversail of public road verge. Placement of temporary load bearing surface. Relocation of telegraph pole. Trimming of trees and vegetation."*

This is to clarify that the temporary staging area is to be removed and the area will be fully reinstated and returned to green pasture upon completion of staging works. As stated in Section 3.3.5.2 of Chapter 3 of the EIAR, all temporary accommodation works associated with the TDR shall be fully reinstated following the construction stage.

3.4.1.6.3 Turbine Delivery: Ballinagree East Culvert

The CCC Archaeology Report states that the use of Horizontal Directional Drilling (HDD) techniques utilised at other bridge crossings be considered at the location of this culvert.

The proposed removal of a stone built culvert feature under a public road in Ballinagree East townland is required to facilitate the delivery of turbines to the wind farm site. As described in Section 14.3.4.3 of the EIAR, this culvert likely dates to the post-1840s period as this section of road is not present on the 1st edition 6-inch Ordnance Survey map. The culvert is not a Protected Structure and is also not included in the National Inventory of Architectural Heritage but is interpreted in the EIAR as a feature of local cultural heritage interest. The EIAR mitigation for this culvert entails the compilation of a detailed pre-works record in written, drawn and photographic formats and archaeological monitoring of construction phase works at its location.

The HDD technique referred to in the CCC Archaeological Report is a methodology utilised to facilitate the installation of cables at bridge crossings along the grid connection route and it is not an applicable technique for the proposed works at this location which are required to facilitate the delivery of turbines to the wind farm site.

Further details on this element of the proposed Project are presented in Chapter 3 of the EIAR (Project Description).

3.4.1.6.4 Wind Farm: Omission of Turbine 8

The CCC Archaeology Report recommends the omission of Turbine 8 as currently proposed as it will negatively impact on the setting of a stone row (CO049-020----) and the surrounding prehistoric landscape.

The following section collates contextual information on the current condition of stone row (CO049-020----), which has been partially levelled, and known prehistoric sites within the surrounding landscape, a number of which retain little or no surface expressions.

The stone row is located 430m to the southeast of the proposed location of Turbine 8 and is 350m from the nearest section of the proposed access track to this turbine. The description of this monument published in the Archaeological Inventory of County Cork. Volume 3: Mid Cork (1997) notes that it formerly comprised a line of three upright stones which were set on a northeast to southwest alignment. The inventory descriptions in this publication are based on field surveys carried out by the Cork Archaeological Survey during the 1980s and early 1990s. As detailed in Table 14-15 of the EIAR, which includes an appraisal of the landscape setting of the monument, the stone row was significantly disturbed at some point following its inspection by the Cork Archaeological Survey and only one of the stones now survives upright at the location. One of the levelled stones lies prostate on the nearby ground while the third stone has been removed from the location. While only one of the upright stones remains extant and the monument no longer retains a surface expression as stone row feature, it is also noted in Table 14-15 of the EIAR that none of the proposed turbines impinge on its original recorded alignment to the southwest and this includes the proposed location of Turbine 8 which is 430m to the northwest of the stone row.

There are three recorded prehistoric sites of likely Bronze Age date located within a 1km area extending from the stone row location and each of these, including their views and settings, are described in Table 14-15 of the EIAR. A burnt mound site (CO049-068----) located c.560m to the south of the stone row comprises a levelled surface spread identified within a field after ploughing works. This site had no surface expression when inspected during the assessment and as noted in Table 14-15 of the EIAR, the ground level views from its location towards the north are obscured by natural topography. Two stone circles (CO049-007---- & CO049-008----) are located on the opposite side of a large ridgeline which rises steeply upwards in the lands to the north of the stone row.

The stone circles are located at respective distances of 915m and 560m from the stone row. As noted in Table 14-15 of the EIAR, this ridgeline completely screens ground level views from the stone circles towards the archaeological sites on its opposite side of the ridge, including the location of the stone row. This landscape setting indicates that these monuments were not constructed to create any intervisible sightlines between their locations. The proposed location of Turbine 8 will, therefore, not impinge on any potential ground level sightlines between the stone row and stone circles as none exist and, in addition, the proposed turbine location is not sited between their locations.

There are also three recorded fulachta fiadh sites of likely Bronze Age date within the southern area of the wind farm site (CO049-057----, CO049-058---& CO049-059-----). These are located in a commercial forestry plantation located c.1.2km to the southwest of the stone row and c.1.17km southwest of Turbine 8. As detailed in Table 14-15 of the EIAR, while existing views from their locations are now completely screened by trees, the partially or completely levelled remains of these sites appear to be located within an area with dominant views to the south. In addition, even when fully extant, fulachta fiadh do not possess visual alignment attributes and Turbine 8 is not located within any potential direct sightline between their locations and the stone row. As noted in Table 14-6 of the EIAR, an extant stone pair (CO060-019----), which is orientated NE-SW, is located within a field to the south of the forestry plantation containing the three fulachta fiadh, has no direct alignment with any of the proposed turbine locations, including Turbine 8. This monument is located outside the site boundary, but a review of satellite images indicates that any potential ground level views towards the stone row are now likely screened by the adjacent forestry plantation.

Further details with respect to the design process associated with the siting of T8 and T9 are contained in Section 2.4.4.3.

Turbine 8 and its associated infrastructure, including its hardstand and access road, will result in no predicted direct impacts on Stone Row CO049-020---- or any other archaeological monuments. The project mitigation at its location includes advance geophysical and archaeological test trenching of the footprint of the turbine and its associated hardstand and access track. While the proposed wind farm development has been interpreted as resulting in a predicted moderate indirect impact on the wider setting of this partially levelled monument during the operational phase of the Project, as noted in Section 14.4.4 of the EIAR, this impact will be reversed during the decommissioning phase.

3.4.1.6.5 Wind Farm: Omission of Turbine 9

The CCC Archaeology Report recommends the omission of Turbine 9 given its proximity to Stone Circle (CO049-008----) and also cites the following monuments located within the wider landscape: Stone Circle CO049-007----, Stone Row CO049-020---- and Fulachta Fiadh CO049-057----, CO049-058---& CO049-059-----.

The multiple stone circle monument (CO049-008----) is located 270m to southeast of the proposed location of Turbine 9. The proposed access track to the turbine extends from the south through a forestry plantation and includes a section of an existing surfaced farm lane. This route was designed to avoid the area of pasture farmland which contains this stone circle. The monument is shown within an open area of land on the 1st edition 6-inch map OS and the existing enclosed pasture field at its location was likely created during late 19th or early 20th century land reclamation works.

The stone circle contains 15 remaining upright stones (of a likely original 17 stones) that range between 40cm and 90cm in height and have been arranged to form an alignment extending to the west-southwest. As noted in Table 14-15 of the EIAR, which includes an appraisal of its setting within the landscape and views to other prehistoric monuments, this monument is situated within a low-lying area with the wider terrain rising to the east and west.

There are no recorded archaeological sites or notable natural topographic features located on the sections of the visually dominant ridgeline to the west and west-southwest of the monument and none of the known archaeological sites within the area of the wind farm on the opposite side of the ridgeline are visible at ground level from its location. A review of the location of solar events on the ridgeline during solstice and equinox dates was carried out as part of the EIAR assessment and did not reveal any events which intersected with the monument alignment on these dates.

As noted in Section 14.4 of the EIAR, the stone circle is located in a pasture field within private farmland and according to the landowner it is rarely visited. In addition, its location cannot be seen from outside the field as the upright stones are below the level of the surrounding field banks and it does not form a prominent feature within the landscape. The proposed Project will incorporate a signed amenity trail which will facilitate public access to the location which is assessed as a moderate positive impact on the cultural heritage resource of the area.

The emerging wind farm layout was subject to archaeological review during the design phase, and this included inputs from the project Landscape and Visual consultants in relation to potential visual impacts on Stone Circle CO049-008----. While turbines will be visible from its location, the review process assisted in the development of a turbine layout intended to avoid direct intrusions on its ritual alignment. In addition, a potential turbine location extending into the east end of the area of fields containing the stone circle was removed from the Project due to a combination of potential archaeological and noise issues identified during this review process. Turbine 9 was also reviewed as part of this process and its proposed location was determined based on a number of environmental constraints, including maximising its set-back from the stone circle as far as feasible.

Further details with respect to the design process associated with the siting of T8 and T9 are contained in Section 2.4.4.3.

The proposed location of Turbine 9 and its associated infrastructure will not result in any predicted direct impacts on Stone Circle CO049-008----and will not impinge on its alignment which is orientated to the west-southwest. The archaeological mitigation measures for the turbine comprise advance geophysical surveys and archaeological test trenching of the footprint of the turbine and its associated hardstand. While the turbine will contribute to the predicted significant indirect impact on the setting of Stone Circle CO049-008---- during the operational phase of the Project, as noted in Section 14.4.4 of the EIAR, this impact will be completely reversed by the decommissioning of the wind farm.

Information on the other prehistoric monuments within the wider environs of Turbine 9 as cited in the CCC Archaeology Report (Stone Circle CO049-007---- , Stone Row CO049-020---- and Fulachta Fiadh CO049-057----, CO049-058---& CO049-059-----) is presented in the EIAR chapter and summary details are collated below.

As detailed in Chapter 14 of the EIAR, Stone Circle CO049-007---- remains well-preserved in a clearing within an area of a modern forestry plantation which will remain unfelled for the lifespan of the proposed Project. This is part of the project proposal in order to protect the above stone circle's existing setting. The surrounding conifer trees within the plantation are set c.10m back from its location and screen ground and sky level views from the monument in all directions, including towards its set alignment to the west-southwest as well as towards the location of Turbine 9 which is 420m directly west. As noted within Table 14-15 of the EIAR, the area between this monument and the field containing stone circle (CO049-008----), which is located c.370m to the south, is heavily forested and there is no existing intervisibility between these monuments. Neither stone circle is situated on a prominence and given their low heights combined with the undulating local topography they may not have been intervisible prior to the forestry plantation. In any event, the proposed location of Turbine 9 will not impinge on any potential pre-forestry sightlines between the two monuments.

While Stone Circle CO049-007---- is a National Monument in State Ownership (ref. 660) there are no direction signs in the surrounding area, there are no forest tracks leading to its location and a GPS had to be used to find the monument during the field survey. The amenity trail element of the proposed Project will include location and information signage for this monument and will facilitate public access to its environs resulting in a positive impact. No new access tracks or other elements of the trail will be constructed or erected at its location in order to avoid potential indirect negative impacts on its setting.

Details on the other prehistoric monuments within the wider environs of Turbine 9 as cited in the CCC Archaeology Report are provided in the above section in relation to Turbine 8 which notes these monuments have no identified interconnecting sightlines and all have been subject to modern disturbance.

The location of Turbine 9 will not impinge on the projected alignment of Stone Row CO049-020----, which now retains only one extant stone upright and is located c.750m to the south of the turbine. As described in the EIAR chapter, the three fulachta fiadh sites cited in the CCC Archaeology Report comprise partially or completely levelled sites within a modern forestry plantation and are located 1.7km to the southwest of Turbine 9. In conclusion, Turbine 9 is not interpreted as contributing to any predicted significant indirect impacts on the settings of Stone Circle CO049-007---- , Stone Row CO049-020---- and Fulachta Fiadh CO049-057----, CO049-058---& CO049-059-----.

3.4.1.7 Design Process as Pertains to the T8 and T9 Area

With respect to Cork County Council's recommendation to remove T8 and T9 due to proximity to the stone row archaeological monument C0049-020 and stone circle C0049-008, and the potential impact on the setting of these features, significant consideration was given to these archaeological features throughout the iterative design process to ensure that no significant direct impacts would occur as a result of the Project.

As described in Section 2.3.4 of Chapter 2 of the EIAR, a constraints - led design philosophy was used to avoid environmental sensitivities and minimise potential environmental impacts as a result of the design with mitigation by avoidance the primary goal of the constraints - led iterative design process.

As described in Section 2.3.4.1 of Chapter 2 of the EIAR, the design has been carried out in accordance with industry guidelines and best practice, namely the Department of Environment, Heritage and Local Government’s (DoEHLG) Wind Energy Development Guidelines (2006) and the Irish Wind Energy Association Best Practice Guidelines (2012). The design process of the Project has had regard to the Department of Housing, Planning and Local Government’s (DoHPLG) Draft Revised Wind Energy Development Guidelines (2019).

The constraints-led design approach consisted of the identification of environmental sensitivities within the project development study area by the design team with a view to identifying suitable areas in which wind turbines may be located.

As described in Section 2.3.3 of Chapter 2 of the EIAR, a study of cultural heritage sites was conducted which identified 14 no. archaeological sites in proximity to the proposed wind farm site. Monuments with potential visual alignments in the greater area were also identified. Through desktop and field based inspection, it was concluded that a wind farm could be developed at the Ballinagree site without impacting on existing archaeological sites or their alignments.

Once the developable area was established, the first design iteration of the Project was developed. The developable area was then further refined as additional constraints were identified throughout the environmental impact assessment process. The project design team worked closely with the EIAR Team including the project archaeologist.

As part of the development of the initial preliminary turbine layout Initial Turbine Layout (24 Turbines, 179 - 185m tip) , all turbine locations were set back from recorded monuments in consultation with the Project Archaeologist.

Following investigation by the Project Archaeologist at Design Iteration 1 Stage, T07 (*T09) was identified as having a potential significant impact on two stone circles due to visual impact on setting. Here T07 was found to be within the visual alignment of the stone circles. Archaeologists recommended to move T07 in order to keep this alignment clear and to maintain this visual alignment for all subsequent design iterations.

At Design Iteration 2 Stage, layout design input parameters included the movement of T03 (*T03), T04 (*T06), T05 (T*04), T06 (*T05), T07 (*T08), T08 (*T07) and T10 (*T09) to allow for an uninterrupted clear visual corridor for the visual alignment of the nearby stone circles (recorded monuments). The turbine movements were between 20m and 100m and also considered other sensitivities such as ecology and distance to nearby dwellings when repositioning.

At Design Iteration 3 stage, all infrastructure was considered to be appropriately set back from registered monuments by the EIAR Team. While indirect visual impacts on the above nearby monuments were identified, these are temporary, and no residual direct or indirect impacts were envisaged that cannot be reversed following decommissioning.

Figure 3-23: Visual Alignments Associated with Stone Circles CO049-008 and C0049-009

3.5 Item 5: Biodiversity Enhancement Management Plan

It is noted that the Biodiversity Enhancement Management Plan lands are generally not within the application site boundary, or within contiguous land ownership boundary. You are requested to provide further information on how the Board can be satisfied that the implementation of this plan and the ongoing land management measures therein would be achieved over the lifetime of the proposed wind farm development.

3.5.1 Response

As part of the planning submission a Biodiversity Enhancement Management Plan (BEMP) was prepared and submitted with the application for consent. This BEMP was included in Volume 3 as Appendix 3-4 and comprises land management commitments and monitoring for approx. 304 hectares of lands in the vicinity of the proposed Ballinagree Wind Farm. In addition, the developer has undertaken to create wildlife corridors through strategic tree-felling between areas of upland habitat in the vicinity of the proposed wind farm area. The land management measures are designed to maintain and enhance local biodiversity. The BEMP lands are identified in Figure 3-5 of Volume 2 - Chapter 3 'Description of the Proposed Development' of the EIAR and Consent Letters from the individual private landowners were also incorporated into the BEMP so to satisfy the Board that agreements are in place between the developer and the landowner for the measures outlined. A landowner consent letter from Coillte Cuideachta Ghniomhaiochta Ainmnithe (Coillte CGA) with respect to ca. 18 Ha of land associated with the proposed *'Coillte Wildlife Corridors'* described in Section 7 of the BEMP has been included with this RFI response and can be found in Appendix 8 of this report. It is important to emphasise as outlined in the introduction section of the BEMP submitted with the initial planning application,

"the BEMP is not designed to mitigate or address particular potential impacts associated with the construction, operation or decommissioning of the proposed wind farm. It is instead a commitment provided to yield a lasting biodiversity benefit to the area around Ballinagree."

Accordingly, it is worth highlighting that the lands subject to the BEMP and implementation of same serve as a planning gain for the surrounding area, rather than serving as works that are required to mitigate against impacts as a result of the proposed wind farm development.

Details on the implementation plan for the BEMP are provided in Section 2.2 of the BEMP. This sets out the commitment to appoint a BEMP liaison officer who will act as a point of contact and manager for the implementation of the plan. This manager will ensure that the commitments are implemented and monitored and that all stakeholders are kept updated on the progress of the scheme. The manager will also liaise with the project ecologist and the individual landowners and convene regular project review meetings. The initial project establishment will require dialogue in relation to the timeline for the delivery of individual prescriptions. It is intended that the approach to delivery will be discussed and agreed within 6 months of the grant of planning permission. The bulk of the interventions (planting, fencing etc.) will be achieved in the first three years from the grant of planning.

The initial Action Plan will cover an initial 5-year period and will set measurable targets for each land holding which will be monitored and reported upon during this early establishment phase. This 5-year Action Plan will be published on a dedicated website that will be established and maintained for the duration of the project. Annual reports will be prepared and measure the progress towards targets (e.g. planting of new hedgerow) and provide an update on ecological monitoring carried out in the area during this initial 5-year establishment phase. At the end of the first 5-year plan an updated Action Plan will be prepared and agreed with the participating landowners. This will see the continuation of land management and maintenance of the various biodiversity prescriptions already in place for the remainder of the period. The lands will be subject to annual ecological surveys (audit of BEMP measures) throughout the lifetime of the windfarm. Key results and updates will be published on the BEMP website.

The measures outlined in the BEMP are built upon best practice recommendations and measures that have been shown to be successful as part of other biodiversity enhancement schemes (see Section 2.1 of the BEMP).

We now submit to the Board copies of letters prepared by legal counsel on behalf of Orsted and Futurenergy Ireland. These outline how the Co-operation Agreements have been entered into with the relevant private landowners for a term of 30 - 35 years, with three of the four landowners having the option to terminate the agreement after 15 years, the fourth does not have this option. It is not anticipated that the landowners will terminate the agreements early, but in the event that they do, alternative lands will be sourced to carry out the BEMP works for the remainder of the term. Please refer to Appendix 8 for a copy of legal counsel letter of confirmation.

It is also confirmed that in the unlikely event that a landowner does not comply with the Co-operation Agreement, in three out of four instances, the Developer can carry out the necessary works. In the case of the fourth landowner, they have agreed to carry out works directly.

With respect to the Coillte owned land. Please find attached legal counsel letter prepared on behalf of Futurenergy Ireland which demonstrates the legal relationship between Coillte CGA (the property owner) and Futurenergy Ireland and Ballinagree Wind Farm DAC (Appendix 8). This letter demonstrates that there is sufficient agreement in place to ensure that Ballinagree Wind Farm DAC can carry out the measures identified for the Coillte Lands.

These agreements confirm that there is a legal agreement in place between the relevant landowners and Orsted and between Coillte and Futurenergy Ireland to carry out the BEMP measures in connection with the Ballinagree Wind Farm. The BEMP is a key environmental commitment and forms part of the particulars of the application for consent and therefore will be implemented as part of the project if planning consent is issued and if the project is brought to construction. In order to provide additional assurance to the Board that the BEMP lands are an integral part of the application for consent and will be delivered, the Developer (Ballinagree Wind Farm DAC) is also willing to enter into a Section 47 Agreement, pursuant to Section 47 of the Planning and Development Act, 2000 (as amended) with the relevant Planning Authority in this instance Cork County Council.

Section 47 agreements are used to regulate development or use of land. An Agreement made under Section 47 is a legally binding and enforceable agreement for the control of the lands in question for the purpose of biodiversity enhancement. Of particular relevance to this development are Section 47(1) and (3), these are repeated below for convenience:

> *"47.—(1) A planning authority may enter into an agreement with any person interested in land in their area, for the purpose of restricting or regulating the development or use of the land, either permanently or during such period as may be specified by the agreement, and any such agreement may contain such incidental and consequential provisions (including provisions of a financial character) as appear to the planning authority to be necessary or expedient for the purposes of the agreement.*

(3) An agreement made under this section with any person interested in land may be enforced by the planning authority, or any body joined with it, against persons deriving title under that person in respect of that land as if the planning authority or body, as may be appropriate, were possessed of adjacent land, and as if the agreement had been expressed to be made for the benefit of that land."

To provide comfort to the Board that the implementation of this plan and the ongoing land management measures therein would be achieved, the Applicant would welcome a condition on any grant of permission which requires the Applicant to enter into a Section 47 Agreement with the Planning Authority (in this Instance Cork County Council) prior to commencement of development for the delivery of the Biodiversity Enhancement Management Plan lands. In this regard, it is requested that any condition for a Section 47 Agreement is for a period of 15 years initially, with a review prior to the 15 year period expiring before signing a second Section 47 Agreement for a further 15 years. It is suggested that this allows for sufficient comfort that the works will be carried out in accordance with the BEMP, and that the Developer can enter into this agreement whilst covering off the unlikely circumstance that a landowner decides to terminate the Co-operation Agreement after 15 years.

We submit that the information submitted provides the Board with the relevant information and certainty that a Section 47 agreement is appropriate in this instance and will be implementable. Section 47 agreements are a common practice, historically in controlling lands relating to one-off housing planning permissions where landowners seeking planning consent or third parties seeking planning consent in areas under strong rural housing pressures had to enter into agreements restricting the use of lands in the area under the control of the landowner who is seeking planning consent or who is selling lands to a third party for a development site. More recently in Large Scale Residential Developments and Strategic Housing Developments in such instances where it was deemed necessary for the Competent Authority to restrict the use of projects . For example, imposing a Section 47 agreement to restrict the nature of tenancy associated with a scheme. We can assure the Council that the arrangements in place between the Developer and the landowners will ensure that the Developer can enter into this Section 47 agreement for the purpose of controlling the BEMP lands.

3.6 Item 6: Response to Other Issues Raised in Submissions

Item 6 of the Board's request for further information invites the Applicant to provide a response to other issues raised in the submissions made.

Following a review of the submissions, responses have been prepared below to observations by the following bodies:

- Inland Fisheries Ireland;
- Transport Infrastructure Ireland;
- Geological Survey of Ireland;
- Irish Aviation Authority;
- Office of Public Works;
- Department of Transport;
- Irish Water.

Various observations made by other parties were also reviewed fully by the Applicant. Following this review, it is contended that the points raised in these third party submissions are fully addressed in the planning application submitted including the EIAR and NIS and this report x.

3.6.1 <u>Response</u>

3.6.1.1 Inland Fisheries Ireland

The Applicant recognises the importance of salmonid fisheries and potential of the Project to impact on same.

Inland Fisheries Ireland have published guidelines relating to construction works along water bodies entitled '*Guidelines on protection of fisheries during construction works in and adjacent to waters*", these guidelines will be adhered to during the construction of the Project.

IFI requested that planning conditions ensure:

- Contaminated (suspended solids, hydrocarbon, cement products etc.) construction runoff will be collected and disposed of in a manner so that pollution of surface waters cannot occur.
- On commencement and for the duration of construction a daily ongoing inspection programme of surface waters in the vicinity of the site will be undertaken, with any escape of contaminants notified immediately to IFI.
- All watercourse instream works will be carried out in dry weather.
- Provision will be made for advance removal and relocation of fish stocks by means of electro-fishing as necessary when instream works occur.
- All new or upgraded watercourse crossings (bridge/culverts), in fish bearing waters, will be constructed in a manner that permits the free passage of fish both at the construction phase and upon completion. IFI will be notified on completion of works at each crossing point to ensure the works meet fishery requirements.

- In terms of grid connection ducting, unless shown to be unavoidable watercourse crossing will be carried out by non-invasive means such as spanning or directional drilling. Open trenching of watercourses will be a measure of last resort. Where open trenching occurs the bed and banks of the crossing point will be reinstated to pre-works condition.

The above requirements are addressed through construction methodologies and mitigation measures set out in the EIAR and CEMP. The Applicant will discharge the above should they be attached as conditions to a grant of planning permission by the Board.

With respect to in-stream works, as described in Chapter 3 of the EIAR (Project Description), the proposed wind farm internal access tracks will cross 13 no. watercourses in total. In addition, a total of 13no . watercourse crossings have been identified along the proposed grid connection route.

Of the 13no. watercourse crossings identified within the wind farm site, 8 no. are existing pipe culverts which shall be either upgraded or replaced or left in-situ. 1no. existing stone bridge shall be replaced with a new clear span concrete bridge. The remaining crossings are proposed new structures in the form of 1no. clear span bridge and 3no. pre-cast box culverts. The proposed crossing designs have been developed in consultation with Inland Fisheries Ireland (IFI).

The grid connection cable route contains 3 No. bridge watercourse crossings and one large culvert crossing which will be completed using horizontal directional drilling (HDD). A number of other minor watercourses crossing locations have been noted along the cable route, i.e. culverts, pipe drains and minor field drains. Crossing of these existing culverts will be as per undercrossing or overcrossing methods, depending on the depth of the culvert or using open trenching.

All watercourse crossings have been designed to avoid the need for in-stream works where possible however, should in-stream works be required, they shall be carried out in accordance with the construction methodology and mitigation measures set out in the CEMP and EIAR as well as the above requirements listed by IFI.

3.6.1.2 Transport Infrastructure Ireland

TII recommended the following condition:

> *"Prior to the commencement of development the developer, a full assessment of structures on roads of any proposed haul route, shall be undertaken to confirm that all the structures can accommodate the proposed loading associated with the delivery of turbine components where the weight of the delivery vehicle and load exceeds that permissiblele under the Road Traffic Regulations which shall be submitted to the satisfaction of the planning authority."*

It should be noted that abnormal weight loads are not a feature of the turbine delivery vehicles. They are abnormal in size only. All construction and delivery vehicles for the proposed development will be subject to the standard axle weight requirements set out under the Road Traffic Regulations and therefore the loadings from construction traffic will not exceed the relevant standards. Notwithstanding the need to use some specialist vehicles to facilitate turbine delivery, it should be noted that the number of load-bearing axles for any specialist vehicles carrying large loads are designed to ensure that the load on any one axle does not exceed acceptable load bearing statutory limits.

3.6.1.3 Geological Survey of Ireland

GSI have requested the following:

> *Should the development go ahead, a copy of reports detailing any further site investigations carried out be provided to GSI.*
>
> *Should any significant bedrock cuttings be created, that they will be designed to remain visible as rock exposure rather than covered with soil and vegetated, in accordance with safety guidelines and engineering constraints. In areas where natural exposures are few, or deeply weathered, this measure would permit on-going improvement of geological knowledge of the subsurface and could be included as additional sites of geometries. Alternatively a digital photographic record of significant new excavations could be provided.*

The content of this request is noted, and the Applicant would welcome a condition to furnish GSI with the requested information in the event of the circumstances described above arising following a grant of planning permission.

3.6.1.4 Irish Aviation Authority

The Irish Aviation Authority (IAA) Air Navigation Services Division (ANSD) stated:

> *"Any person who seeks to erect a man-made object in excess of 45 meters anywhere within the state above ground or water surface level must notify the IAA ANSD of the intended crane erection at least 30 days in advance, as a crane operating at or above this height may constitute an obstacle to air navigation."*

Additionally, the following data is to be supplied once construction is planned or commenced or available to the airspace team:

- The WGS84 coordinates (in degrees, minutes and seconds) for each turbine;
- Height above ground level (to blade tip) and elevation above mean sea level (to blade tip);
- Horizontal extent (rotor diameter) of turbines and blade length where applicable;
- Lighting of the wind firm, which turbine(s) is/are lit, and what type of lighting."

As described in Section 16.5.1.1 of Chapter 16 'Telecommunications and Aviation' of the EIAR submitted with the initial application, an aeronautical obstacle lighting scheme will be agreed with IAA in line with IAA's consultation response and applied to the proposed turbines. The co-ordinates in WGS84 format and ground and tip height elevations for each turbine will be supplied to the IAA at the end of the construction phase. In addition to this IAA will be notified of intention to commence crane operations at least 30 days prior to their erection.

The Applicant would welcome a condition to ensure that these requirements are adhered to in the event of a grant of permission.

3.6.1.5 Office of Public Works

Please refer to Section 2.3 of this Report which responds directly to RFI Item 3, dealing with points raised by the OPW in respect of the proposed Project.

3.6.1.6 Department of Transport

The Department of Transport stated the following in their submission:

> *"The Department of Transport would consider it important that liaison should occur with the Local Authority, TII and NTA if necessary, on any future Greenway and Active Travel infrastructure that may be planned for this area."*

The Applicant would welcome the opportunity to liaise with Cork County Council, TII and NTA, in the event of any future Greenway and Active Travel infrastructure that may be planned for this area. The Applicant is not aware of any active travel and greenway plans in the area and none were identified by consultees during EIAR scoping consultation for this project.

As described in Section 11.6.3 of Chapter 11 'Population, Human Health and Material Assets' of the EIAR submitted with the initial application, the proposed Project will include approximately 15km of upgraded or new access tracks which will be developed as walking trail routes throughout the wind farm site. This will include links to existing sections of the Duhallow Way as well as providing users with a new section of trail to a viewing platform from the Duhallow Way. Furthermore, it is proposed to connect these trails to existing archaeological features throughout the site and supply archaeological and biodiversity heritage information boards, trail waymarks, trail viewing points and a trailhead carpark and picnic area. It is proposed to partially reinstate the southern construction compound for use as a trail head car park with up to 40 no. parking spaces for visitors. The proposed amenity trail is illustrated in Figure 11-5 of Chapter 11 'Population, Human Health and Material Assets' of the EIAR.

3.6.1.7 Irish Water

Irish Water requests any grant of permission be conditioned as follows:

1. The applicant shall ensure that there will be negative impact to any of Irish Waters Drinking Water Source(s) which may be in proximity to the development during both construction and operational phases of the development.
2. The applicant shall ensure no negative impact to any of Irish Waters Groundwater Source(s) which may be in proximity to the development during both construction and operational phases of the development to ensure compliance but the Groundwater Directive (80/68/EEC).
3. The applicant shall sign a connection agreement with Irish Water for any new connection(s) required.
4. The applicant shall duct high voltage underground cabling from the wind farm to a substation.
5. The applicant shall agree with Irish Water, any proposals to divert existing water or wastewater services prior to commencement of works.

   We respectfully request ABP to review the proposed conditions from Irish Water. Please note that a connection agreement will not be required from Irish water as public sewer or water supply is not required for this project.

4. CONCLUSION

We trust the Board will have full regard to this further information submission, in which we have demonstrated that:

- The proposed development is consistent with the Cork County Development Plan 2022 - 2028, and that this has had limited implications to the proposed development, with the wind strategy remaining unchanged for the area of the proposed development site in line with the previous 2014 Development Plan
- An additional photomontage has been prepared from a suitable viewpoint which has informed the conclusion that it is not considered that the proposed wind farm will generate significant visual impacts at the N22 Macroom Bypass.
- Matters raised by the Office of Public Works have been addressed in detail and, where necessary, additional information has been included as part of this response.
- The key points raised in the Cork City Council submission have been responded to, with particular attention paid to the list of items in Appendix B of the submission.
- Information has been provided to inform the Board how the lands subject to the Biodiversity Enhancement Management Plan will be implemented and how management measures achieved over the lifetime of the proposed wind farm.
- Key issues raised in other submission received in relation to the proposed development have been identified and responded to.

We look forward to a positive decision in due course and if you have any further queries, please do not hesitate to contact us.

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 1

Further Information Request Letter and Copy of Emails Confirming Extension to Respond to Further Information Request

Our Case Number: ABP-312606-22

Your Reference: Ballinagree Wind DAC

An Bord Pleanála

FEHILY TIMONEY & Co.

Distribution TB / JH

0 3 MAY 2023

Job No: P2114

Correspondence No: 3

Comment:

Fehily Timoney and Company
Core House
Pouladuff Road
Cork
Co. Cork
T12 D773

Date: 02 May 2023

Re: Wind farm development of 20 turbines with 110kV electrical substation and all related site works and ancillary development.
Townlands of Annagannihy, Aughinida, Ballynagree East, Ballynagree West, Bawnmore, Caherbaroul, Carrigagulla, Carrigduff, Clonavrick, Derryroe, Drishane More, Dromagh, Drominahilla, Dromskehy and other townlands, Co. Cork.

Dear Sir / Madam,

I have been asked by An Bord Pleanála to refer further to the above mentioned proposed development which is before the Board for consideration.

Please be advised that the Board, in accordance with section 37(F)(1) of the Planning and Development Act, 2000, as amended, hereby requires you to furnish the following further information in relation to the effects on the environment of the proposed development: .

1. It is noted that the Cork County Development Plan 2022 - 2028 has been adopted since the lodgement of the application. You are requested to address the implications, if any, of the new Development Plan for the proposed development.
2. You are requested to provide an additional photomontage from a suitable viewpoint on the recently opened section of the Macroom Bypass and an assessment of the visual impact from said viewpoint.
3. You are requested to address the matters raised in the submission made by the Office of Public Works. In particular, your response should include:
   (a) Submission of a site-specific flood risk assessment.
   (b) Address contended errors/contradictory information in EIAR.
   (c) Address the contended issues with regard to flow estimation calculations and swale volumes.
   (d) Confirm whether the design of watercourse crossings WF-HF5 and WF-HF8 complies with OPW requirements.

4. You are requested to provide a detailed response to the matters raised in the submission made by Cork County Council. In particular, this should include a response to the list of items contained in Appendix B of said submission.

5. It is noted that the Biodiversity Enhancement Management Plan lands are generally not within the application site boundary, or within contiguous land ownership boundary. You are requested to provide further information on how the Board can be satisfied that the implementation of this plan and the ongoing land management measures therein would be achieved over the lifetime of the proposed wind farm development.

6. You are invited to provide a response to other issues raised in the submissions made.

The further information referred to above should be received by the Board within 12 weeks from the date of this notice (i.e. **no later than 5.30 p.m. on the 25th July 2023**).

In this regard, please submit 2 hard copies and one electronic copy of the above information.

Please note that following its examination of any information lodged in response to this request for additional information, the Board will then decide whether or not to invoke its powers under section 37(F)(2) of the Planning and Development Act, 2000, as amended, requiring you to publish notice of the furnishing of any additional information and to allow for inspection or purchase of same and the making of further written submissions in relation to same to the Board.

If you have any queries in relation to the matter please contact the undersigned officer of the Board. Please quote the above mentioned An Bord Pleanála reference number in any correspondence or telephone contact with the Board.

Yours faithfully,

Sarah Caulfield

Sarah Caulfield
Executive Officer
Direct Line: 01-8737287

PA11

Conor Auld

Subject: FW: ABP Ref. 312606-22 - Ballinagree Wind Farm RFI - Request for extension of deadline for submission of Further Information

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From: SIDS <sids@pleanala.ie>
Sent: Friday, July 21, 2023 9:09 AM
To: Conor Auld <conor.auld@ftco.ie>
Subject: RE: ABP Ref. 312606-22 - Ballinagree Wind Farm RFI - Request for extension of deadline for submission of Further Information

Dear Mr. Auld,

I have been asked by An Bord Pleanála to refer to you email dated 20th July 2023, the contents of which are noted.

Please be advised that the Board will grant the 3 month extension to your request.

Kind regard,
Cora Cunningham
Senior Executive Officer

Trevor Byrne

From: SIDS <sids@pleanala.ie>
Sent: Friday 20 October 2023 11:05
To: Conor Auld; SIDS
Cc: Jim Hughes; Trevor Byrne
Subject: RE: ABP Ref. 312606-22 - Ballinagree Wind Farm RFI - Request for extension of deadline for submission of Further Information

Good morning Conor.

I wish to acknowledge receipt of your email.

Please be advised the Boards representatives have granted an extension to the FI response deadline.

The new date is 24th January 2024.

Regards
Ashling Doherty
Executive Officer

From: Conor Auld <conor.auld@ftco.ie>
Sent: Thursday, October 19, 2023 4:24 PM
To: SIDS <sids@pleanala.ie>
Cc: Jim Hughes <jim.hughes@ftco.ie>; Trevor Byrne <trevor.byrne@ftco.ie>
Subject: ABP Ref. 312606-22 - Ballinagree Wind Farm RFI - Request for extension of deadline for submission of Further Information

Dear Sir, Madam,

In relation to the abovementioned application, ABP Case Number ABP-312606-22, please see attached letter from this office requesting an extension of 3 months to the deadline for the submission of Further Information requested by ABP (previously extended to 25 October 2023).

The requested further 3 month extension would bring the deadline for submission of further information to 25 January 2024.

The reasoning for this request for extension is to allow for further consideration of the responses to the request and as such ensure that a fully detailed response can be furnished to the Board.

We trust that this is in order.

We would be grateful if you could please confirm receipt of this email, and the attached document.

If you have any queries, please do not hesitate to get in contact.

Regards,

FEHILY TIMONEY

Conor Auld
Senior Planner

Fehily Timoney and Company
t: +353 (0)1 6583500
www.fehilytimoney.ie

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 2

Example Excerpts from Project Design Change Log

Example Excerpts from Project Design Change Log[i]

ID	Date	Layout Revision / Name	Category	Description of the Proposed Design Change and Rationale
1	28/02/2020	Client's preliminary turbine layout	WTG Layout	N/A. First preliminary layout issued by client
5	18/05/2020	Option 4 (DI1 Option 1)	WTG Layout	The layouts have been revised primarily based on the DI1 tier 1 constraints inc, Ecology, LVIA feedback, slope etc. Also following the layout changes needed after our team call on the 8th we have also now prioritized further constraints such as private landowners were possible.
6	18/05/2020	Option 5 (DI1 Option 2)	WTG Layout	The layouts have been revised primarily based on the DI1 tier 1 constraints inc, Ecology, LVIA's feedback, slope etc. Also following the layout changes needed after our team call on the 8th we have also now prioritized further constraints such as private landowners were possible.
9	16/09/2020	DI2	Drainage	Increase setback to mapped watercourses to 75m from 50m.
10	16/09/2020	Option 4 (DI1 Option 1)	Ecology	T2[ii] - Recommend move out of sensitive habitat Habitat sensitivity under review by ecologist with recommendation to follow
12	16/09/2020	Option 4 (DI1 Option 1)	Engineering	T3 - Mature forestry with a relatively steep localised slope and peaty topsoil. Recommend moving 100m north, closer to the access track where the ground is flatter or further south to the top of the hill. (Site observation)
13	16/09/2020	Option 4 (DI1 Option 1)	Engineering	T5 - Turbine currently located on a steep slope (supported by site observations). Recommend relocating further south to higher elevation or north into downslope forestry.
14	16/09/2020	Option 4 (DI1 Option 1)	Noise	T6 - Recommend move NW to maximise distance from nearest receptors
15	16/09/2020	Option 4 (DI1 Option 1)	Noise	T7 - Recommend move W to maximise distance from nearest receptors
17	16/09/2020	Option 4 (DI1 Option 1)	Noise	T8 - Recommend move S to maximise distance from nearest receptors
18	16/09/2020	Option 4 (DI1 Option 1)	Drainage	T8 - Currently within 75m of river. Move south inside DI2 developable area.
19	16/09/2020	Option 4 (DI1 Option 1)	Archaeology	T8 - Recommendation to move turbine North or West to maximise distance to both receptors to East and SE.
20	16/09/2020	Option 4 (DI1 Option 1)	Noise	T9 - Recommend move SW to maximise distance from nearest receptors
21	16/09/2020	Option 4 (DI1 Option 1)	Engineering	T10 - Turbine location right next to existing access road. Recommend moving ~50m west to for constructability purposes. (supported by site observations)
22	16/09/2020	Option 4 (DI1 Option 1)	Drainage	T11 -Near a small stream. Recommend moving ~50m south. (site observation)

ID	Date	Layout Revision / Name	Category	Description of the Proposed Design Change and Rationale
23	16/09/2020	Option 4 (DI1 Option 1)	Engineering	T11 - Turbine location right next to existing access road. Recommend moving ~50m west to for constructability purposes. (supported by site observations)
24	16/09/2020	Option 4 (DI1 Option 1)	Engineering	T13 - Area of cut forestry with a steep slope and peat. Would recommend moving south to flatter ground out of mapped high slope zone. (supported by site observations)
25	16/09/2020	Option 4 (DI1 Option 1)	Engineering	T15 - Steep slope with peat in an area of cut forestry. Would recommend moving west out of mapped high slope zone. (supported by site observations)
26	16/09/2020	Option 4 (DI1 Option 1)	Engineering	T16 - Open field, steep sloped with peat. Recommend moving south out of mapped high slope zone. (supported by site observations)
28	16/09/2020	Option 4 (DI1 Option 1)	Ecology	Currently outside DI2 developable area due to buffer with NHA. Recommend move north into DI2 developable area.
29	09/10/2020	DI2 - Option 1	WTG Layout	Draft turbine layout developed by client based on updated constraints analysis and recommendations from EIAR team.
30	09/10/2020	DI2 - Option 2	WTG Layout	Draft turbine layout developed by client based on updated constraints analysis and recommendations from EIAR team.
31	16/10/2020	DI2 Rev 2 Layout	WTG Layout	Revised layout following further feedback for ecology, archaeology and LVIA
34	07/01/2021	DI3 draft turbine layout	WTG Layout	Updates to the DI2 layout that are based on recent community engagement feedback. Two turbines were recommended to move, T5 & T9 and as a result there was a minor move to T7 required.
37	22/03/2021	DI3	GA	Hydrology identified part of proposed new substation footprint located in river flood zone. Proposal to move east out of flood zone.
39	26/03/2021	DI3	GA	Addition of temporary construction compound in northern part of site.

[i] Some commercially sensitive information has been redacted such as landowner details.
[ii] Turbine numbering reflects the design iteration at the time and not necessarily those shown in the final layout.

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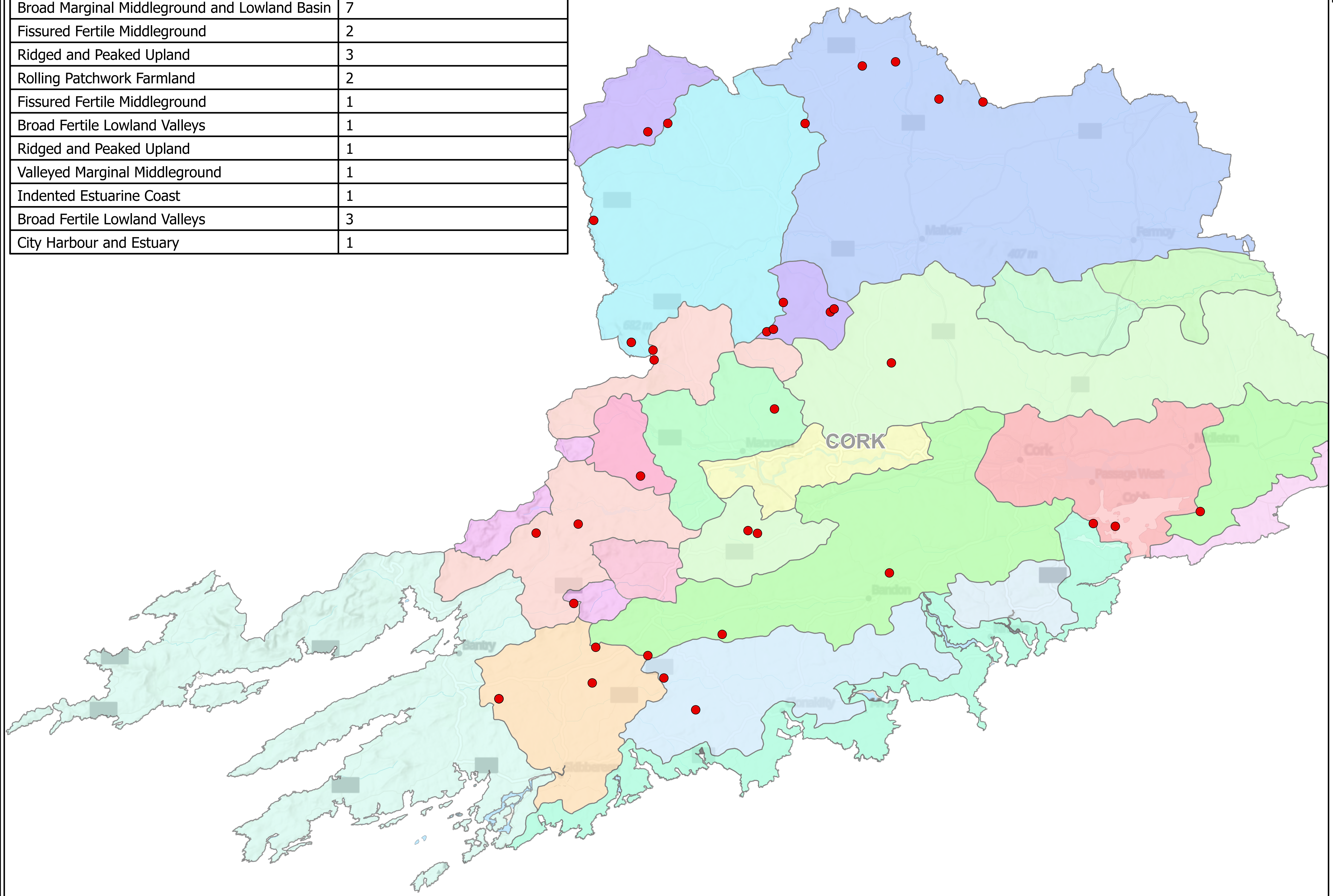
APPENDIX 3

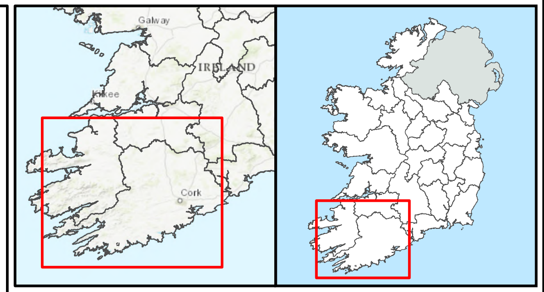
Supporting Maps & Drawings

Precedent Cork Wind Farm Location Maps

Path: R:\Map Production\2023\P23-129\Workspaces\P23_129_Peat\P23_129_Peat.aprx

Landscape Character Type	Number of Windfarms (SEAI)
Fissured Marginal and Forested Rolling Upland	1
Broad Marginal Middleground Valleys	6
Fertile Plain with Moorland Ridge	4
Fissured Marginal and Forested Rolling Upland	6
Rolling Marginal Middleground	1
Broad Marginal Middleground and Lowland Basin	7
Fissured Fertile Middleground	2
Ridged and Peaked Upland	3
Rolling Patchwork Farmland	2
Fissured Fertile Middleground	1
Broad Fertile Lowland Valleys	1
Ridged and Peaked Upland	1
Valleyed Marginal Middleground	1
Indented Estuarine Coast	1
Broad Fertile Lowland Valleys	3
City Harbour and Estuary	1





Legend

- SEAI Wind Farms June 2022

Landscape Character types

- Broad Bay Coast
- Broad Fertile Lowland Valleys
- Broad Marginal Middleground Valleys
- Broad Marginal Middleground and Lowland Basin
- City Harbour and Estuary
- Fertile Plain with Moorland Ridge
- Fissured Fertile Middleground
- Fissured Marginal and Forested Rolling Upland

TITLE: Landscape Character Areas from Cork County Development Plan 2022

PROJECT: Ballinagree Wind Farm RFI Report

FIGURE NO:	INFO		
CLIENT:	Coillte & Orsted		
SCALE:	1:500,000	**REVISION:**	0
DATE:	21/06/2023	**PAGE SIZE:**	A3

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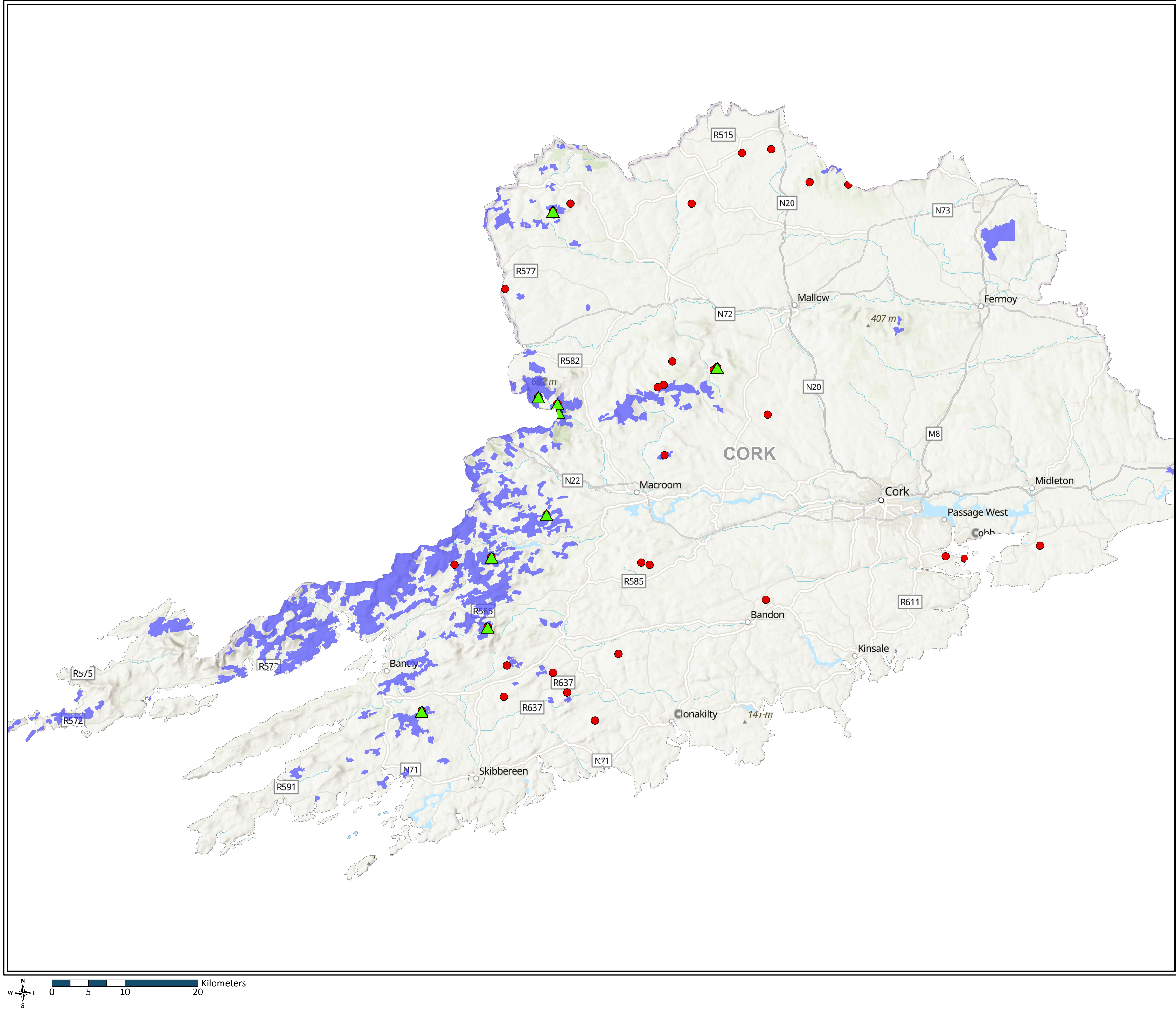
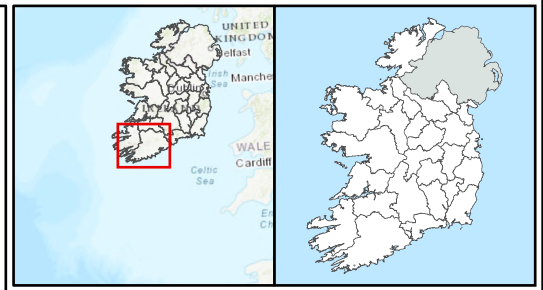
Kilometers
0 5 10 20

Path: R:\Map Production\2023\P23-129\Workspaces\P23_129_Peat\P23_129_Peat.aprx





Legend

SEAI Windfarms that intersect peat bogs based on CORINE Land cover dataset

SEAI Wind Farms June 2022

CORINE Land Cover 2018

412 Peat bogs

TITLE:	SEAI Wind Farms intersecting areas of peat bogs based on CORINE land cover
PROJECT:	Ballinagree Wind Farm RFI Report
FIGURE NO:	INFO
CLIENT:	Coillte & Orsted
SCALE: 1:500,000	**REVISION:** 0
DATE: 20/06/2023	**PAGE SIZE:** A3

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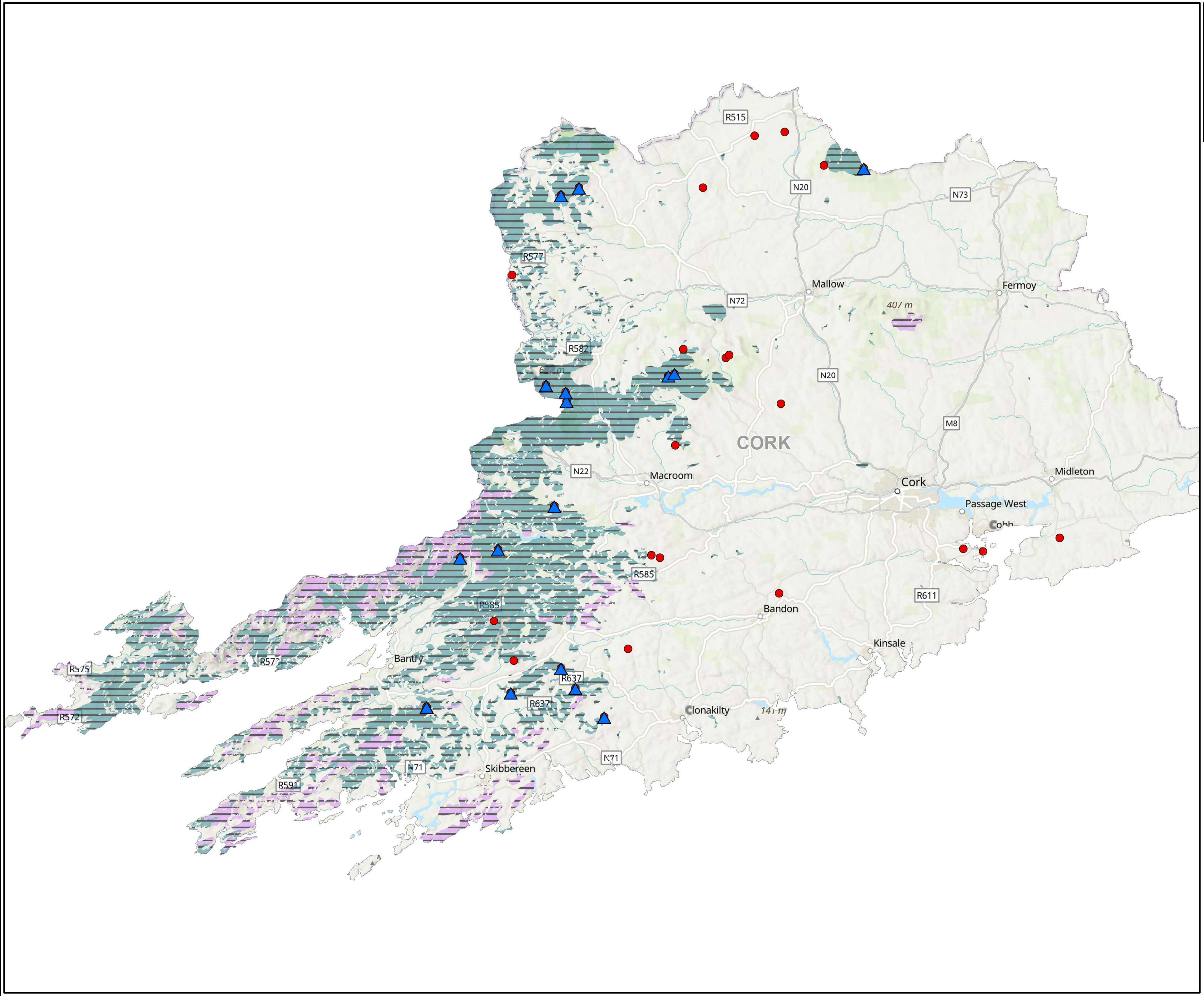

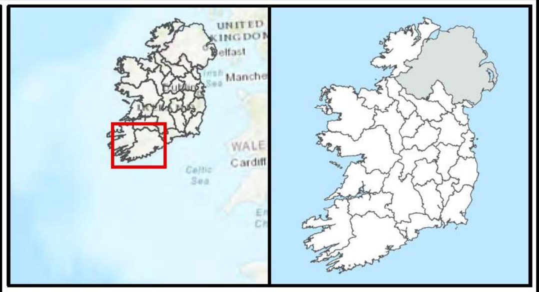

Legend

- SEAI Windfarms that intersect peat bogs based on GSI Soils dataset
- SEAI Wind Farms June 2022

Irish Soil Information System - Soil Type

- Peat
- Peat over lithoskeletal sandstone and shale bedrock

TITLE:	SEAI Wind Farms intersecting areas of peat bogs based on GSI Soils dataset
PROJECT:	Ballinagree Wind Farm RFI Report
FIGURE NO:	INFO
CLIENT:	Coillte & Orsted
SCALE:	1:500,000
REVISION:	0
DATE:	20/06/2023
PAGE SIZE:	A3

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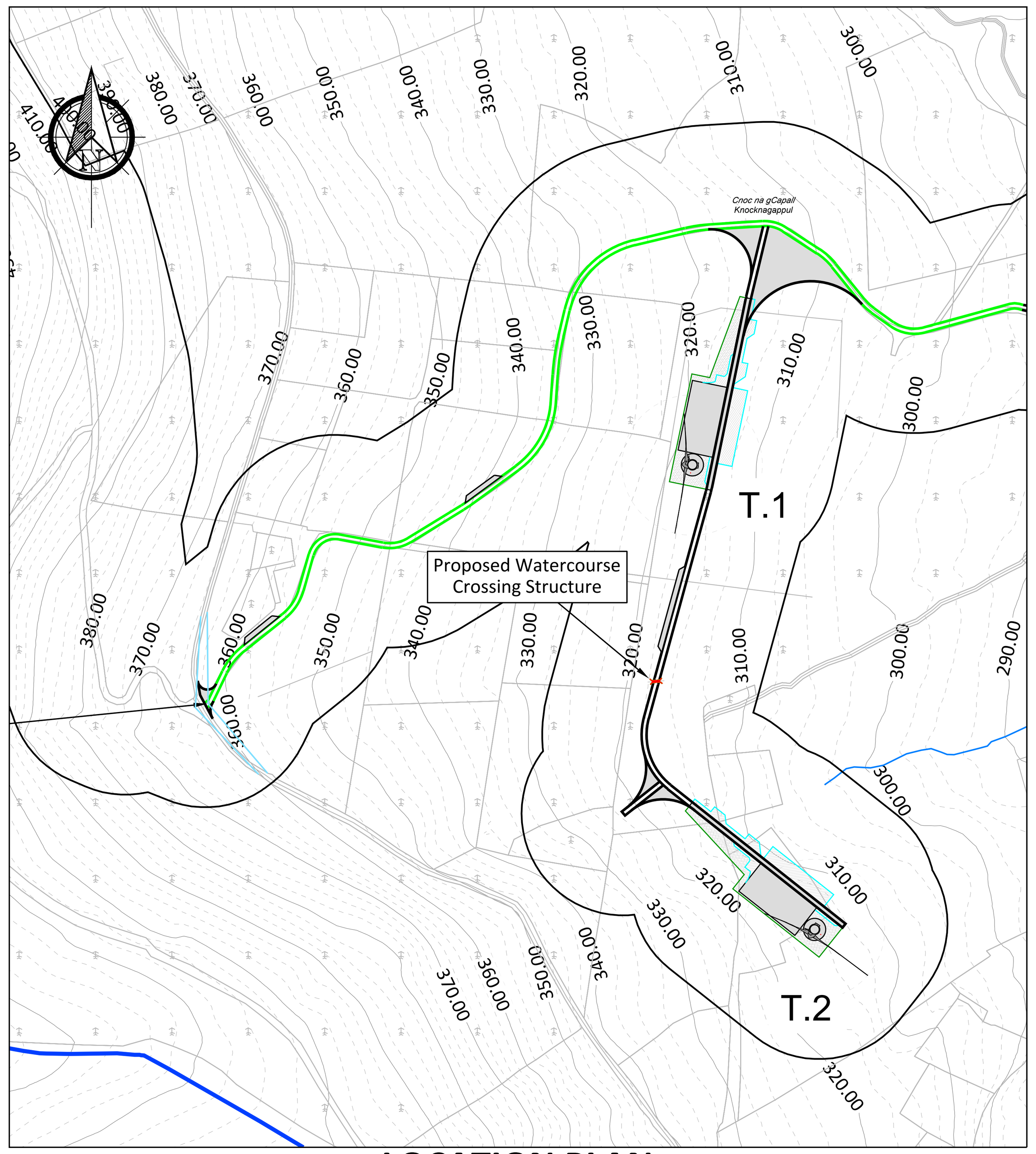
0 5 10 20

Copy of Watercourse Crossing Detail Drawings for Crossings WF-HF5 and WF-FF8

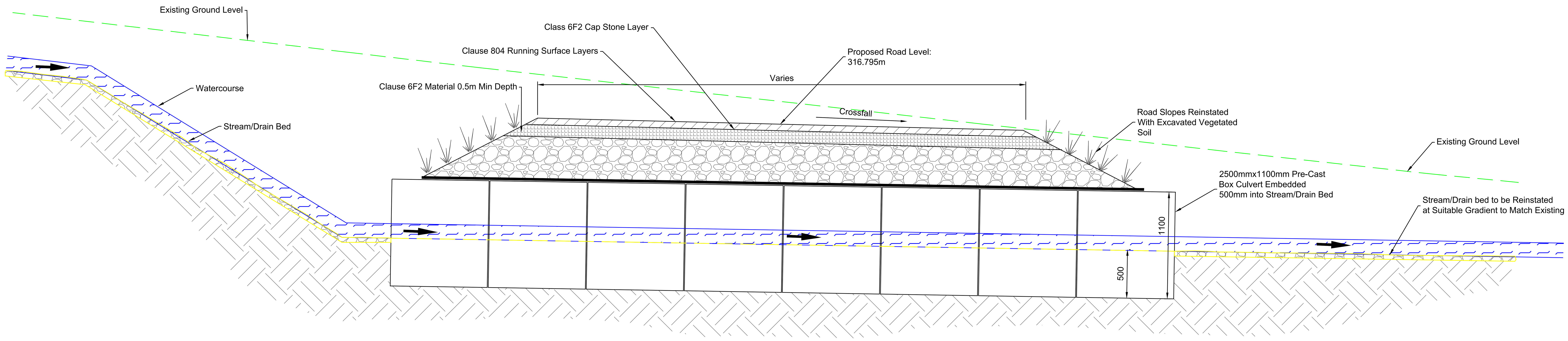


LOCATION PLAN
Scale 1:5

Legend
- Planning Boundary
- Property Boundary
- Proposed Wind Farm Access Track
- Existing Road To Be Upgraded
- Passing Bays
- Turning Areas
- Turbine And Hardstanding Areas
- Temporary Compound Area
- Borrow Pit Area
- Substation Compound
- Existing Wayleave
- Overhead 110kV ESB Powerline
- Proposed Met Mast

Notes.
1. This drawing is for planning purposes only.
2. Dimensions in meters unless otherwise noted.
3. Levels shown relative to ordinance datum (Malin Head).
4. Co-ordinates are to Irish Transverse Mercator (ITM).
5. Extent of earthworks not shown.

Indicates Direction of Flow



NEW ROAD DETAIL
Scale 1:25

0m 0.25m 0.50m 0.75m 1.00m 1.25m 1.50m 1.75m 2.00m 2.25m 2.50m
Scale 1:25

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Rev.	Description	App By	Date
A	ISSUE FOR APPROVAL	JH	15.12.21
B	ISSUE FOR PLANNING	JH	XX.01.22

PROJECT
BALLINAGREE WIND FARM

CLIENT
BALLINAGREE WIND DAC

SHEET
PROPOSED WATERCOURSE CROSSING DETAIL - WF-HF5

Date	Project number P2114	Scale (@ A1-) 1:25
Drawn by NS	Drawing Number P2114-0300-0015	Rev B
Checked by TB		

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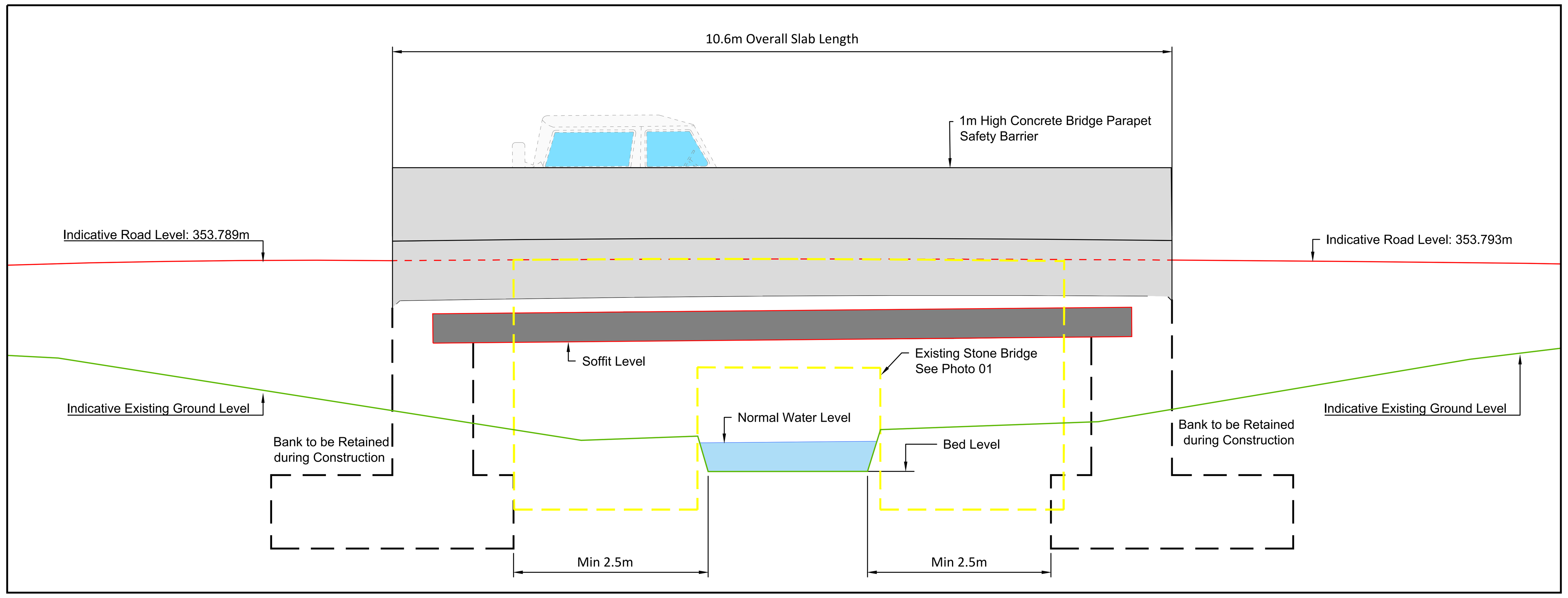
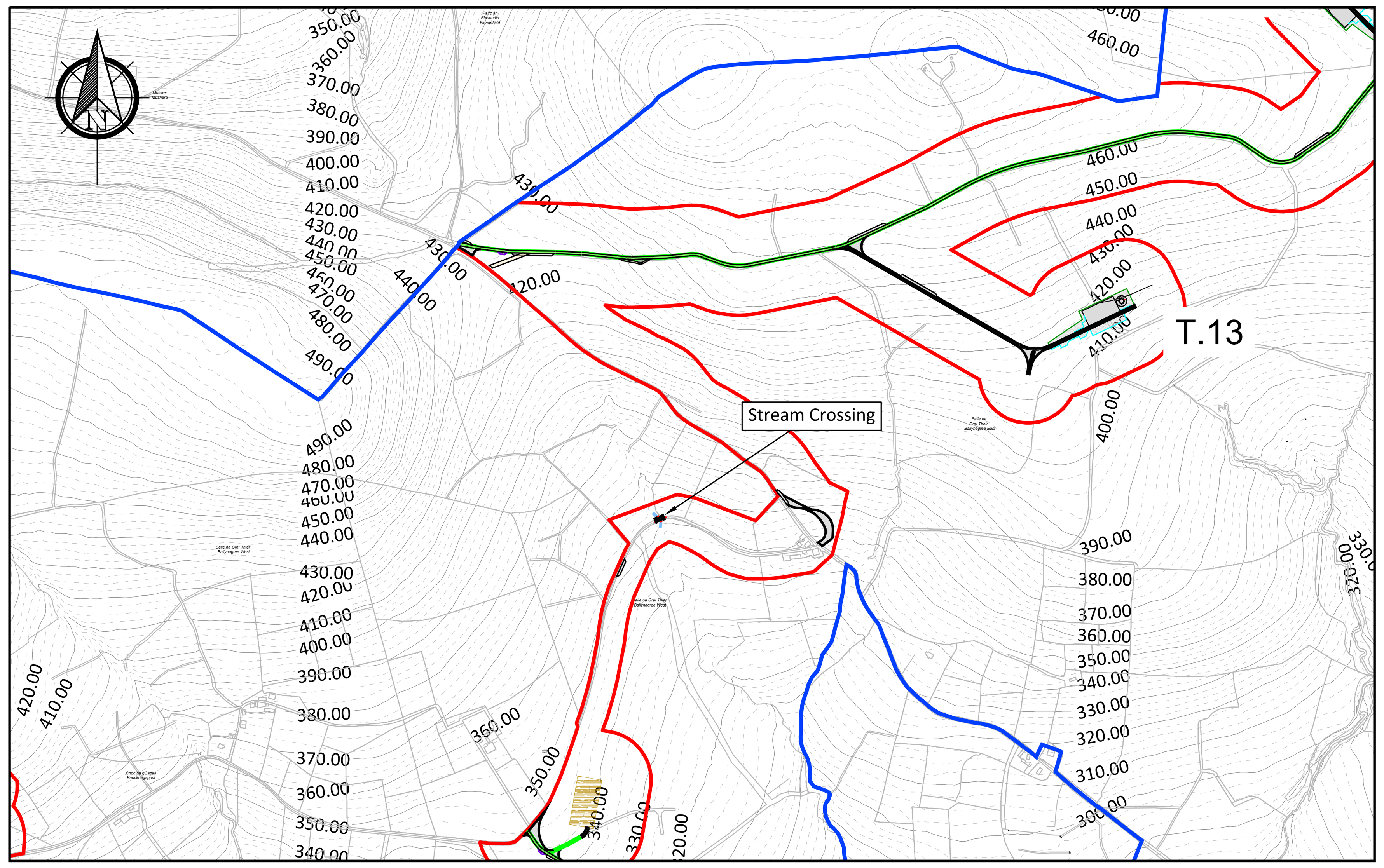
Wednesday 26 January 2022



SECTION A-A

Scale 1:50



LOCATION PLAN

Scale 1:10000

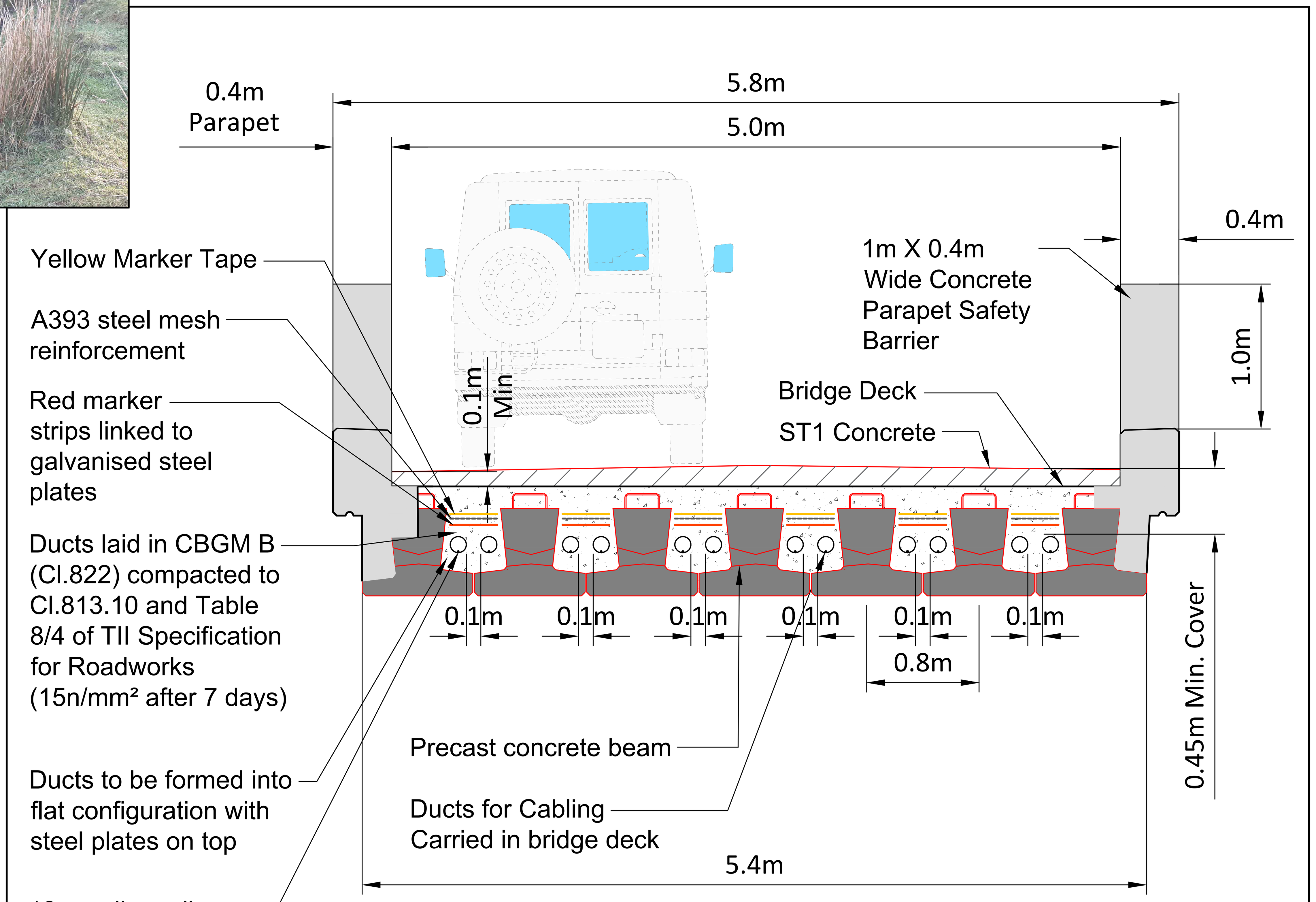
Legend

- Planning Boundary
- Property Boundary
- Proposed Wind Farm Access Track
- Existing Road To Be Upgraded
- Passing Bays
- Turning Areas
- Turbine And Hardstanding Areas
- Temporary Compound Area
- Borrow Pit Area
- Substation Compound
- Existing Wayleave
- Overhead 110kV ESB Powerline
- Proposed Met Mast

Notes.

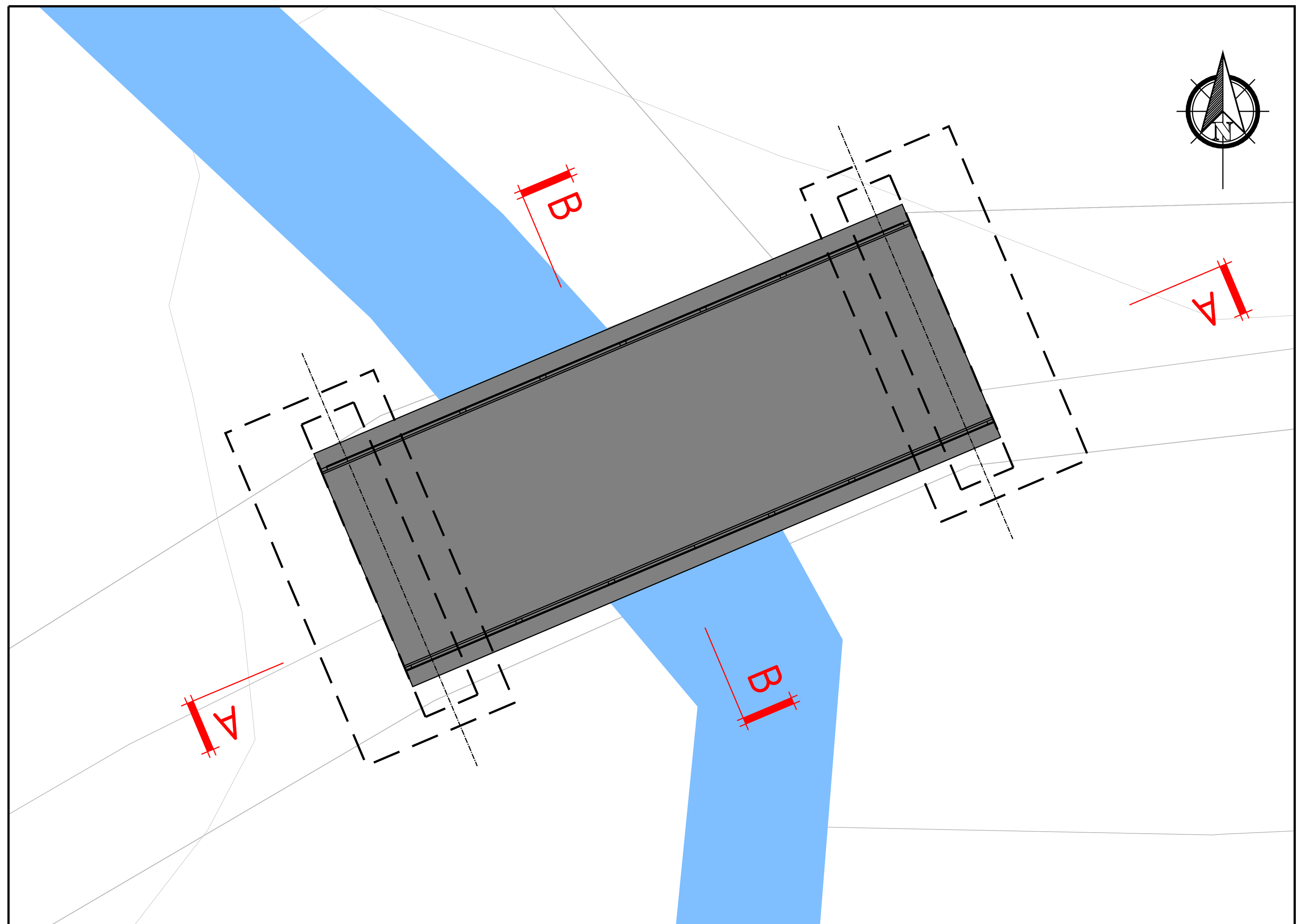
1. This drawing is for planning purposes only.
2. Dimensions in meters unless otherwise noted.
3. Levels shown relative to ordinance datum (Mal
4. Co-ordinates are to Irish Transverse Mercator
5. Extent of earthworks not shown.

EXISTING STONE BRIDGE PHOTO 01



SECTION B-B

Scale 1:25



BRIDGE PLAN

Scale 1:100

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Rev.	Description	App By	Date
A	ISSUE FOR APPROVAL	JH	15.12.21
B	ISSUE FOR PLANNING	JH	26.01.22

PROJECT: BALLINAGREE WIND FARM

CLIENT: BALLINAGREE WIND DAC

SHEET: PROPOSED WATERCOURSE CROSSING DETAIL - WF-HF8

Date	Project number	Scale (@ A1-)
15.12.21	P2114	AS SHOWN

Drawn by: NS

Checked by: TB

Drawing Number: P2114-0300-0017

Rev: B

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Wednesday 26 January 2022

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APPENDIX 4

Photomontages

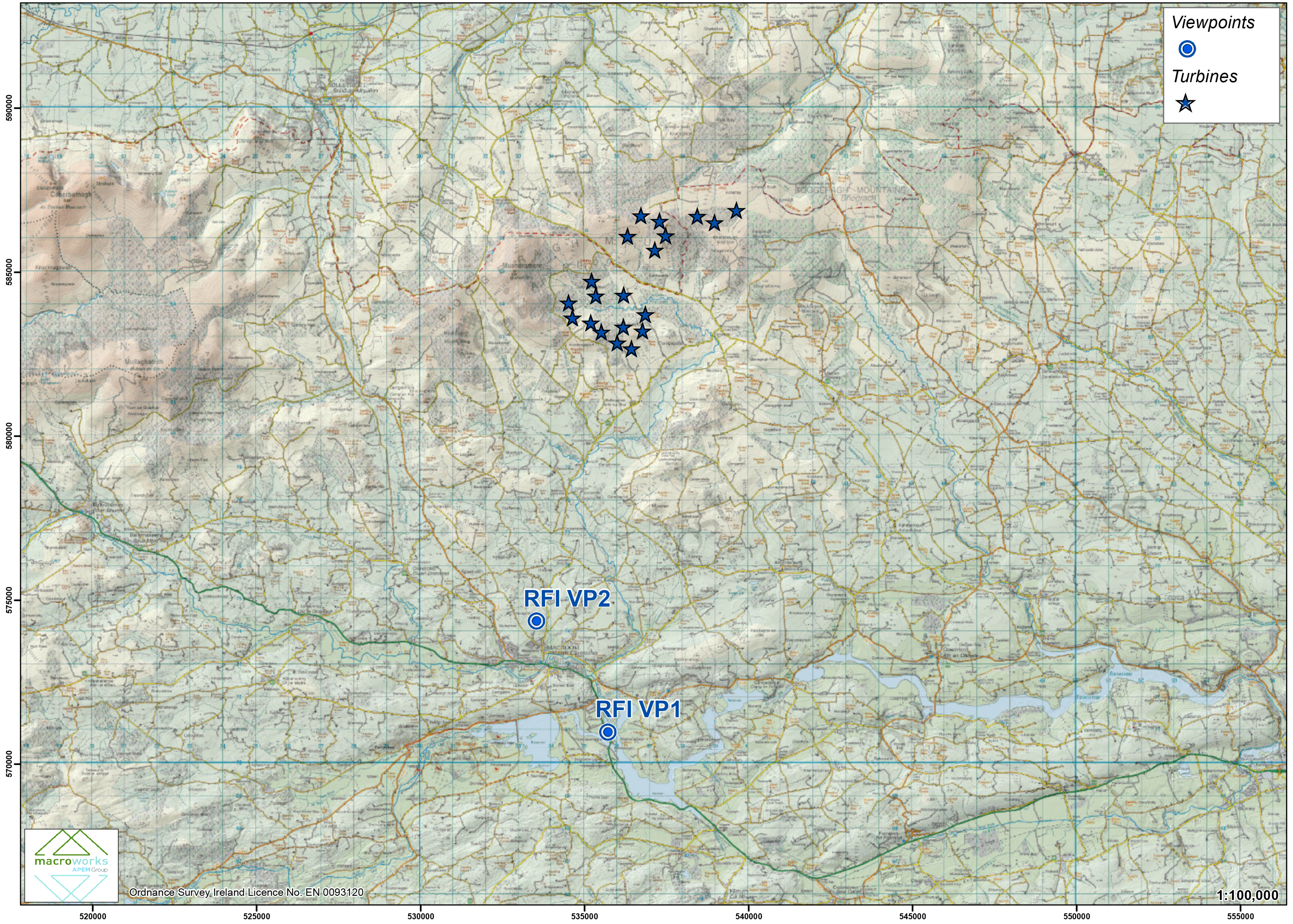
Ballinagree Wind Farm

RFI Viewpoint Photomontages

July 2023

Index of Imagery

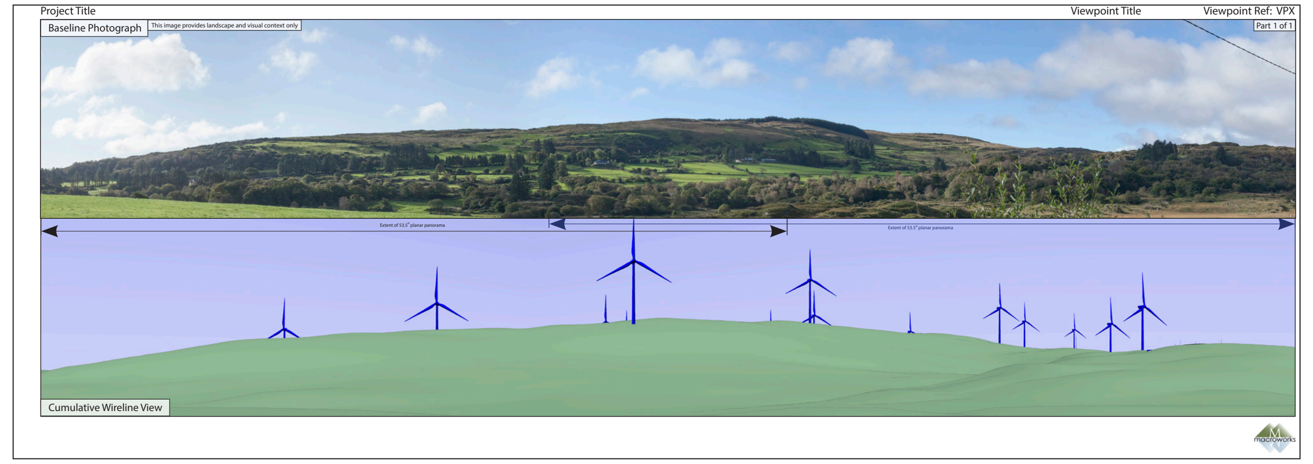
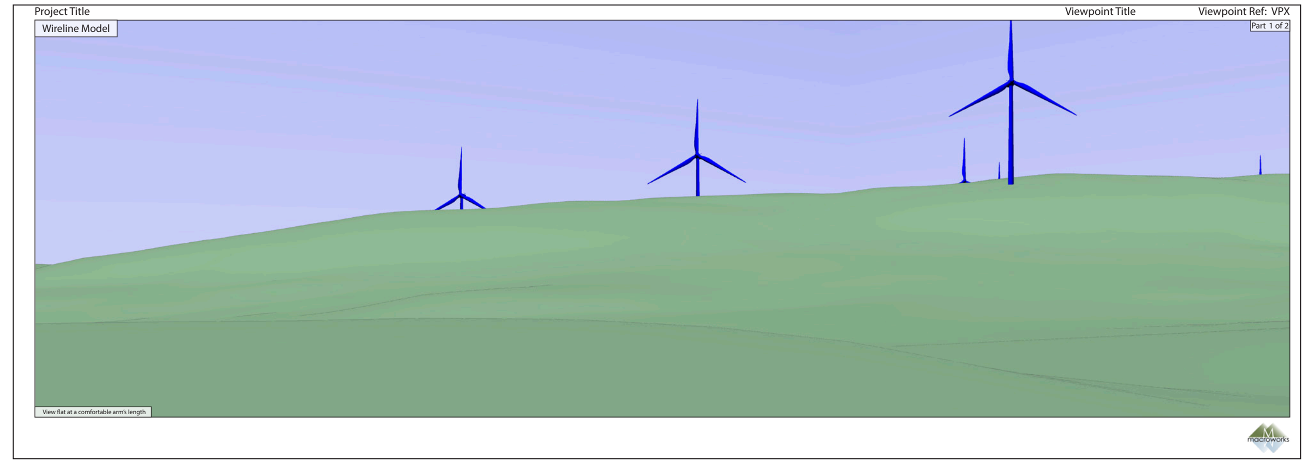
RFI viewpoint locations selected for the Ballinagree Wind Farm project



RFI VP1: N22 (Macroom Bypass) at Coolcower Roundabout
Page 1: Baseline (Contextual Wireline and Photo)
Page 2: Wireline
Page 3: Photomontage

RFI VP2: N22 (Macroom Bypass) at Kilnagurteen
Page 1: Baseline (Contextual Wireline and Photo)
Page 2: Wireline
Page 3: Photomontage

How photomontages are presented for each viewpoint

	What is Displayed	Rationale
Sheet 1: 90º Baseline panorama and matching wireline 	90º Baseline Panorama Photograph and matching Cumulative Wireline (Cylindrical Projection - to be viewed curved): The top image depicts a 90º (included angle) Baseline panorama generated from captured photography. The bottom image depicts a 90º (included angle) matching computer generated wireline. This image includes the proposed wind farm development and includes other cumulative wind farm developments (existing and/or permitted and/or proposed wind farm developments in the public domain). Extent bars indicate the extent of the 53.5º Panoramic Photomontage/Wireline Views within the depicted 90º Baseline views. Information relating to the viewpoint, proposed development and photography capture are included. A small thumbnail map is included which indicates the location of the viewpoint and the direction and extent of the depicted view. A coloured legend referencing turbines are also included to help distinguish the proposed turbines from the other cumulative turbines.	As required by the SNH guidelines, the purpose of the baseline panorama and wireline is to provide wider landscape and visual context to help the viewer understand where development sits within the wider landscape. The wireline also illustrates cumulative effects and provides the viewer with the full cumulative context. The baseline panorama is not intended to represent how large or small the turbines will appear in reality or how close they will appear to the viewer.
Sheet 2 (provided where necessary): Contextual Panoramic Photomontage View (120º - 180º) 	Contextual Panoramic Photomontage View (ranging from 120º to 180º) (Cylindrical Projection - to be viewed curved): The image demonstrates a contextual panoramic photomontage view (ranging from 120º to 180º included angle) which is generated from captured photography. It includes the proposed wind farm development and includes only other existing cumulative wind farm developments. Extent bars indicate the extent of both the 53.5º Panoramic Photomontage/Wireline Views and the 90º Baseline Views within the depicted Contextual Panoramic Photomontage View. Information relating to the viewpoint, proposed development and photography capture are included. A small thumbnail map is included which indicates the location of the viewpoint and the direction and extent of the depicted view.	An additional page not required by the guidelines, this contextual photomontage view is included to give a broader context to the viewer. It is generally included where there are multiple 90º and 53.5º views, which are required by the guidelines, for a particular viewpoint.
Sheet 3: 53.5º Wireline View 	53.5º Wireline View (Planar Projection - to be viewed flat) This image shows a 53.5º (included angle) Wireline View which matches the 53.5º Panoramic Photomontage View. It includes the proposed wind farm development and includes other cumulative wind farm developments (existing and/or permitted and/or proposed wind farm developments in the public domain). Wirelines are computer-generated images which depict the 'bare ground' terrain along with the proposed wind farm development and other cumulative wind farms developments within the depicted view. They are generated in GIS (Geographic Information System) mapping software based from a DTM (Digital Terrain Model). Information relating to the viewpoint, proposed development and photography capture are included. A small thumbnail map is included which indicates the location of the viewpoint and the direction and extent of the depicted view. A coloured legend referencing turbines are also included to help distinguish the proposed turbines from the other cumulative turbines.	As required by the SNH guidelines, the A1 wireline is intended to provide the best impression of the apparent size of the turbines and the distance to the development from the viewpoint location. It illustrates the 'bare ground' visibility and a provide a clear view of the wind farm to inform the assessment. **Only images at this scale, held at a comfortable arms length, should be used when trying to understand the size of the development and its distance from the viewpoint.**
Sheet 4: 53.5º Panoramic Photomontage View 	53.5º Panoramic Photomontage View (Planar Projection - to be viewed flat): This image demonstrates a 53.5º (included angle) photomontage generated from captured photography. It includes the proposed wind farm development and includes only other existing cumulative wind farm developments. Information relating to the viewpoint, proposed development and photography capture are included. A small thumbnail map is included which indicates the location of the viewpoint and the direction and extent of the depicted view.	As required by the SNH guidelines, the A1 panorama is intended to provide the best impression of the apparent size of the turbines and the distance to the development from the viewpoint location. **Only images at this scale, held at a comfortable arms length, should be used when trying to understand the size of the development and its distance from the viewpoint.**

Part 1 of 1

Baseline Photograph

This image provides landscape and visual context only

Cumulative Wireline View

Extent of 53.5° planar panorama

This cylindrical projection panorama has been captured, prepared and presented in accordance with the guidance set out in the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'.

Proposed Turbines | Existing Turbines | Permitted Turbines

National Grid Cordinate (ITM)		Horizontal Field of View: 90 ˚ (cylindrical projection)		Date and Time:	03/07/2023 10:14
Easting:	535709	Principal Distance:	522 mm	Camera:	Canon 5D Mark II
Northing:	570982	Turbine Tip Height:	Max Tip Height of 185m	Lens:	Fixed 50mm
Elevation:	68.7 m			Camera Height:	1.7m (AGL)

Direction (clockwise from Grid N):	358 ˚
Distance to Nearest Visible Turbine:	11.6 km
Nearest Turbine:	T5

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Wireline Model

Part 1 of 1

View flat at a comfortable arm's length

This planar projection panoramic model has been prepared and presented in accordance with the guidance set out in the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'.

Proposed Turbines

Existing Turbines

Permitted Turbines

National Grid Cordinate (ITM)		Horizontal Field of View:	53.5 ˚ (planar projection)
Easting:	535709	Principal Distance:	812.5 mm
Northing:	570982	Paper size:	(half A1) 841 x 297 mm
Elevation:	68.7 m	Correct printed image size:	820 x 260 mm

Date and Time:	03/07/2023 10:14	Direction (clockwise from Grid N):	358 ˚
Camera:	Canon 5D Mark II	Distance to Nearest Visible Turbine:	11.6 km
Lens:	Fixed 50mm	Nearest Turbine:	T5
Camera Height:	1.7m (AGL)		

Photomontage

Part 1 of 1

View flat at a comfortable arm's length

This planar projection panorama has been captured, prepared and presented in accordance with the guidance set out in the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'.

National Grid Cordinate (ITM)		Horizontal Field of View:	53.5 ˚ (planar projection)	Date and Time:	03/07/2023 10:14	Direction (clockwise from Grid N):	358 ˚
Easting:	535709	Principal Distance:	812.5 mm	Camera:	Canon 5D Mark II	Distance to Nearest Visible Turbine:	11.6 km
Northing:	570982	Paper size:	(half A1) 841 x 297 mm	Lens:	Fixed 50mm	Nearest Turbine:	T5
Elevation:	68.7 m	Correct printed image size:	820 x 260 mm	Camera Height:	1.7m (AGL)		

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Baseline Photograph

This image provides landscape and visual context only

Cumulative Wireline View

Extent of 53.5° planar panorama

This cylindrical projection panorama has been captured, prepared and presented in accordance with the guidance set out in the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'.

Proposed Turbines | Existing Turbines | Permitted Turbines

National Grid Cordinate (ITM)	
Easting:	533525
Northing:	574368
Elevation:	127.9 m

Horizontal Field of View: 90 ° (cylindrical projection)
Principal Distance: 522 mm
Turbine Tip Height: Max Tip Height of 185m

Date and Time:	03/07/2023 10:21
Camera:	Canon 5D Mark II
Lens:	Fixed 50mm
Camera Height:	1.7m (AGL)

Direction (clockwise from Grid N):	18 °
Distance to Nearest Visible Turbine:	8.7 km
Nearest Turbine:	T5

This planar projection panoramic model has been prepared and presented in accordance with the guidance set out in the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'.

Proposed Turbines
Existing Turbines
Permitted Turbines

National Grid Cordinate (ITM)	
Easting:	527163
Northing:	601073
Elevation:	198.0 m
Horizontal Field of View:	53.5 ˚ (planar projection)
Principal Distance:	812.5 mm
Paper size:	(half A1) 841 x 297 mm
Correct printed image size:	820 x 260 mm
Date and Time:	03/07/2023 10:21
Camera:	Canon 5D Mark II
Lens:	Fixed 50mm
Camera Height:	1.7m (AGL)
Direction (clockwise from Grid N):	18 ˚
Distance to Nearest Visible Turbine:	8.7 km
Nearest Turbine:	T5

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APEM Group

Photomontage

Part 1 of 1

View flat at a comfortable arm's length

This planar projection panorama has been captured, prepared and presented in accordance with the guidance set out in the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'.

National Grid Cordinate (ITM)	
Easting:	533525
Northing:	574368
Elevation:	127.9 m

Horizontal Field of View:	53.5 ˚ (planar projection)
Principal Distance:	812.5 mm
Paper size:	(half A1) 841 x 297 mm
Correct printed image size:	820 x 260 mm

Date and Time:	03/07/2023 10:21
Camera:	Canon 5D Mark II
Lens:	Fixed 50mm
Camera Height:	1.7m (AGL)

Direction (clockwise from Grid N):	18 ˚
Distance to Nearest Visible Turbine:	8.7 km
Nearest Turbine:	T5

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APPENDIX 5

Site Specific Flood Risk Assessment

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED BALLINAGREE WIND FARM

Site Specific Flood Risk Assessment for Ballinagree Wind Farm

Prepared for:

Ballinagree Wind DAC

Ballinagree Wind farm

Date: January 2024

Core House, Pouladuff Road, Cork, T12 D773, Ireland

T: +353 21 496 4133 | E: info@ftco.ie

CORK | DUBLIN | CARLOW

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Appendix 6 - SSFRA Flood Maps

Appendix 7 - Site Photos

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LIST OF TABLES

1. INTRODUCTION

Fehily Timoney and Company (FT) was commissioned by Ballinagree Wind DAC to prepare a Site Specific Flood Risk Assessment (SSFRA) for the Proposed Wind Farm Development in Ballinagree, Co. Cork in response to a request for further information by An Bórd Pleanála with respect to the planning application submitted for Ballinagree Wind Farm.

The proposed wind farm site is located in a rural area. Settlement in the area is made up of one-off rural housing and farmyards generally located along the road network of the area (Linear settlement pattern). The nearest settlement is the village of Ballinagree which is located approximately 1.5 km to the south of the wind farm site.

Access to the proposed wind farm site is primarily via the existing local road L2578 'Butter Road' from the direction of Millstreet to the North West.

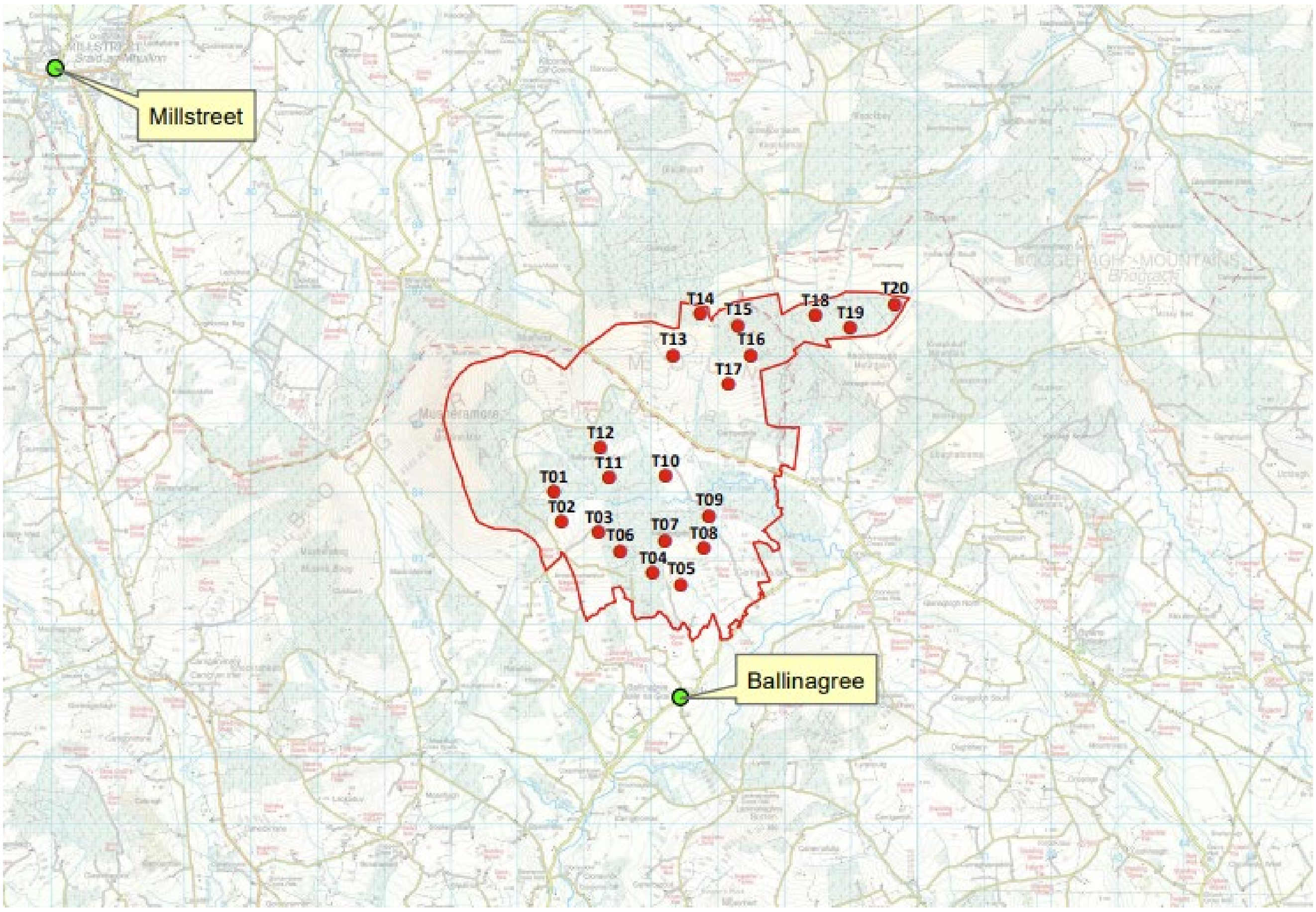

Figure 1-1: Site Location

The report aims to confirm if there are any potential flood risks for the subject site, as identified in the high-level flood risk assessment carried out in the preparation of the county Development Plan 2022-2028.

As part of the scope of work, FT was commissioned to extend the flood model to incorporate lands to the south of the wind farm site and examine the flooding in this area.

2. FLOOD RISK ASSESSMENT METHODOLOGY

2.1 General

The Guidelines for Planning Authorities and its Technical Appendices outline the requirements for a SSFRA. The Guidelines for Planning Authorities requires that works:

- Avoid development in areas at risk of flooding.
- Substitute less vulnerable uses where avoidance is not possible.
- Mitigate and manage the risk where avoidance and substitution are not possible.

The key principles of the Guidelines for Planning Authorities apply the Sequential Approach to the planning process. Figure 2-1 of this report describes the mechanism of the sequential approach for use in the planning process.

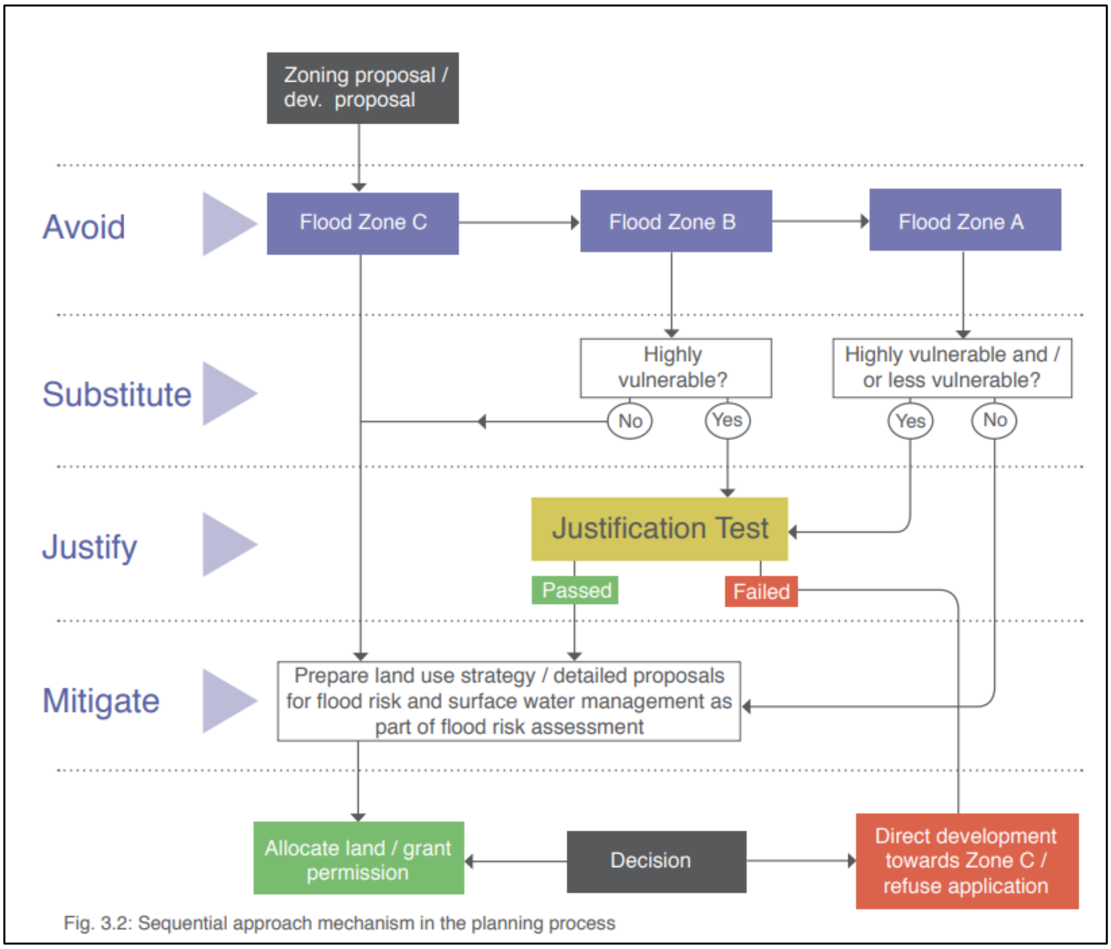

Figure 2-1: Sequential Approach Mechanism[1]

[1] Figure 3.2 of the *Guidelines for Planning Authorities*.

2.2 Source-Pathway-Receptor Model

The assessment of flood risk requires a thorough understanding of the following:

- The sources of flood water (e.g., high sea levels, intense or prolonged rainfall leading to runoff and increased flow in rivers and sewers)
- The pathways by which the flood water reaches those receptors (e.g., river channels, river and coastal floodplains, drains, sewers and overland flow).
- The people and assets affected by flooding (known as the receptors).

The Source-Pathway-Receptor (S-P-R) Model illustrated in Figure 2-2 has become widely used to assess and inform the management of environmental risks.

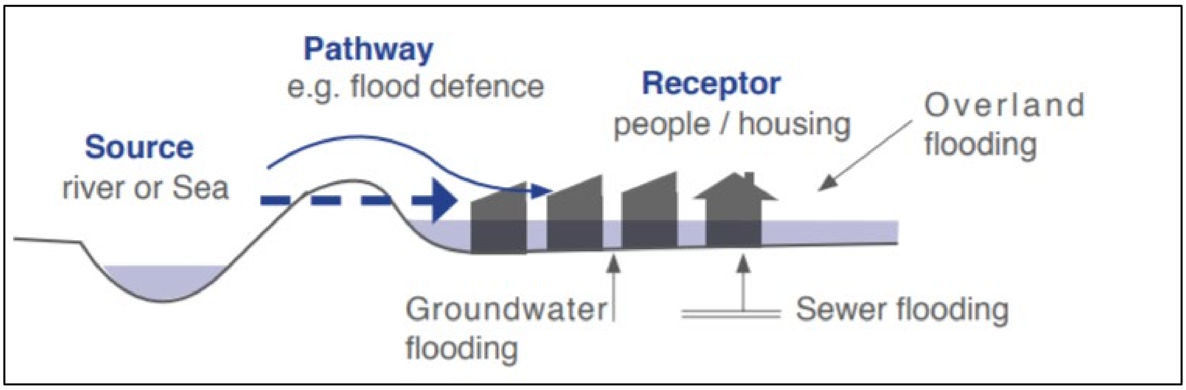

Figure 2-2: Source-Pathway- Receptor Model[2]

2.3 Likelihood of Flooding and Definition of Flood Zones

The Guidelines for Planning Authorities define the likelihood of flooding as the percentage probability of a flood of a given magnitude occurring or being exceeded in any given year. The likelihood of flooding is expressed as a return period or annual exceedance probability (AEP).

Flood Zones are graphical areas within which the likelihood of flooding is in a particular range. They are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. The Guidelines for Planning Authorities split these flood zones into three categories:

- Flood Zone A – where the probability of flooding from rivers and the sea is high (greater than 1% AEP for river flooding or 0.5% AEP for coastal flooding).
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% AEP and 1% AEP for river flooding and between 0.1% AEP and 0.5% AEP for coastal flooding).
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% AEP for both river and coastal flooding).

[2] Source: Fig 2.2 of the *Guidelines for Planning Authorities*.

2.4 Classification of the Proposed Development and Justification Test

The Guidelines for Planning Authorities categorises all types of development as either:

- Highly Vulnerable (garda, ambulances, schools, hospitals, dwelling houses, student halls…).
- Less Vulnerable (buildings used for: retail leisure, warehousing, commercial, industrial, and non-residential institutions,).
- Water Compatible (flood control infrastructure, docks, marinas, amenity open spaces...).

The Guidelines classify potential development in terms of its vulnerability to flooding. The types of development falling within each vulnerability class are described in Table 2.1 of the Guidelines, which is reproduced in Table 2-2.

Table 2-1: Vulnerability Class[3]

Highly vulnerable development (Including essential infrastructure)	• Garda, ambulance and fire stations and command centres required to be operational during flooding; • Hospitals; • Emergency access and egress points; • Schools; • Dwelling houses, student halls of residence and hostels; • Residential institutions such as residential care homes, children's homes and social services homes; • Caravans and mobile home parks; • Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; • Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and • Sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	• Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; • Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; • Land and buildings used for agriculture and forestry; • Waste treatment (except landfill and hazardous waste); • Mineral working and processing; • Local transport infrastructure.

[3] Source: Table 3.2 of the *Guidelines for Planning Authorities*.

Water-compatible development	• Flood control infrastructure; • Docks, marinas and wharves; • Navigation facilities; • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; • Water-based recreation and tourism (excluding sleeping accommodation); • Lifeguard and coastguard stations; • Amenity open space, outdoor sports and recreation and essential facilities Such as changing rooms; • Essential ancillary sleeping or residential accommodation for staff required By uses in this category (subject to a specific warning and evacuation plan).

Uses which are not listed in the table should be considered on their own merits.

The Sequential Approach restricts development types to occur within the flood zone appropriate to their respective vulnerability classes. Table 2-2 identifies the types of development appropriate for each flood zone and those that will require a Justification Test.

Table 2-2: Matrix of Vulnerability Versus Flood Zone[4]

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

The Justification Test has been designed to rigorously assess the appropriateness of developments that are being considered in areas of moderate or high flood risk. There are two types of the Justification Test:

- The first is the Plan-making Justification Test which is used at the plan preparation and adoption stage where it is intended to zone or otherwise designate land which is at moderate or high risk of flooding.
- The second is the Development Management Justification Test which is used at the planning application stage where it is intended to develop land at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be inappropriate for that land.

[4] Source: Table 3.2 of the *Guidelines for Planning Authorities*.

2.5 Flood Risk Assessment Stages

The Guidelines for Planning Authorities outline that a staged approach should be adopted when carrying out a SSFRA. These stages, see also Figure 2-3 below are:

- Stage 1 Flood Risk Identification.
- Stage 2 Initial Flood Risk Assessment.
- Stage 3 Detailed Flood Risk Assessment.

Shapes FRA

Influences FRA

	Flood risk identification	Initial flood risk assessment	Detailed flood risk assessment
Regional Flood Risk Appraisal	✓	U	U
Strategic Flood Risk assessment – County-wide	✓	P	U
Strategic Flood Risk Assessment – City or town within a county plan	✓	✓	P
Site-specific flood risk assessment	✓	✓	✓

P = Probably needed to meet the requirements of the Justification Test

U = Unlikely to be needed

✓ = Required to be undertaken

Figure 2-3: Flood risk assessment stages required per scale of study undertaken[5]

Stage 1: Flood risk identification – to identify whether there may be any flooding or surface water management issues relating to the Proposed Development site that may warrant further investigations. The flood risk identification stage uses existing information to identify whether there may be any flooding or surface water management issues related to the site. Flood risks identified in this stage are then addressed in Stage 2.

Stage 2: Initial flood risk assessment – to confirm sources of flooding that may affect the development site, to appraise the adequacy of existing information and to determine what surveys and modelling approach is appropriate to match the spatial resolution required and complexity of the flood risk issues. This stage involves the review of data addressed in Stage 1. Data where the flood risk at the site is recognised as being low is screened out and it is not further addressed in the report, data which recognised the flood risk on the site to be medium or high is further analysed in the report.

Stage 3: Detailed flood risk assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development, of its potential impacts on flood risk elsewhere and of the effectiveness of any proposed mitigation measures. This will typically involve the use of an existing or construction of a hydraulic model across a wide enough area to appreciate the catchment wide impacts and hydrological process involved.

[5] Source: Appendix A of *Guidelines for Planning Authorities*, Table A3.

3. EXISTING SITE

3.1 Description of Catchments

This section addresses catchment characteristics of the proposed wind farm site.

The proposed wind farm site is located within two hydrometric areas (catchment) of the Irish River Network System. These are Lee, Cork Harbour and Youghal Bay (ID 19) and Blackwater (Munster) (ID 18).

The wind farm site is situated within three sub-catchments as defined by the WFD and shown on Figure 10-2 of the EIAR Chapter 10_Hydrology and WQ. These waterbodies are known as:

- Sullane_SC_020 (19_7)
- Blackwater (Munster)_SC_050 (18_4)
- Blackwater (Munster)_SC_070 (18_7).

The wind farm site is situated within eight sub-basins. These waterbodies are known as:

- Awboy_010 – IE_SW_19A030200
- Laney_030 – IE_SW_19L010400
- Laney_020 – IE_SW_19L010200
- Owenbaun (Rathcool)_010 – IE_SW_18O050500
- Laney_010 – IE_SW_19L010100
- Rathcool_010 – IE_SW_18R010400
- Nad_010 – IE_SW_18N010400
- Glen (Banteer)_010 – IE_SW_18G040600

There are no construction activities and surface runoff from the wind farm site in the Awboy_010 and Owenbaun (Rathcool)_010 sub-basins.

Turbines T1, T2, T3, T6, T7, T8, T9, T10, T11, T12, T13, T16 and T17 are within Laney_010 sub-basin. Turbines T4 and T5 are within Laney_020. Turbines T14, T15 and T18 are within Nad_010 and Turbines T19 and T20 are within Glen (Banteer)_010 sub-basin.

The elevation range of the overall wind farm site varies between approximately 640 m OD and 210 m OD, and it has a mountainous topography. Turbines will be installed in the range between approximately 460 m OD and 255 m OD.

The main hydrology feature within the wind farm site is the Laney River and Nadanuller Beg Stream. All surface runoff within the Laney_010 sub-basin drains to the River Laney or its tributaries. The River Laney runs in northwest-southeast direction. The following tributaries of the River Laney are receiving receptors of the wind farm site:

- West Ballynagree Stream
- Knocknagappul 19 Stream
- Carrigagulla
- Unnamed Stream and its tributary located approximately 700 m southwest of turbine T13
- Ballynagree East Stream
- Unnamed Streams east of the proposed borrow pits located at the western side of Laney_010
- Unnamed Stream located approximately 400m west of turbine T17
- Unnamed Stream located approximately 350m southwest of turbine T18

The northeastern part of the windfarm site drains ultimately into the Nadanuller Beg Stream which forms part of Blackwater River (Cork/Waterford) SAC approximately 3.6km northeast of the site. The following tributaries of the Nadanuller Beg Stream will be receiving the runoff from the wind farm site:

- Unnamed Stream located approximately 350m north of turbine T14
- Unnamed Stream located approximately 600m west of turbine T18
- Unnamed Stream located approximately 330m north of turbine T18
- Unnamed Stream located approximately 640m northeast of turbine T18

The surface runoff from turbine T19 and T20 drains into the Glen (Banteer) Stream which forms part of Blackwater River (Cork/Waterford) SAC approximately 4.7km northeast of the wind farm site.

Rainfall data from Met Éireann was analysed and recorded at Cork Airport, which is c.37 km southeast of the Site and associated infrastructure.

The 30-year annual average rainfall at Cork Airport weather station, recorded from 1993 to 2022, was calculated to be 1239.7mm.The average rainfall at the Proposed Wind Farm Site may be higher than this due to relief rainfall as, the site it is located at a higher elevation than the stations. For this reason, it is more appropriate to utilise rainfall parameters considering that the Site is in a mountainous environment.

The Standard Average annual Rainfall (SAAR) of the Area from the FSU Portal, picking strategic points on Site, ranges between 1571 - 1650mm, which gives a solid conservative output; it will be used for the Hydraulic Analysis in Section 6.2.

In Support of the choice made, please see below in Table 3-1 the Rainfall data from Met Éireann average annual rainfall recorded from the closest weather station in Mushera. This station is approximately 2 km north-west of the Site and associated infrastructure, giving an Average Rainfall in millimetres within the range found on the FSU portal.

Table 3-1: Rainfall Data - Mushera Weather Station

Total rainfall in millimetres for Mushera Weather Station													
Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Average
Rainfall	1609	1661	1688	1947	1941	1470	1566	1812	1762	2162	1755	1878	1615

The M5-60[6] at development location is 17.6 mm according to the Met Éireann rainfall data. This is the predicted rainfall depth in a sixty minute storm that will occur with a frequency of once every five years.

All wind farm turbines have been located at least 75m from any open waterbody. The OPW have a watercourse database showing indicative flow direction. On Figure 10-2 of the EIAR Chapter 10_Hydrology and WQ it can be seen that the proposed turbine T2 appears to be situated within 75m of the Knocknagappul Stream. However, during site inspection it was noted that this stream is not locatedas shown on OPW mapping, but it is situated 160m northeast of T2.

There are no lakes or reservoirs within the wind farm site study area.

3.2 Subsoil and Hydrogeology

According to the Geological Survey of Ireland (GSI), the local deposits are mainly comprised of till derived from Devonian sandstones. These deposits have a high variability in particle size distribution, which is a determinant factor for the ground permeability. Locally, some peat deposits are identified on the northwest of the project boundary; and alluvial deposits are mapped along river Laney and its tributary Cruppoge Stream. Rock outcrop and sub crop are near the western edge of the project area. The related GSI figure is shown below.

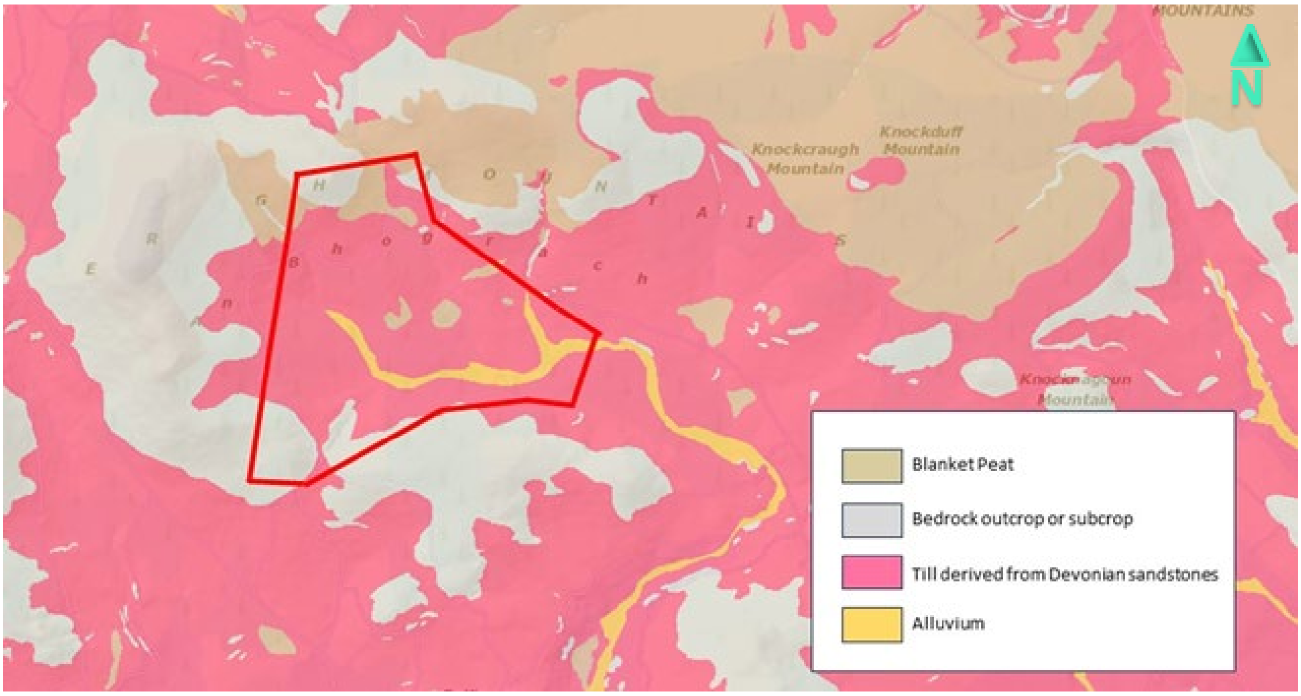

Figure 3-1: Soil Characteristic

[6] This is for a 5-year return period, with a 60-minute duration rainfall.

According to the ground investigation factual report performed by Irish Drilling Ltd. in 2021, the glacial till material is comprised of sequences of sandy gravelly SILT and Gravel with cobble content. High permeability is expected in the gravel layers and low to moderate is expected in the sandy gravelly SILT, since several observations of water seepage have been recorded in the trial pits logs.

According to GSI, there are two main rock formations in the project area:

- Ballytrasna Formation: Purple mudstone and sandstone. In the type area some 90% of the formation is composed of dusky-red mudstone while the remainder comprises pale-red fine-medium grained sandstone. The member contains significant quartz-pebbly sandstones at Ballyvoyle and Helvick Heads.
- Caha Mountain Formation: Purple and green sandstone and siltstone. The sandstone bodies show low angle cross stratification and usually have erosive bases, cutting into underlying fine-grained material. Towards the top of the formation, intraformational breccias occur sporadically, showing low angle cross- stratification.

According to the ground investigation factual report performed by Irish Drilling Ltd. in 2021, the top of bedrock has a high variability in depth, but it is frequently shallow (1-2.5mBGL). It is comprised of normal sequences of siltstone and sandstone with predominance of siltstone.

According to GSI, the local permeability is classified as moderate and with high vulnerability, which suits with the ground investigation results.

There are no karst features located within the site. The nearest one is approximately 10km northwest of the subject site, which is a spring in Namurian formation, and this formation is not present in the project area. No karst signs were identified in the ground investigation, which suits with the non-carbonated nature of the local rock.

The structures' locations have the following particularities:

- WF-HF4: Alluvial deposits overlying glacial till and shallow rock is expected according to GSI and the Ground Investigation. Nevertheless, no exploratory holes have specifically targeted this structure.
- WF-HF5: Glacial till overlying shallow rock according to GSI, which is confirmed by the trial pit TP18 of the ground investigation, which is around 20m away the structure location.
- WF-HF6: Alluvial deposits overlying glacial till and shallow rock is expected according to GSI and the Ground Investigation. Nevertheless, no exploratory holes have specifically targeted this structure.
- WF-HF9: Glacial till overlying shallow rock according to GSI, and 150m to southeast of a peat blanket.

3.3 Hydrological Features

A Site walkover survey was conducted in July 2023 to establish the drainage pattern and to record existing hydrology features; a collection of the site visit photos can be found in Appendix 6, lodged with this Report. The site of the Proposed Wind Farm has a steep slope, given the mountainous nature of the area, the site slopes from north to south and south-east direction. The site has one Main River, the Laney, with three branches. The mainstream, the Laney River, flows from northwest to south-east direction, two branches flow from north to south, joining the Laney at approximately the centre of the site, and the last branch join the Laney from the west, flowing in the eastern direction.

3.3.1 Proposed Infrastructure - Water Crossing

As part of this SSFRA, a detailed review of the proposed internal wind farm watercourse crossings was carried out to ensure the proposed crossing designs would be acceptable for Section 50 consent in accordance with OPW requirements. As a result of the detailed flood modelling and hydrological analysis carried out as part of the SSFRA, it is recommended that specific design features are incorporated at 4 no. crossings identified in the planning application. These are described in Table 3-2 below.

Table 3-2: Proposed Watercourse Crossing Details

Crossing No.	Details of Crossing Structure Proposed in Planning Application	Recommended Design Adjustments Following SSFRA
Crossing WF-HF4	Single span bridge - 14.1 m in length.	Single span bridge - 14.1 m in length with 1.5 m diameter flood relief culverts.
Crossing WF-HF6	Pre-cast box culvert – 2.5 m x 1.7 m.	Pre-cast box culvert – 3.6 m x 2.7 m.
Crossing WF-HF8	Single span bridge - 10.6 m in length.	Single span bridge - 9.1 m in length.
Crossing WF-HF9	Pre-cast box culvert – 2 m x 1.7 m.	A single-span bridge - 8.5 m in length.

Detail drawings of the proposed crossings can be found in Appendix 3.

In response to the OPW request, FT have provided an accurate hydrological analysis and 4 different methodologies for the hydraulic analysis, shown respectively in Section 6.1 and Section 6.2.

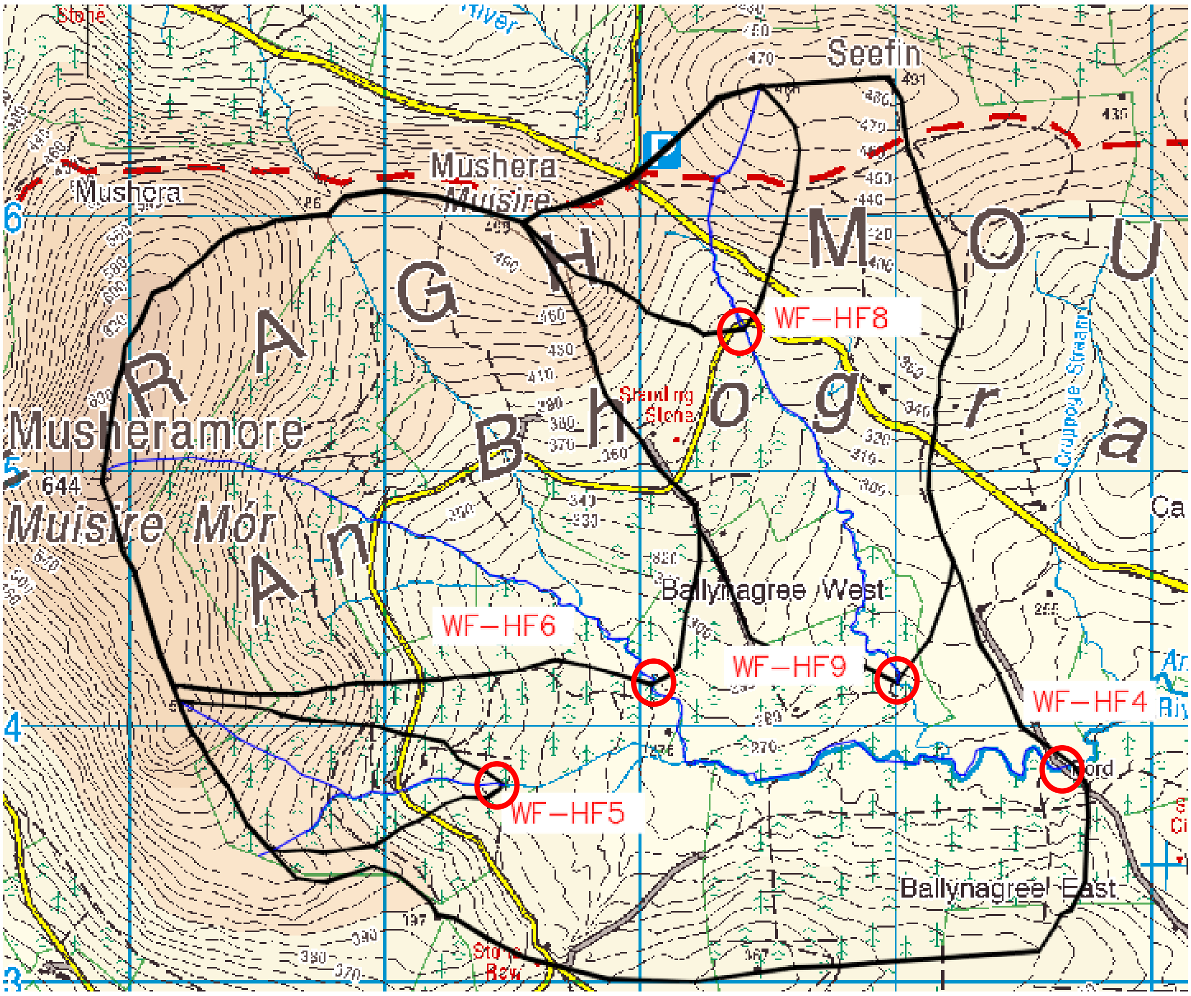

Figure 3-2: Proposed Structures Locations

4. STAGE 1 - FLOOD RISK IDENTIFICATION

4.1 Areas for Further Assessment and Benefiting Lands

The National Catchment Flood Risk Management (CFRAM) Programme has examined the flood risk, and possible mitigation measures to address the risk, in 300 communities throughout the country at potentially significant flood risk. These communities were identified through the Preliminary Flood Risk assessment (PFRA), which was a national screening assessment of flood risk. The communities recognized as being at a significant flood risk are called Areas for Further Assessment (AFA). For the AFAs a detailed hydraulic modelling has been carried out to produce indicative flood maps (CFRAM Maps).

The subject site is not within an AFA.

Local Authority is charged with responsibility of maintaining Drainage Districts. According to the OPW database, no local drains form part of this drainage district.

4.2 Coastal Flooding

The subject site is within The Laney_010 Sub Basin, part of the Sullane_SC-020 Sub-Catchment, Cork (Munster). The Proposed Development is not within CFRAM Study Area for Coastal Flooding.

The ground levels within the site varies between 640mOD and 210.0mOD. The site is located approximately 47km from sea. Therefore, the site is not at risk of coastal flooding.

4.3 Groundwater Flooding

The Geological Survey of Ireland (GSI) has some relevant records to evaluate the influence of Groundwater in flooding events. They are the following:

- The overburden soil permeability is classified as moderate;
- Aquifer recharge:
  - 51-100 mm/yr to south of River Laney.
  - 101-200 mm/yr to north of River Laney.
- Aquifer: It is classified as moderately productive on the northern side of River Laney and unproductive on the southern side.

Based on the Geotechnical Factual Report provided by Irish Drilling Ltd. in 2021, we can conclude with the following:

- A low to moderate soil permeability is confirmed based on trial pits observations.
- There are levels of shallow perched groundwater in the overburden soil, ranged between 0.3 to 3.0 m BGL.
- Measures in standpipes with zone response in rock show groundwater levels between 0.56 to 7.95.

As a topographical context, the project is in the River Laney Valley, near the head of basin, which is comprised by bedrock subcrop as described in Section 3.2.

The overburden ground is expected to be close to saturation state and with limited capacity of rainwater absorption.

We can conclude that the beneficial factor of runoff absorption is low in the local context. Nevertheless, the influence of groundwater in flooding events is also limited due to the following reasons:

- The low to moderate water transmissivity in the overburden ground.
- The small area of water collection upstream the fluvial basin.
- The possible water infill through the exposed area of bedrock subcrop is also limited due to the general coverage of fine soil and the small area of water collection which comprises around 1.5km2.

4.4 Fluvial Flooding

4.4.1 CFRAM and NIF Maps

CFRAM does not show the site being vulnerable to fluvial flooding. However, the National Indicative Fluvial Mapping shows that the site is vulnerable to fluvial flooding as shown on figure 4-1 and on NFIM OPW Flood Map provided in Appendix 2.

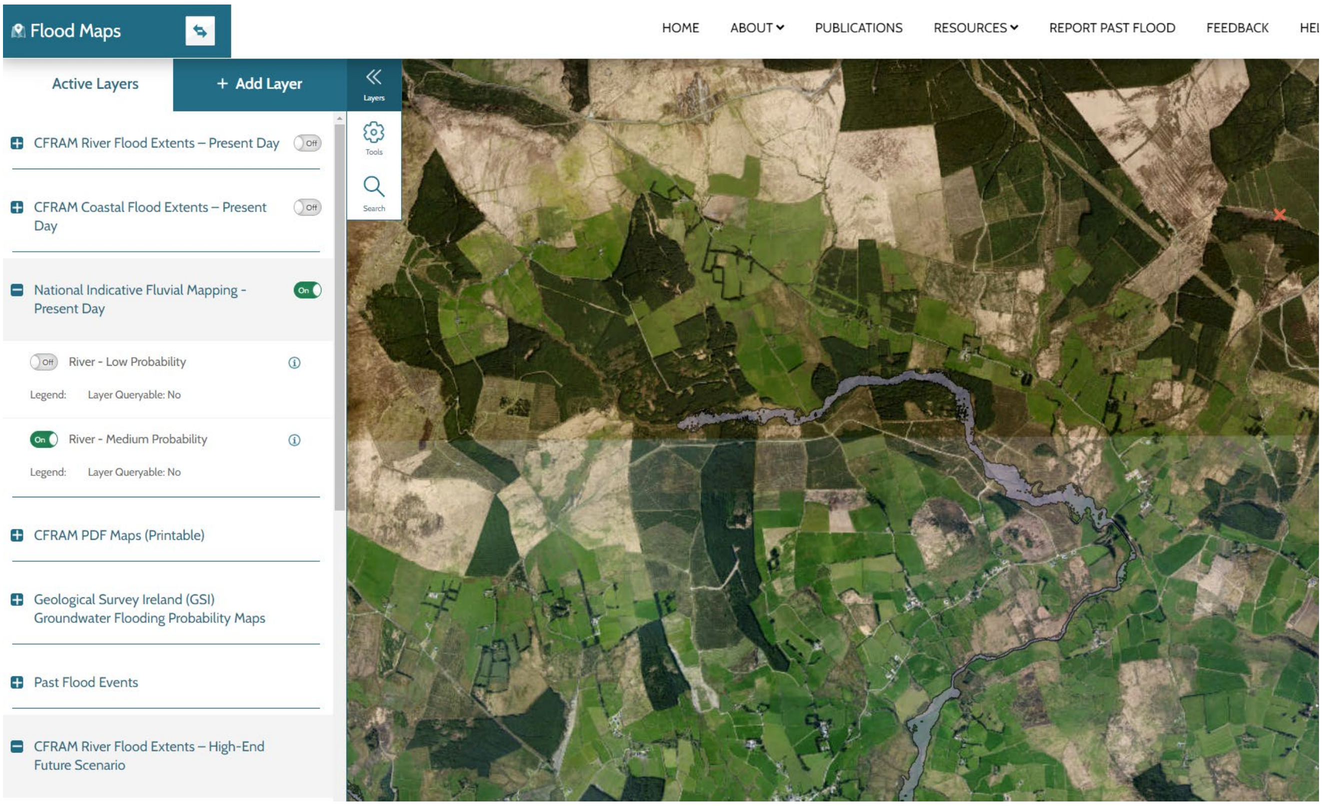

Figure 4-1: NFIM Flood Map - Medium Probability

4.4.2 Cork County Development Plan 2022 Mapping

Cork County Development Plan Mapping shows that the Site is within flood zone A and appears to be based on OPW National Fluvial Indicative Mapping information. For information purposes, an image of the flood map according to CCDP is shown in Figure 4-2.

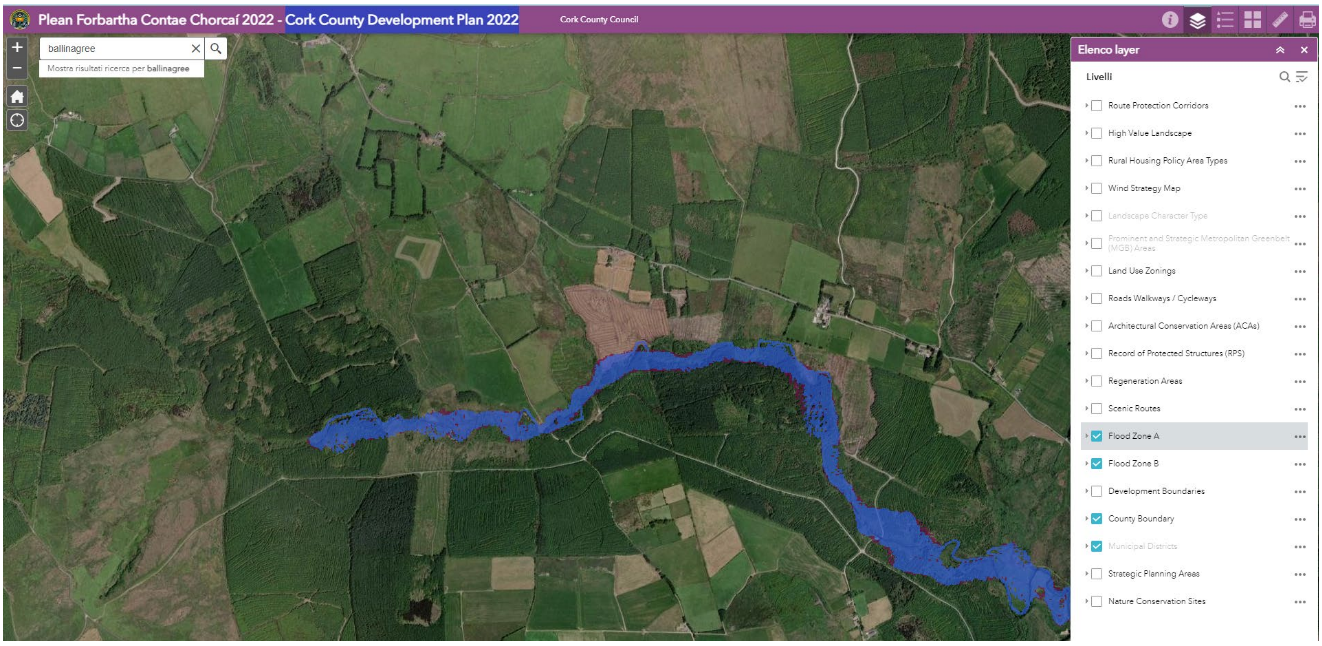

Figure 4-2: Cork County Development Plan 2022 Mapping - High Probability

4.5 Pluvial Flooding

CFRAM does not show the site being vulnerable to pluvial flooding.

The site is a mix of forestry and agricultural grassland areas, forming a sloped catchment draining to the east of the site.

Please note that every Proposed Development must limit the surface runoff to the greenfield rate (pre-development rate) to not increase the flood risk downstream of the site. It is recommended that surface water attenuation is in line with the following requirements outlined oi the documents and guidelines listed below:

- Greater Dublin Strategic Drainage Study (GDSDS).
- Guidelines for the Crossing of Watercourses During of National Road Schemes - TII Publications (2008)
- Water Run-Off from Construction Sites - SEPA - (WAT-SG-75)

4.6 Historical Flooding

The national flood hazard mapping (www.floodmaps.ie), does not indicate any record of historical flooding within the wind farm site boundary. However, there is a recurring flood incident recorded under the name "Annagannihy North to Musheera Co. Cork Recurring" located at the unnamed stream approximately 650m northeast of turbine T10.

There are no recorded flood incidents within 2km buffer zone of the wind farm site identified in the OPW database. It is unlikely that the recorded flood incidents outside of the buffer zone had any effect on the site, this is due to the mountainous topography of the wind farm site.

There are no areas defined as 'benefiting lands' within the wind farm site. Benefiting lands are defined as a dataset prepared by OPW identifying land that might benefit from the implementation of Arterial Drainage Schemes (under the Arterial Drainage act 1945) and indicating areas of land subject to flooding or poor drainage.

There are no historical flood incidents along the grid connection or within 2 km buffer zone.

5. STAGE 2 - INITIAL FLOOD RISK ASSESSMENT

The primary objective of conducting an initial flood risk assessment is to investigate flood-related concerns identified during Stage 1 Flood Risk Identification. Based on the information recorded in Stage 1, it has been determined that the Site is within the flood zone.

Figure 5-1: NFIM Flood Map - Medium Probability - WF-HF4 Location

According to the NFIM, the site is within Flood Zone B, particularly in the area near the location of WF-HF4. Given that this structure is considered as "Less Vulnerable Development" as defined under "Local Transport Infrastructure", the Proposed Development is deemed 'Appropriate' in accordance with the guidelines of the OPW's publication, as shown in Table 5-1. In response to OPW's request for a Site Specific Risk Assessment, a Justification Test has been completed as detailed in Section 6.

Table 5-1: Matrix of Vulnerability Versus Flood Zone - Case of Study

	Flood Zone A	Flood Zone B	Flood Zone C
Highly Vulnerable Development	Justification Test	Justification Test	Appropriate
Less Vulnerable Development	Justification Test	Appropriate	Appropriate
Water-Compatible Development	Appropriate	Appropriate	Appropriate

6. STAGE 3- DETAILED FLOOD RISK ASSESSMENT

As part of the Site-Specific Flood Risk Assessment, hydrological and hydraulic analysis and modelling was undertaken along the specific reach of the Hydrological Features, this enabled the delineation of appropriate flood zones and to provide information on flood depth for various flood events.

The hydraulic modelling undertaken on Site estimated the peak flood flows along Three Hydrological Estimation Flows (HF's), please refer to Figure 6-1**.** for location circled in Red. The estimated peak flows, in conjunction with a digital terrain model (DTM) were used to general flood extent and flood depth maps for 1% AEP (annual exceedance probability) and 0.1%AEP.

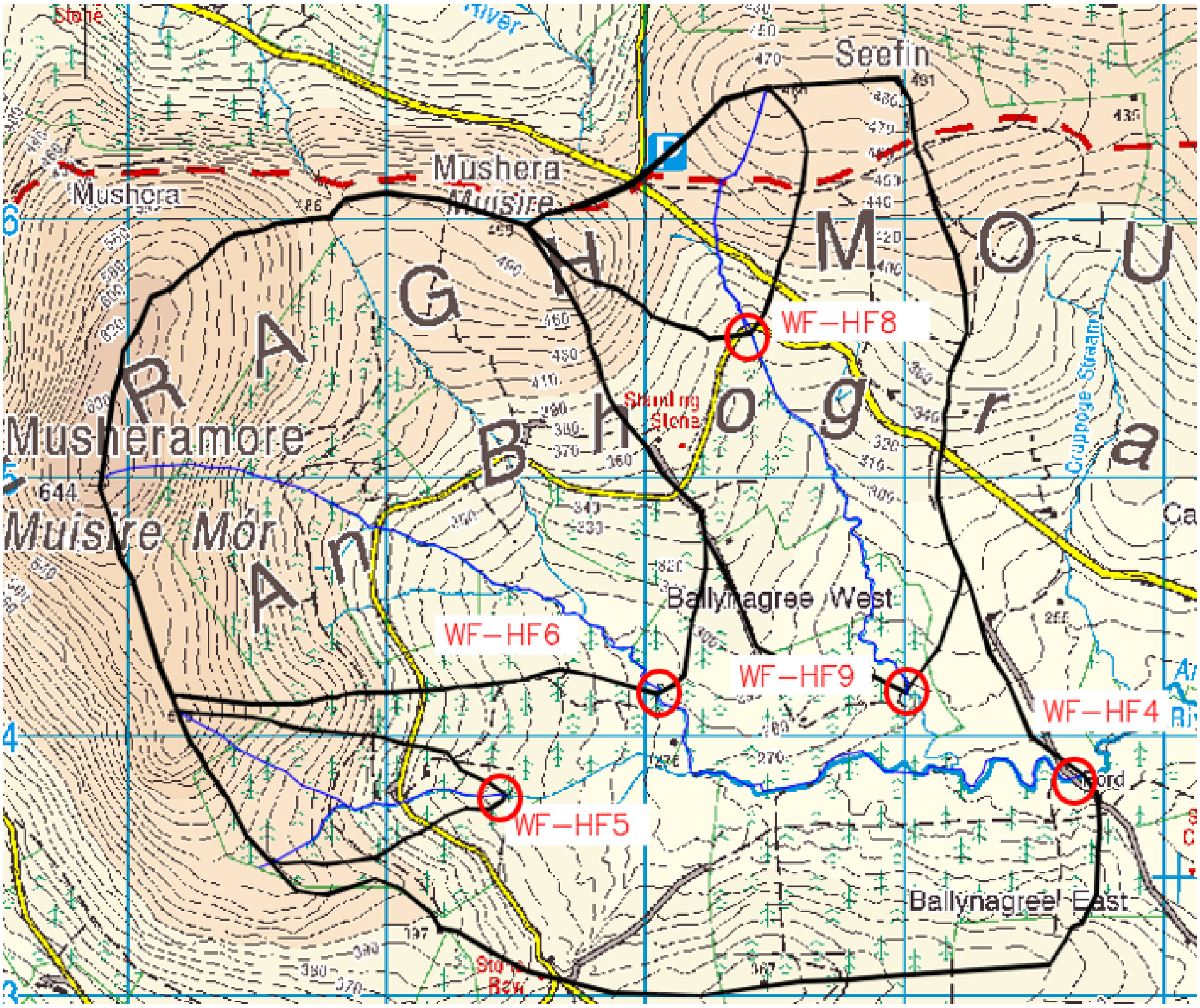

Figure 6-1: Location of Hydrological Estimation Flows

6.1 Hydrology Analysis

The Site is an ungauged catchment, therefore the flow estimation techniques adopted rely on ungauged methods. The flood estimation, in accordance with the OPW guidelines on Hydrology, three methods were considered for estimating the peak flow of the streams.

The methods used to estimate the peak flow of the streams included:

- Institute of Hydrology Report 124 Method (IH124);
- FSU 3 Variable Method;
- FSU 7 Variables Method.

Hydrological estimation points (HFs) are specific locations set at intervals along a watercourse where flow estimates are derived, based on catchment descriptors. For this exercise, these points align with the culvert locations. For natural catchments with minimal human influence, the method of deriving flow estimates from catchment descriptors proves reliable and dependable..

The catchment descriptors are summarised in Table 6-1 below:

Table 6-1: Catchment Descriptors for each HF's

Feature ID	Catchment Area	SAAR (mm)	FAR	BFIsoi	URBEX	SOILL	DRAIN D
	Km²	(mm)	-	-	-	-	Km/km
WF-HF4	9.68	1612	1	12.3	0	0.405	1.313
WF-HF5	0.43	1650	1	5.4	0	0.405	2.127
WF-HF6	3.55	1599	1	7.6	0	0.405	1.236
WF-HF8	0.43	1571	1	5.6	0	0.405	1.059
WF-HF9	2.55	1579	1	10.2	0	0.405	1.238

The Hydrology Analysis will be conducted to ascertain the flow values corresponding to the Annual Exceedance Probabilities (AEP) of 1% and 0.1%, plus 20% of Climate Change. This analysis aims to simulate a flooding event and generate flood zone scenarios A and B.

A comparison of Index flood for three applied methods is shown. IH124 Method was mainly adopted for further analysis because it gives a more conservative flow and it is more appropriate for catchment of area less than 25km², when compared to FSU-3 Variable Method and FSU-7 Variable Method..

Table 6-2 and Table 6-3 below will show the comparison between the different methods, highlighted in Green the methods selected for each Catchment.

Table 6-2: Comparison of index Flood for three applied methods - 1% AEP + 20%CC

	Catchment Area	IoH 124	FSU 3-Variable	FSU - 7 Variable
	Km²	(m3/s)	(m3/s)	(m3/s)
WF-HF4	9.68	25.16	17.14	22.45
WF-HF5	0.431	1.62	1.22	1.61
WF-HF6	3.550	10.21	7.54	9.55
WF-HF8	0.583	2.00	1.96	1.99
WF-HF9	2.550	7.53	5.68	6.18

Table 6-3: Comparison of index Flood for three applied methods - 0.1% AEP + 20%CC

	Catchment Area	IoH 124	FSU 3-Variable	FSU - 7 Variable
	Km²	(m3/s)	(m3/s)	(m3/s)
WF-HF4	9.68	33.37	21.16	28.30
WF-HF5	0.431	2.04	1.56	1.99
WF-HF6	3.550	13.54	9.30	12.04
WF-HF8	0.583	2.66	2.42	2.51
WF-HF9	2.550	9.99	7.01	7.79

6.2 Hydraulic Analysis

6.2.1 Model Details

The hydraulic planning for the proposed structures was conducted by creating a Hec-Ras hydraulic model for the relevant river channel, in line with the standards outlined in the UK CIRIA Report No. 6892 Culvert Design and Operation Guide" (2010).

The planned bridge is designed to have minimal impact on the flood levels upstream and downstream from the existing bridge. The highest flow rate used in the analysis corresponds to the return periods of 100 years and 1000 years, with a 20% inclusion for climate change.

The Manning's values, which indicate of the flow characteristics for the river channel, flood plain, and current structure, were determined using photos from a site visit, utilised to apply the proposed Manning's values in the Hec-Ras reference manual. The contraction and expansion coefficients utilized were likewise drawn from the recommendations of the Hec-Ras reference manual.

Table 6-4: Design parameter used in the Hydraulic Analysis.

Parameter	Value	Origin
Manning's Value (Channel)	0.035	Hec-Ras Reference Manual
Manning's Value (Flood Plain)	0.045	Hec-Ras Reference Manual
Contraction Coefficient	0.1	Hec-Ras Reference Manual
Expansion Coefficient	0.3	Hec-Ras Reference Manual

After selecting an appropriate design flow, a hydraulic analysis was conducted using Hec-Ras 6 software. Separate hydraulic models were created for each scenario to compare pre-construction and post-construction flow regimes. The post-construction model has used a combination of the existing topographic survey and the proposed bridge design and layout.

The hydraulic behaviour was simulated using the developed models, which provided water velocity and elevation values at various locations within the river and flood plains upstream and downstream of the existing and proposed bridges.

6.2.2 Flood Zone A

6.2.2.1 Comparison Between Existing and Proposed Scenarios - Bridge WF-HF4

Upon completion of the hydraulic modelling, a comparison has been undertaken between the water levels obtained from the existing and proposed scenarios. This comparison allowed for conclusions to be drawn regarding the potential impact of the proposed bridge. The table below compares the result of the existing and proposed scenarios at each cross-section.

Table 6-5: Water Level Comparison – Existing VS Proposed - 1% AEP- WF-HF4

River Station	Location	ES	PS	Diff (PS-ES)	Observations
		W.S. Elev	W.S. Elev	W.S. Elev	
60	Upstream	243.57	243.71	0.14	Significant increase of water level
50	Upstream	243.49	243.66	0.17	Significant increase of water level
39.97	Upstream	243.42	243.61	0.19	Significant increase of water level
32.52	Upstream	243.37	243.54	0.17	Significant increase of water level

River Station	Location	ES	PS	Diff (PS-ES)	Observations
		W.S. Elev	W.S. Elev	W.S. Elev	
17.52	Downstream	243.30	243.34	0.04	Slight increase of water level
10	Downstream	243.25	243.25	0.00	No variation of water level
0.14	Downstream	243.15	243.15	0.00	No variation of water level

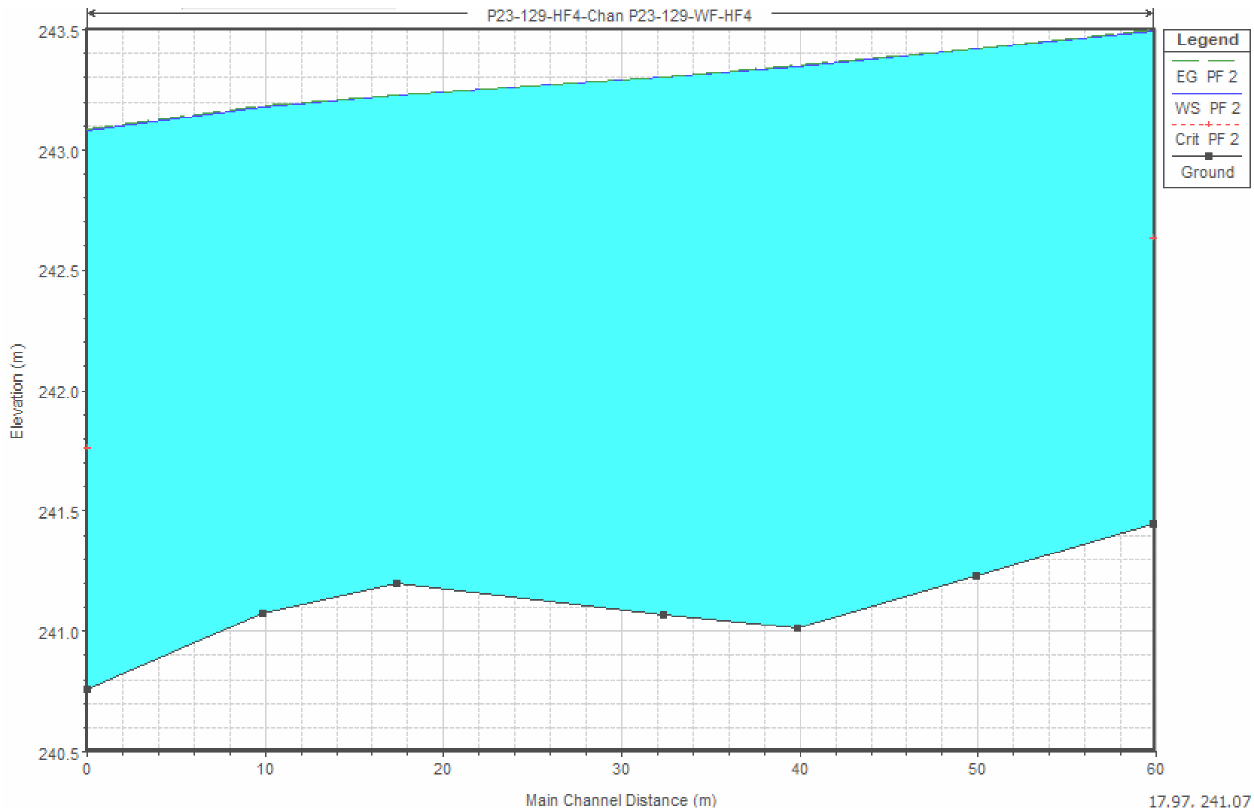

Figure 6-2: Longitudinal Section - WF-HF4 - 1% AEP - Current Scenario

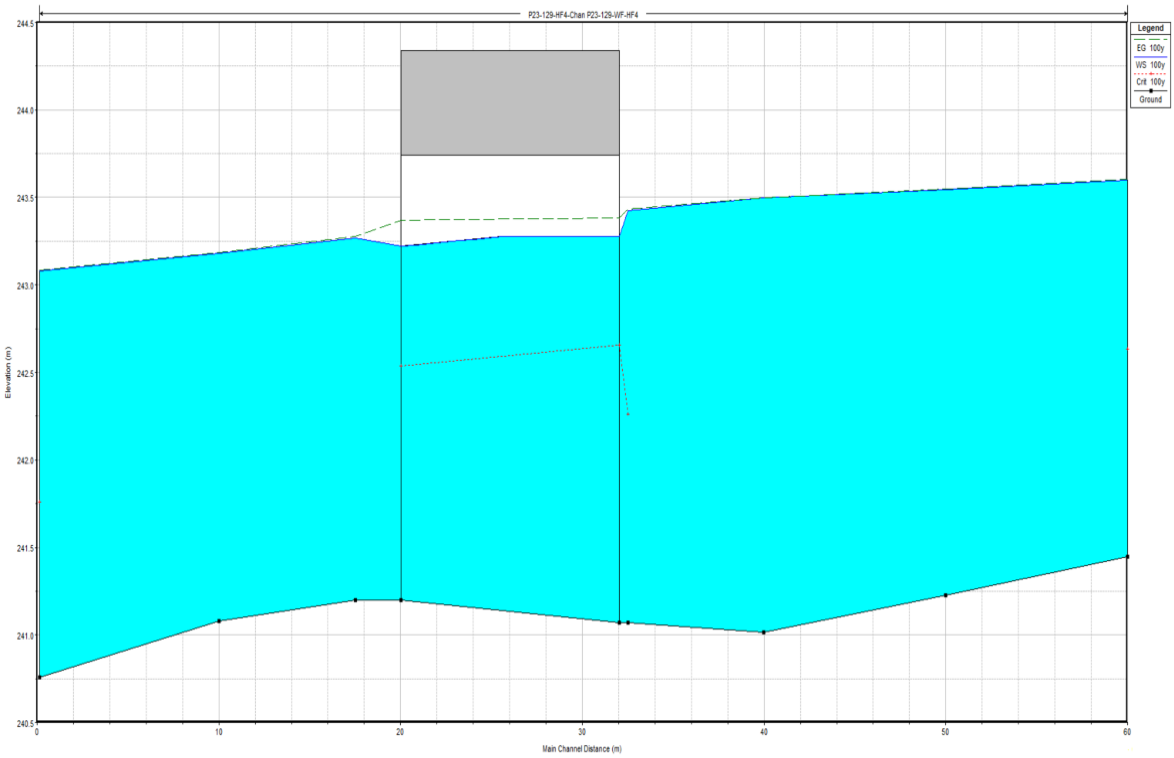

Figure 6-3: Longitudinal Section - WF-HF4 - 1% AEP - Proposed Scenario

6.2.2.2 Comparison Between Existing and Proposed Scenarios - Culvert WF-HF6

Upon completion of the hydraulic modelling, a comparison has been undertaken between the water levels obtained from the existing and proposed scenarios. This comparison allowed for conclusions to be drawn regarding the potential impact of the proposed bridge. The table below compares the result of the existing and proposed scenarios at each cross-section.

Table 6-6: Water Level Comparison – Existing VS Proposed - 1%AEP - WF-HF6

River Sta	Location	ES	PS	Diff (PS-ES)	Observations
		W.S. Elev	W.S. Elev	W.S. Elev	
26.85	Upstream	281.83	281.94	0.11	Significant increase of water level
22.5	Upstream	281.78	281.91	0.13	Significant increase of water level
7.5	Downstream	281.44	281.44	0.00	No variation of water level
0	Downstream	281.32	281.32	0.00	No variation of water level

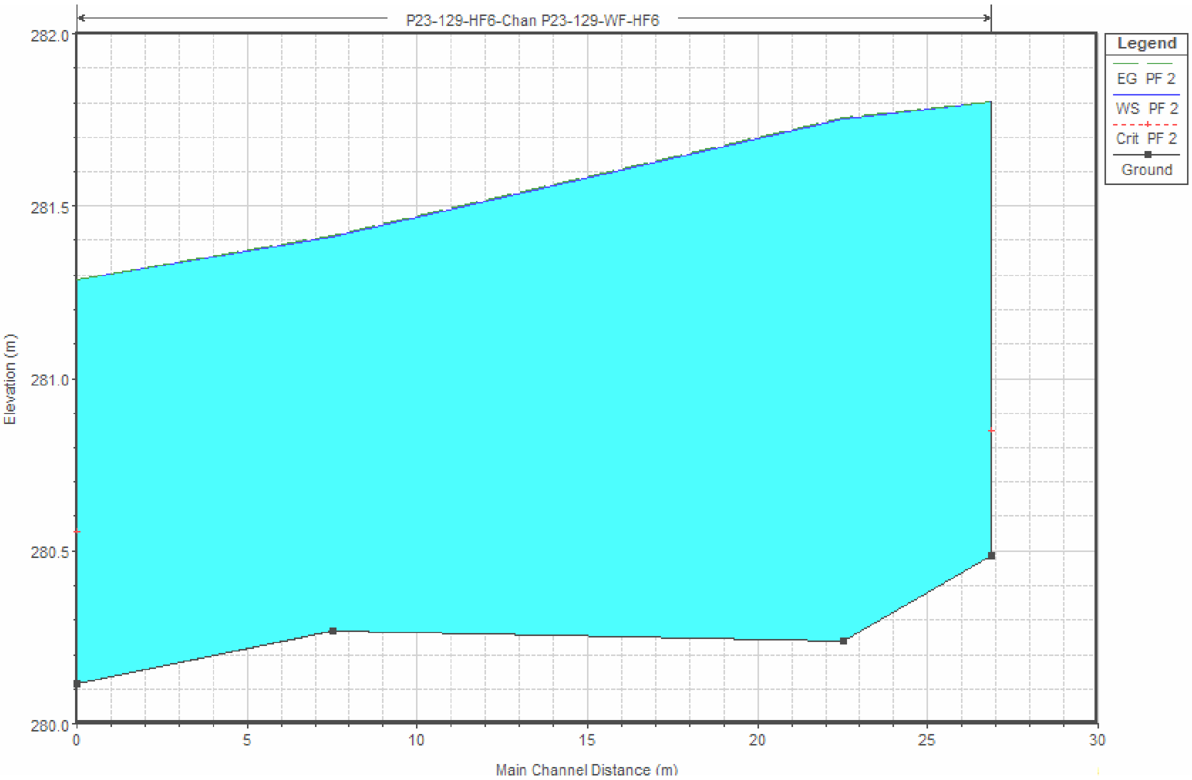

Figure 6-4: Longitudinal Section - WF-HF6 - 1% AEP - Current Scenario

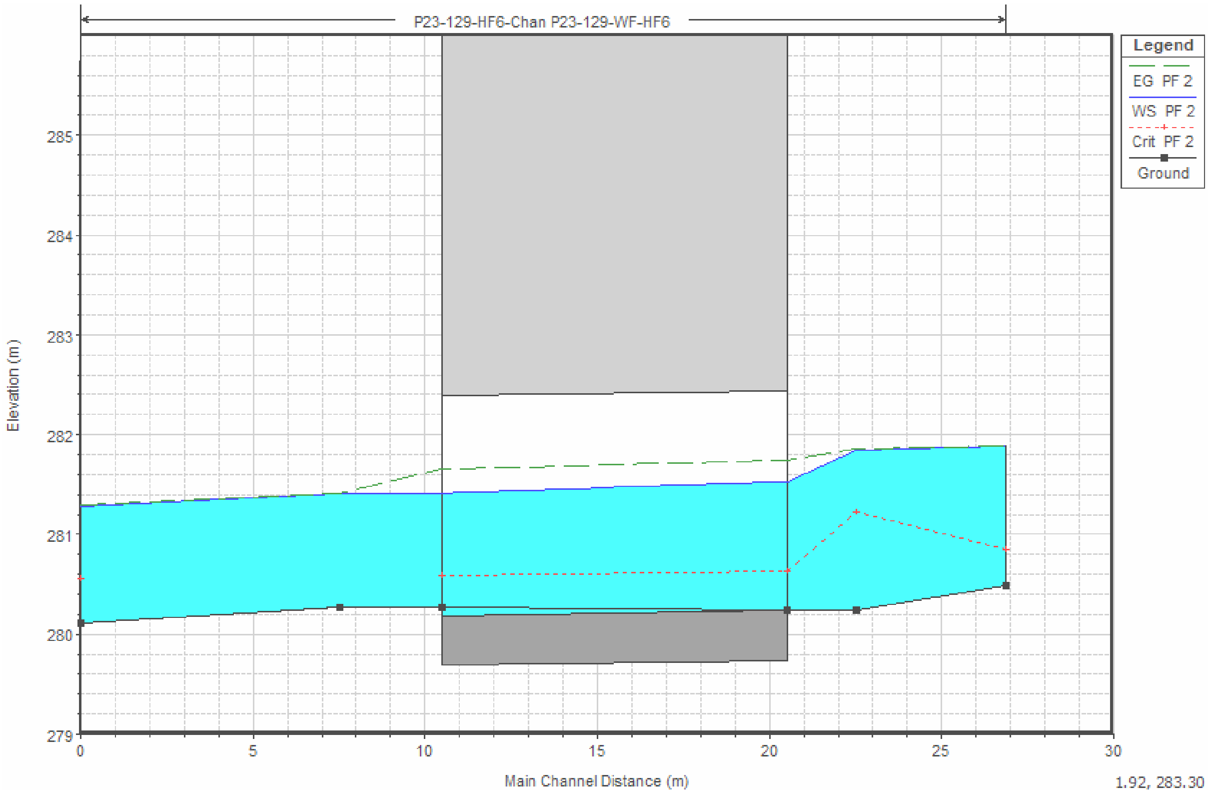

Figure 6-5: Longitudinal Section - WF-HF6 - 1% AEP Proposed Scenario

6.2.2.3 Comparison Between Existing and Proposed Scenarios - Bridge WF-HF8

Upon completion of the hydraulic modelling, a comparison has been undertaken between the water levels obtained from the existing and proposed scenarios. This comparison allowed for conclusions to be drawn regarding the potential impact of the proposed bridge. The table below compares the result of the existing and proposed scenarios at each cross-section.

Table 6-7: Water Level Comparison – Existing VS Proposed - 1%AEP - WF-HF8

River Sta	Location	ES	PS	Diff (PS-ES)	Observations
		W.S. Elev	W.S. Elev	W.S. Elev	
58.37	Upstream	353.21	353.21	0.00	No variation of water level
50	Upstream	352.67	352.67	0.00	No variation of water level
40	Upstream	352.83	352.82	-0.01	Slight reduction of water level
30	Downstream	352.44	352.44	0.00	No variation of water level
20	Downstream	350.42	350.42	0.00	No variation of water level
10	Downstream	348.66	348.66	0.00	No variation of water level
0	Downstream	347.61	347.61	0.00	No variation of water level

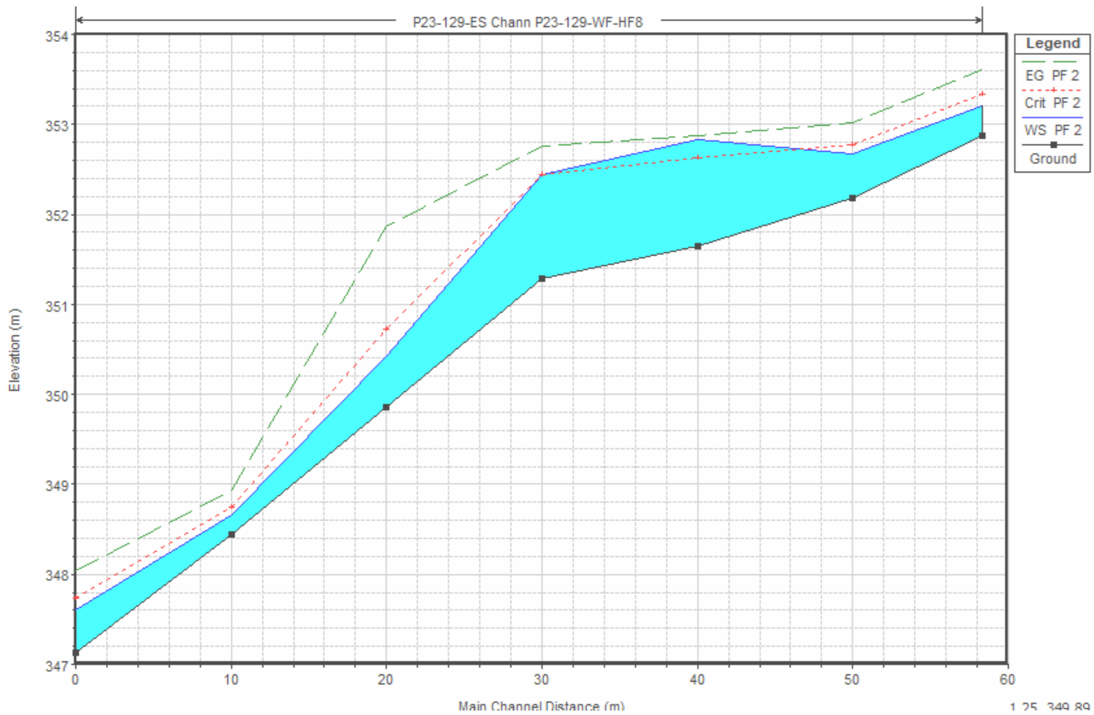

Figure 6-6: Longitudinal Section - WF-HF8 - 1% AEP - Current Scenario

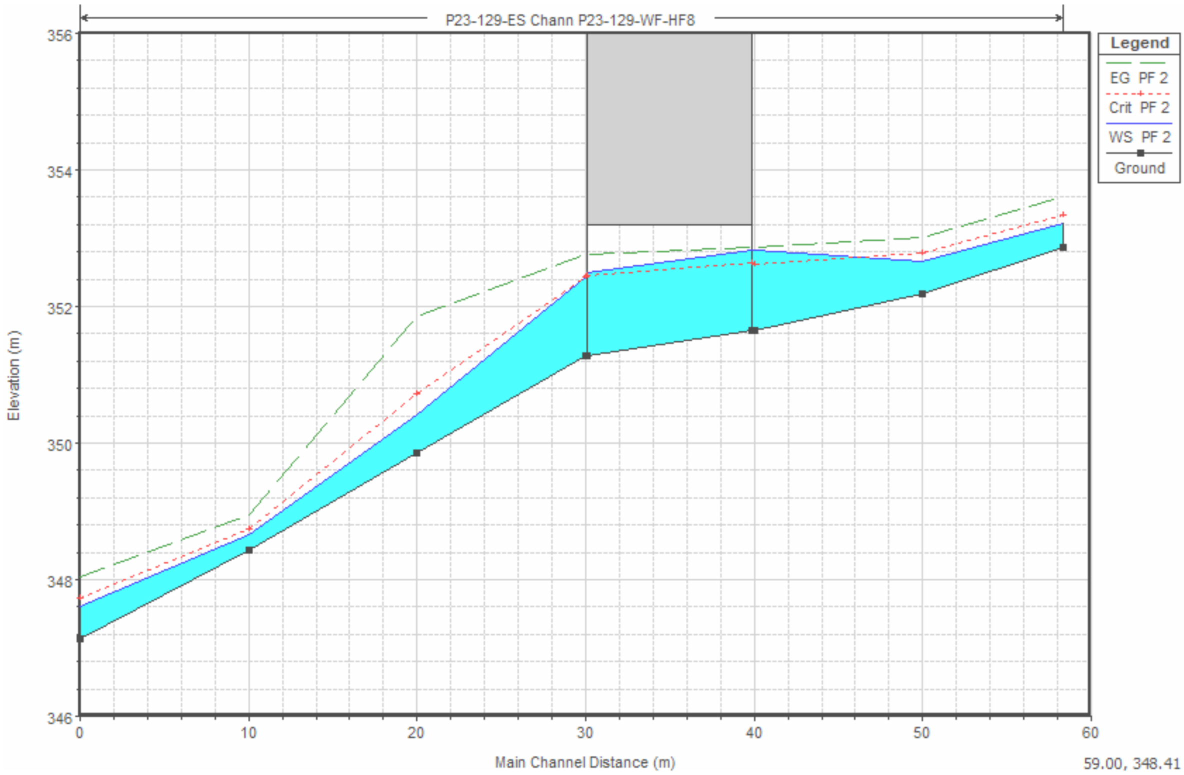

Figure 6-7: Longitudinal Section - WF-HF8 - 1% AEP - Proposed Scenario

6.2.2.4 Comparison Between Existing and Proposed Scenarios - Bridge WF-HF9

Upon completion of the hydraulic modelling, a comparison has been undertaken between the water levels obtained from the existing and proposed scenarios. This comparison allowed for conclusions to be drawn regarding the potential impact of the proposed bridge. The table below compares the result of the existing and proposed scenarios at each cross-section.

Table 6-8: Water Level Comparison – Existing VS Proposed - 1%AEP - WF-HF9

River Sta	Location	ES	PS	Diff (PS-ES)	Observations
		W.S. Elev	W.S. Elev	W.S. Elev	
24.99	Upstream	258.84	258.86	0.02	Slight increase of water level
22.49	Upstream	258.70	258.74	0.04	Slight increase of water level
7.5	Downstream	258.49	258.49	0.00	No variation of water level
0	Downstream	257.97	257.97	0.00	No variation of water level

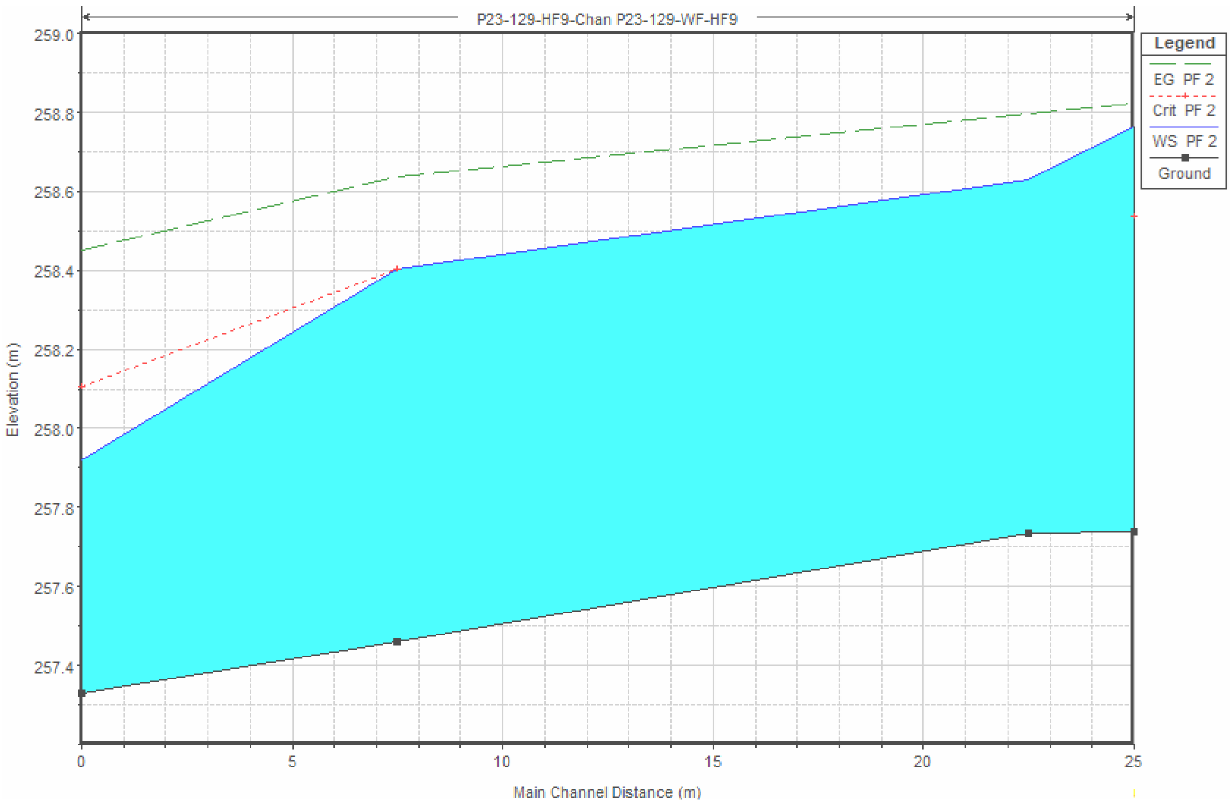

Figure 6-8: Longitudinal Section - WF-HF9 - 1% AEP - Current Scenario

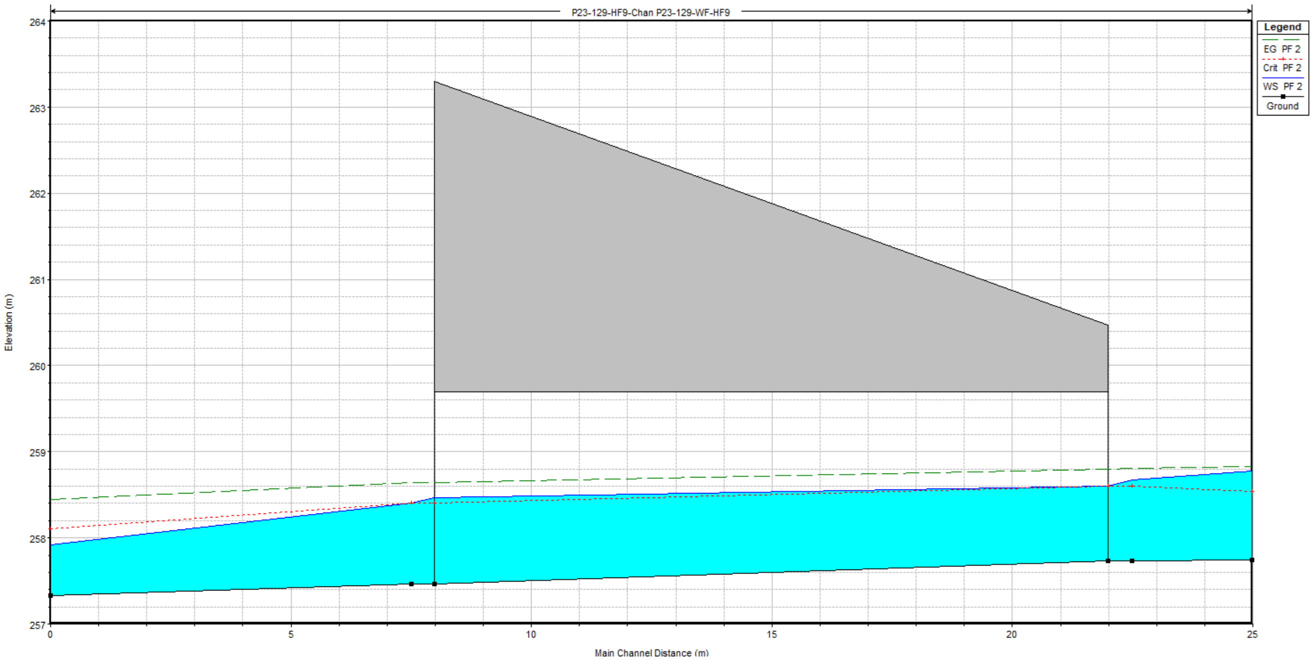

Figure 6-9: Longitudinal Section - WF-HF9 - 1% AEP - Proposed Scenario

6.2.3 Flood Zone B

6.2.3.1 Comparison Between Existing and Proposed Scenarios - Bridge WF-HF4

Upon completion of the hydraulic modelling, a comparison has been undertaken between the water levels obtained from the existing and proposed scenarios. This comparison allowed for conclusions to be drawn regarding the potential impact of the proposed bridge. The table below compares the result of the existing and proposed scenarios at each cross-section.

Table 6-9: Water Level Comparison - Existing VS Proposed - 0.1%AEP - WF-HF4

River Sta	Location	ES	PS	Diff (PS-ES)	Observations
		W.S. Elev	W.S. Elev	W.S. Elev	
60	Upstream	243.78	244.04	0.26	Significant increase of water level
50	Upstream	243.7	244	0.30	Significant increase of water level
39.97	Upstream	243.63	243.96	0.33	Significant increase of water level
32.52	Upstream	243.58	243.89	0.31	Significant increase of water level
17.52	Downstream	243.49	243.54	0.05	Slight increase of water level
10	Downstream	243.44	243.44	0.00	No variation of water level
0.14	Downstream	243.34	243.34	0.00	No variation of water level

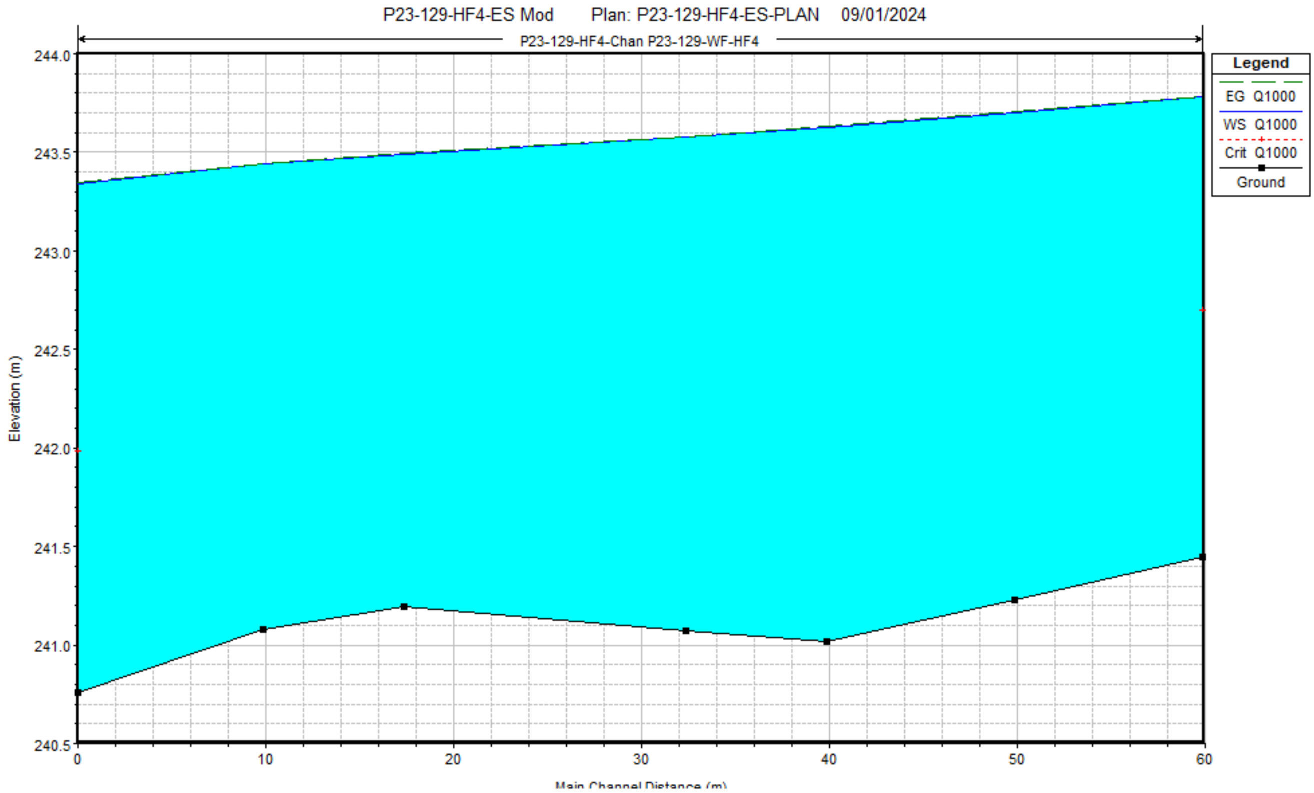

Figure 6-10: Longitudinal Section - WF-HF4 - 0.1% AEP - Current Scenario

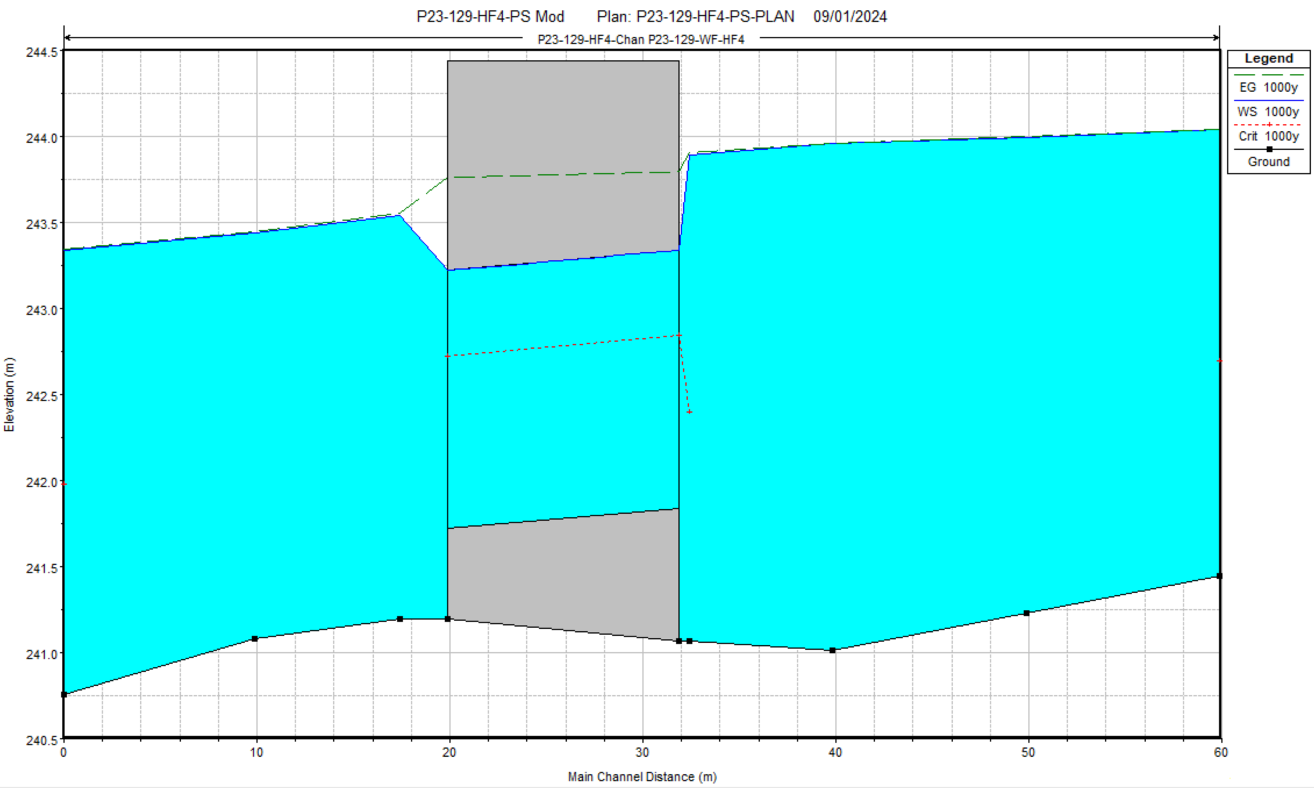

Figure 6-11: Longitudinal Section - WF-HF4 - 0.1% AEP - Proposed Scenario

6.2.3.2 Comparison Between Existing and Proposed Scenarios - Culvert WF-HF6

Upon completion of the hydraulic modelling, a comparison has been undertaken between the water levels obtained from the existing and proposed scenarios. This comparison allowed for conclusions to be drawn regarding the potential impact of the proposed bridge. The table below compares the result of the existing and proposed scenarios at each cross-section.

Table 6-10: Water Level Comparison - Existing VS Proposed - 0.1%AEP - WF-HF6

River Sta	Location	ES	PS	Diff (PS-ES)	Observations
		W.S. Elev	W.S. Elev	W.S. Elev	
26.85	Upstream	Upstream	281.97	282.25	0.28
22.5	Upstream	Upstream	281.92	282.23	0.31
7.5	Downstream	Downstream	281.6	281.6	0.00
0	Downstream	Downstream	281.48	281.48	0.00

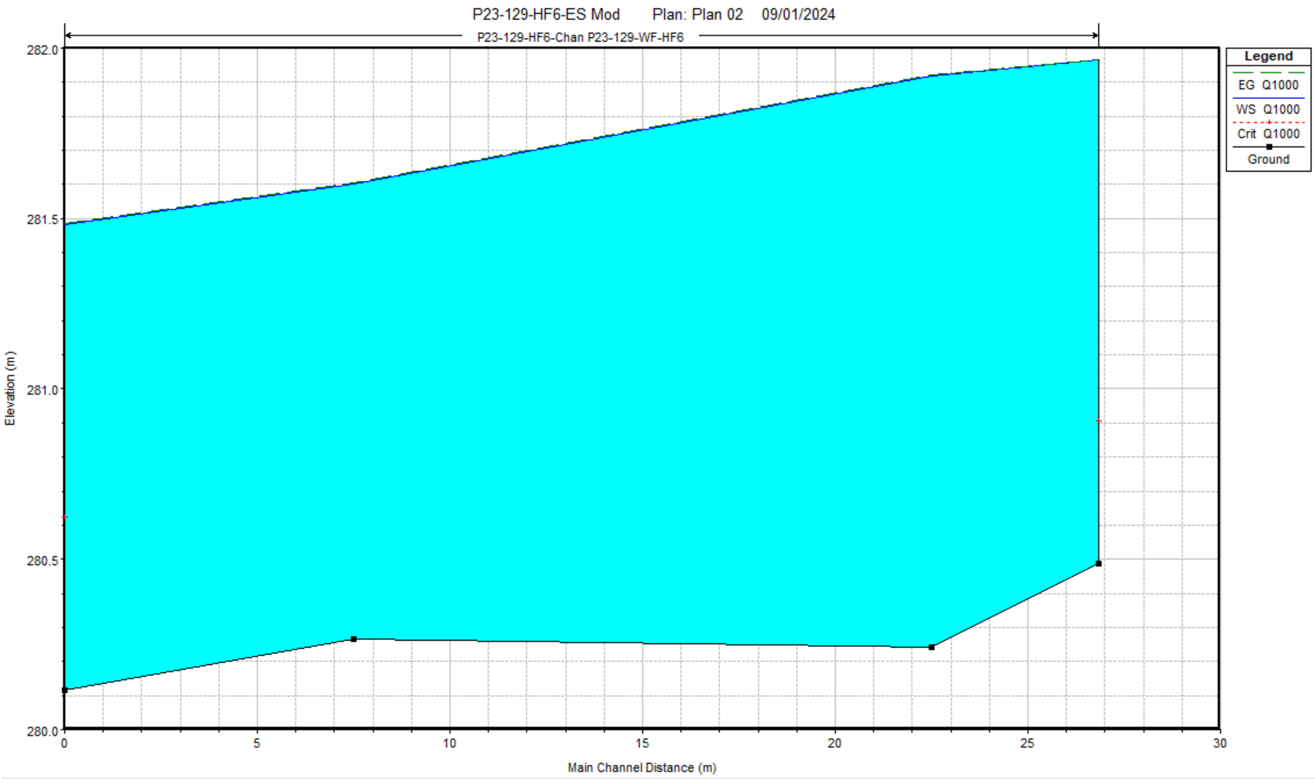

Figure 6-12: Longitudinal Section - WF-HF6 - 0.1% AEP - Current Scenario

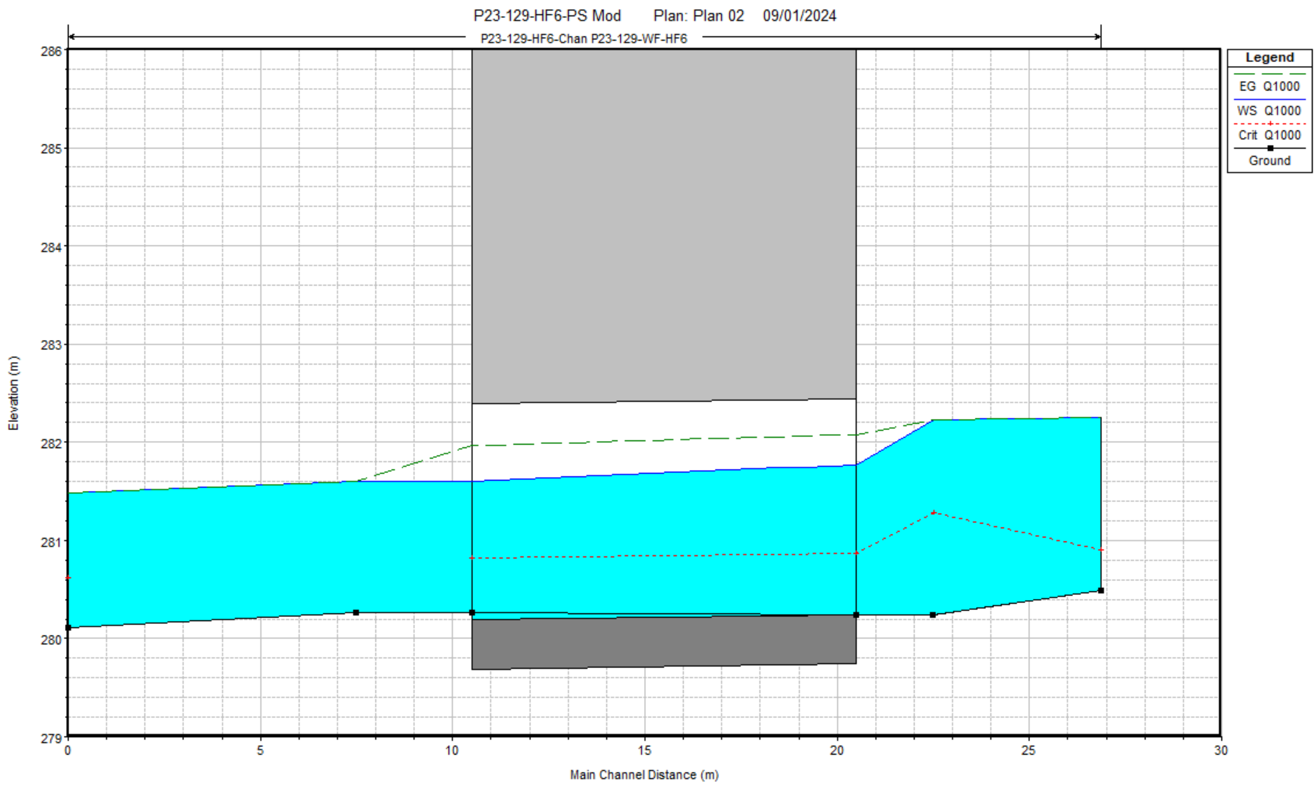

Figure 6-13: Longitudinal Section - WF-HF6 - 0.1% AEP - Current Scenario

6.2.3.3 Comparison Between Existing and Proposed Scenarios - Bridge WF-HF8

Upon completion of the hydraulic modelling, a comparison has been undertaken between the water levels obtained from the existing and proposed scenarios. This comparison allowed for conclusions to be drawn regarding the potential impact of the proposed bridge. The table below compares the result of the existing and proposed scenarios at each cross-section.

Table 6-11: Water Level Comparison - Existing VS Proposed - 0.1%AEP - WF-HF8

River Sta	Location	ES	PS	Diff (PS-ES)	Observations
		W.S. Elev	W.S. Elev	W.S. Elev	
58.37	Upstream	353.25	353.25	0.00	No variation of water level
50	Upstream	352.74	352.74	0.00	No variation of water level
40	Upstream	352.98	352.98	0.00	No variation of water level
30	Downstream	352.65	352.65	0.00	No variation of water level
20	Downstream	350.47	350.47	0.00	No variation of water level
10	Downstream	348.68	348.68	0.00	No variation of water level
0	Downstream	347.65	347.65	0.00	No variation of water level

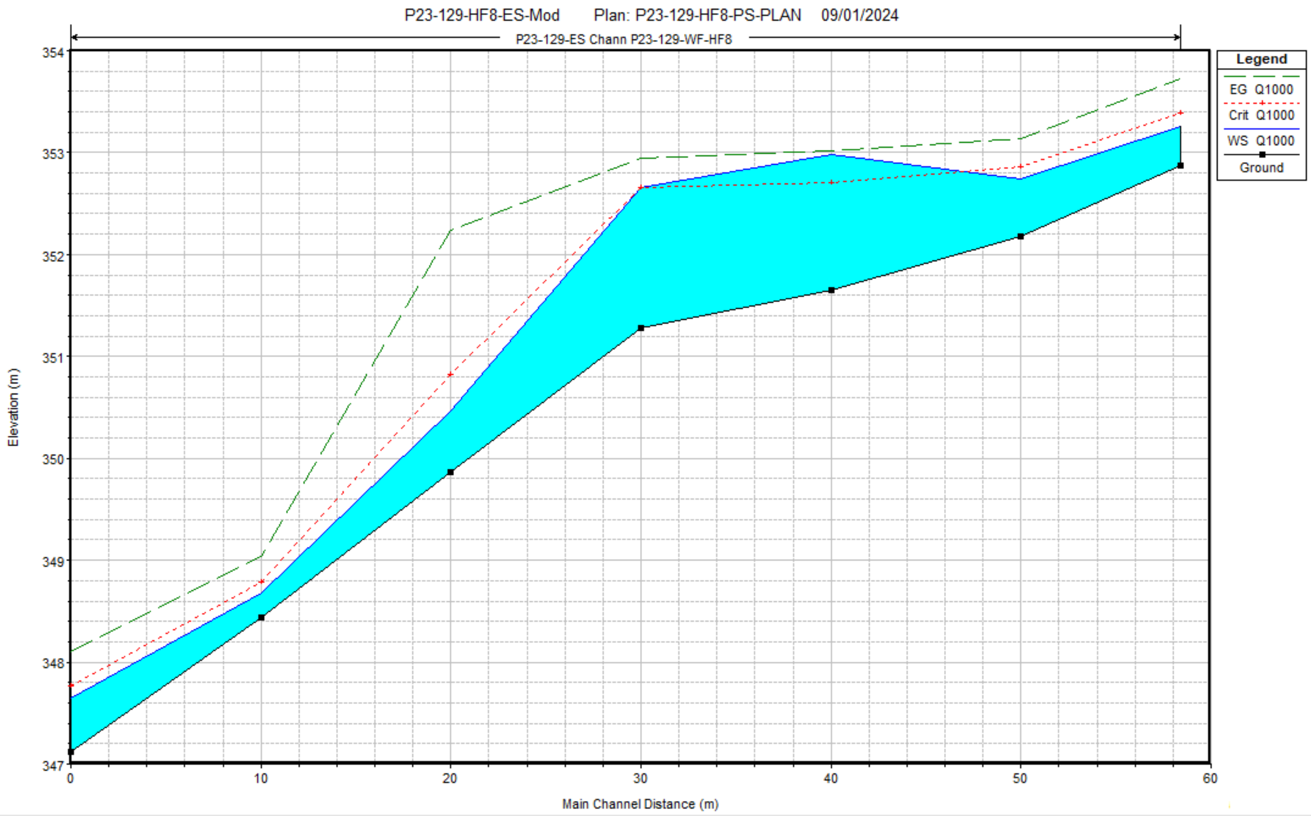

Figure 6-14: Longitudinal Section - WF-HF8 - 0.1% AEP - Current Scenario

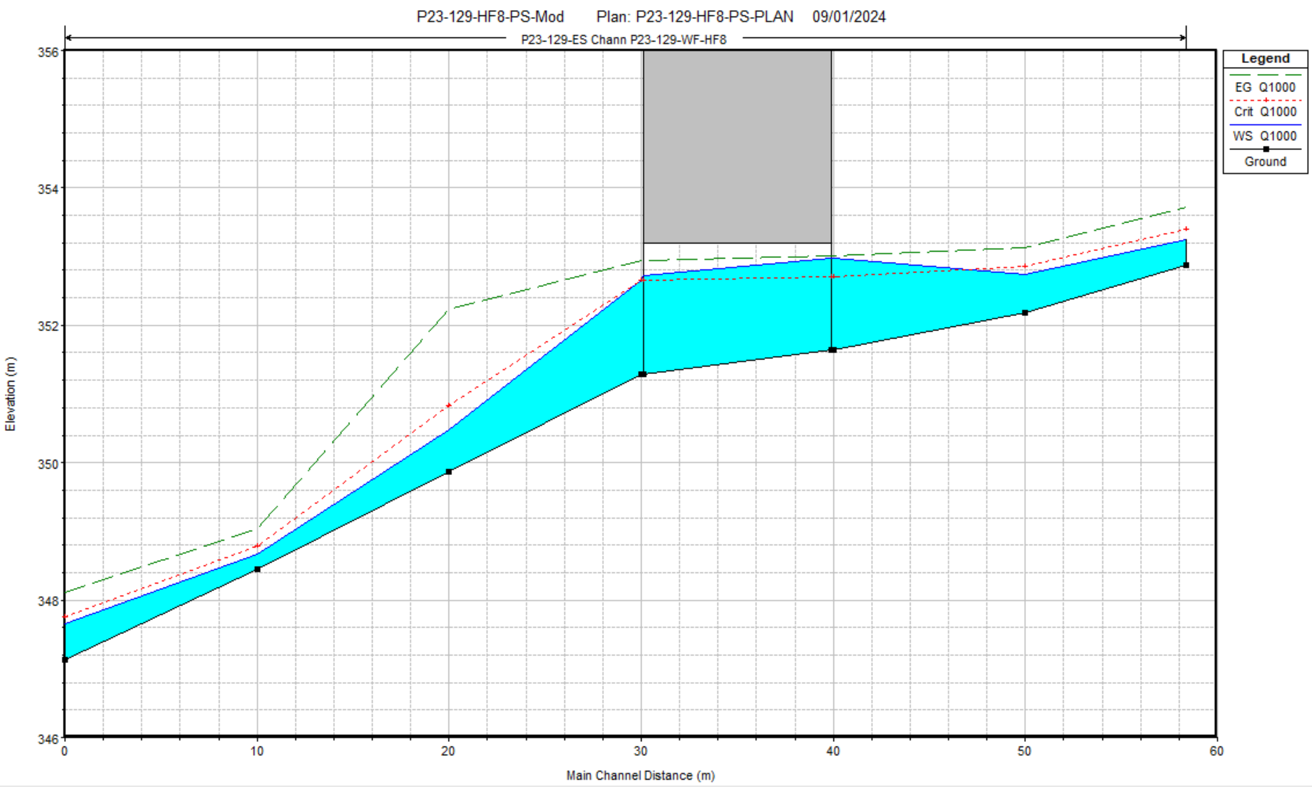

Figure 6-15: Longitudinal Section - WF-HF8 - 0.1% AEP - Proposed Scenario

6.2.3.4 Comparison Between Existing and Proposed Scenarios - Bridge WF-HF9

Upon completion of the hydraulic modelling, a comparison has been undertaken between the water levels obtained from the existing and proposed scenarios. This comparison allowed for conclusions to be drawn regarding the potential impact of the proposed bridge. The table below compares the result of the existing and proposed scenarios at each cross-section.

Table 6-12: Water Level Comparison - Existing VS Proposed - 0.1%AEP - WF-HF9

River Sta	Location	ES	PS	Diff (PS-ES)	Observations
		W.S. Elev	W.S. Elev	W.S. Elev	
24.99	Upstream	258.99	259.00	0.01	Slight increase of water level
22.49	Upstream	258.82	258.86	0.04	Slight increase of water level
7.5	Downstream	258.60	258.60	0.00	No variation of water level
0	Downstream	258.03	258.03	0.00	No variation of water level

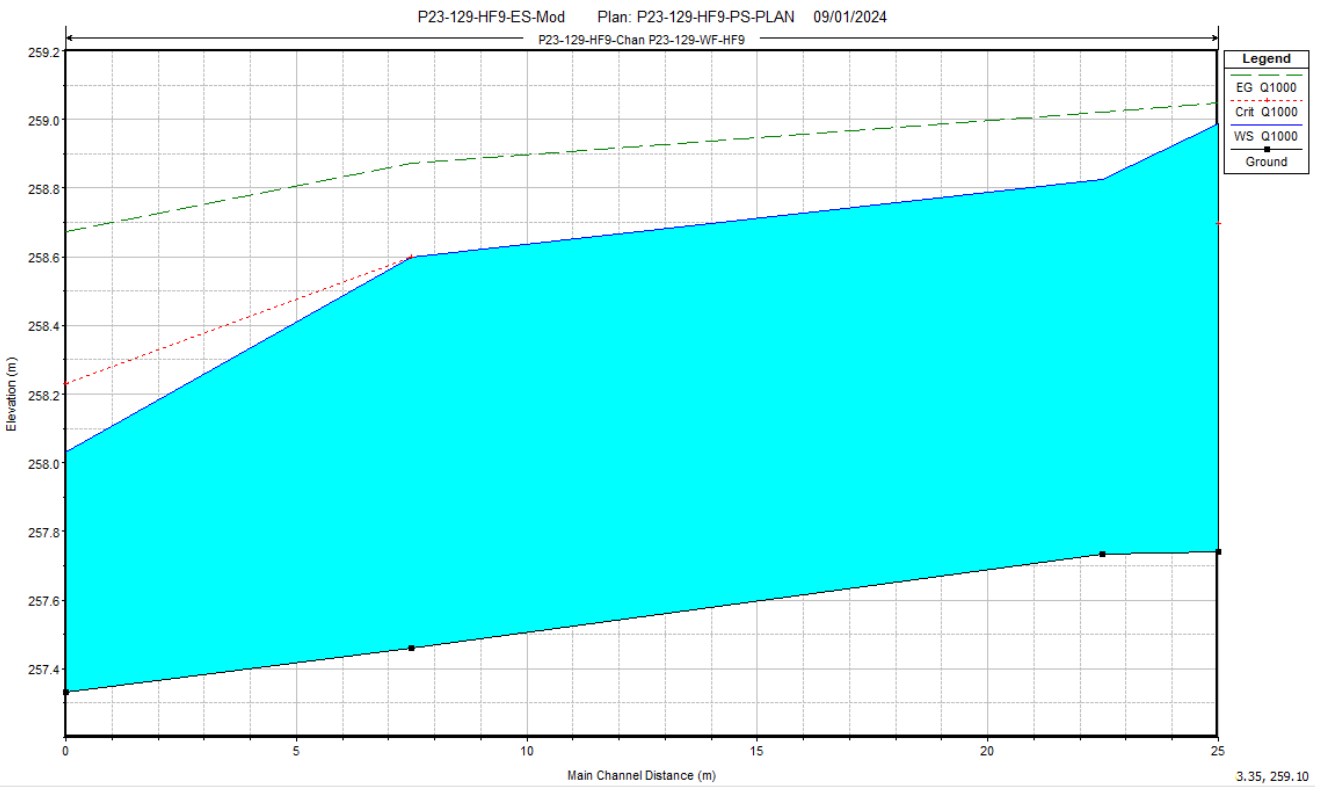

Figure 6-16: Longitudinal Section - WF-HF9 - 0.1% AEP - Current Scenario

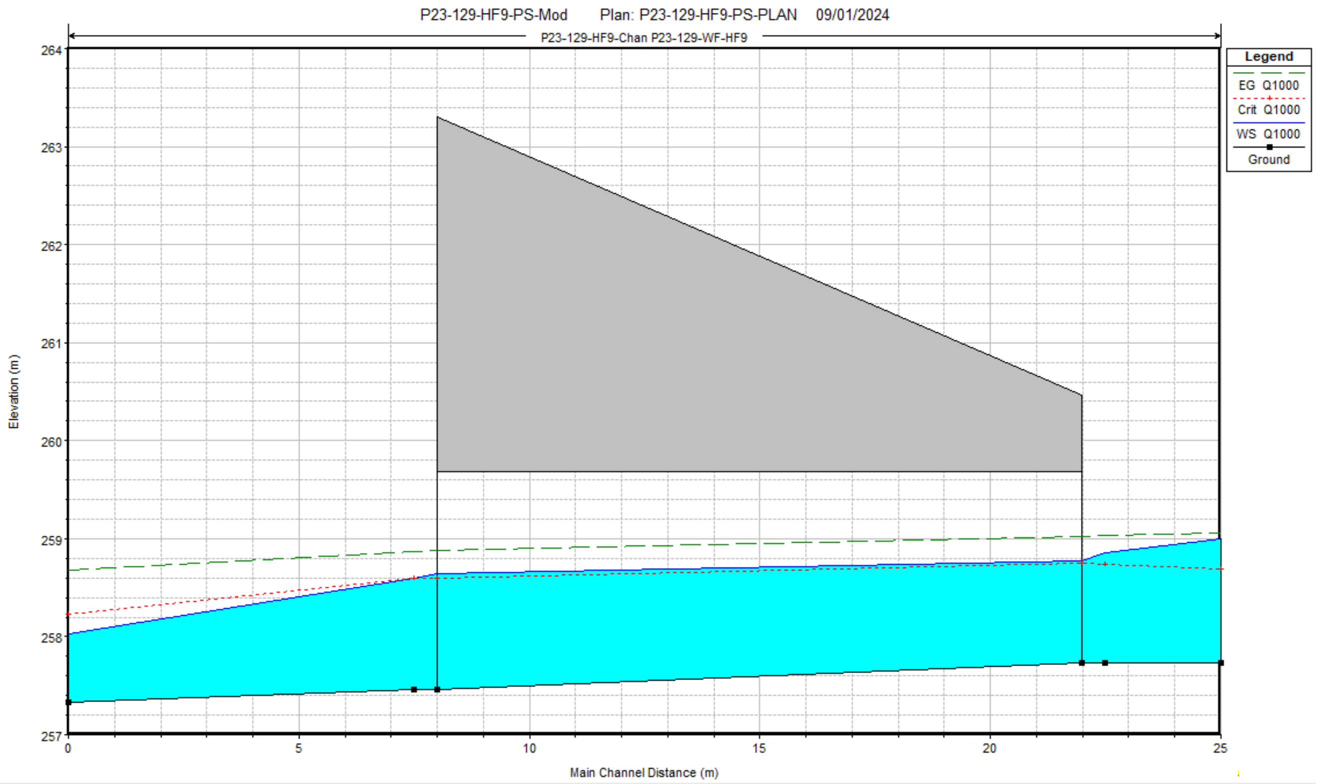

Figure 6-17: Longitudinal Section - WF-HF9 - 0.1% AEP - Proposed Scenario

7. MITIGATION MEASURES

Given that the proposed structures are situated within the river channels and banks, it was necessary to incorporate mitigation measures into their design. Sufficient span and height have been provided to the structures, and the embankment has been optimized to minimize the footprint and height. These measures are intended to reduce flow restrictions that could potentially cause an increase in flood extents. It is important to note that ongoing monitoring and maintenance of the culverts and bridges will be essential to ensure their continued effectiveness over time.

Construction stage methodologies and mitigation measures to be adopted for the construction of proposed pre-cast concrete box culverts and clear span bridges are set out in the Construction and Environmental Management Plan submitted as part of the EIAR for the planning application.

8. CONCLUSION

This Site-Specific Flood Risk Assessment (SSFRA) thoroughly investigated the local hydrological conditions concerning the proposed wind farm site at Ballinagree. The study Indicates that the site is susceptible to flooding for 1 in 10 and 1 in 100 year fluvial events, particularly around the WF-HF4 Proposed Water crossing Location as identified on Stage 1 - Flood Risk Assessment and proven on Stage 2 - Flood Risk Assessment.

Based on the findings of this SSFRA, it has been established that the flood risk to the site can be effectively managed by implementing a design featuring a single span bridge. The focus of this assessment also extends to the design of infrastructure that interface with the branches of the Laney River.

Considering the outcomes of the SSFRA, it is evident that adopting Single Span bridges for the water crossings in WF-HF8 and WF-HF9 would adequately address the flood risk concerns. As for the crossing in WF-HF6, a Pre-Cast Box Culvert with a width of 3.6 m and height of 2.7 m will be implemented to mitigate flood risks effectively.

Considering the mitigation measures discussed above, the proposed structures are not expected to have a negative impact on the anticipated flood extent and levels in the site vicinity. Therefore, the proposed development complies with the core principles of the Planning System and Flood Risk Management Guidelines.

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APPENDIX 1

SITE LAYOUT PLAN

FEHILY TIMONEY

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Rev.	Description	App By	Date
A	FURTHER INFORMATION	TB	04.08.23

PROJECT: BALLINAGREE WIND FARM - RFI

CLIENT: BALLINAGREE WIND DAC

SHEET: 1:12500 SITE LAYOUT PLAN

Date	Project number	Scale (@ A1-)
04.08.23	P23-129	1:12500

Drawn by	NS
Checked by	TB
Drawing Number	P23-129-0100-0001
Rev	A

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Friday 4 August 2023

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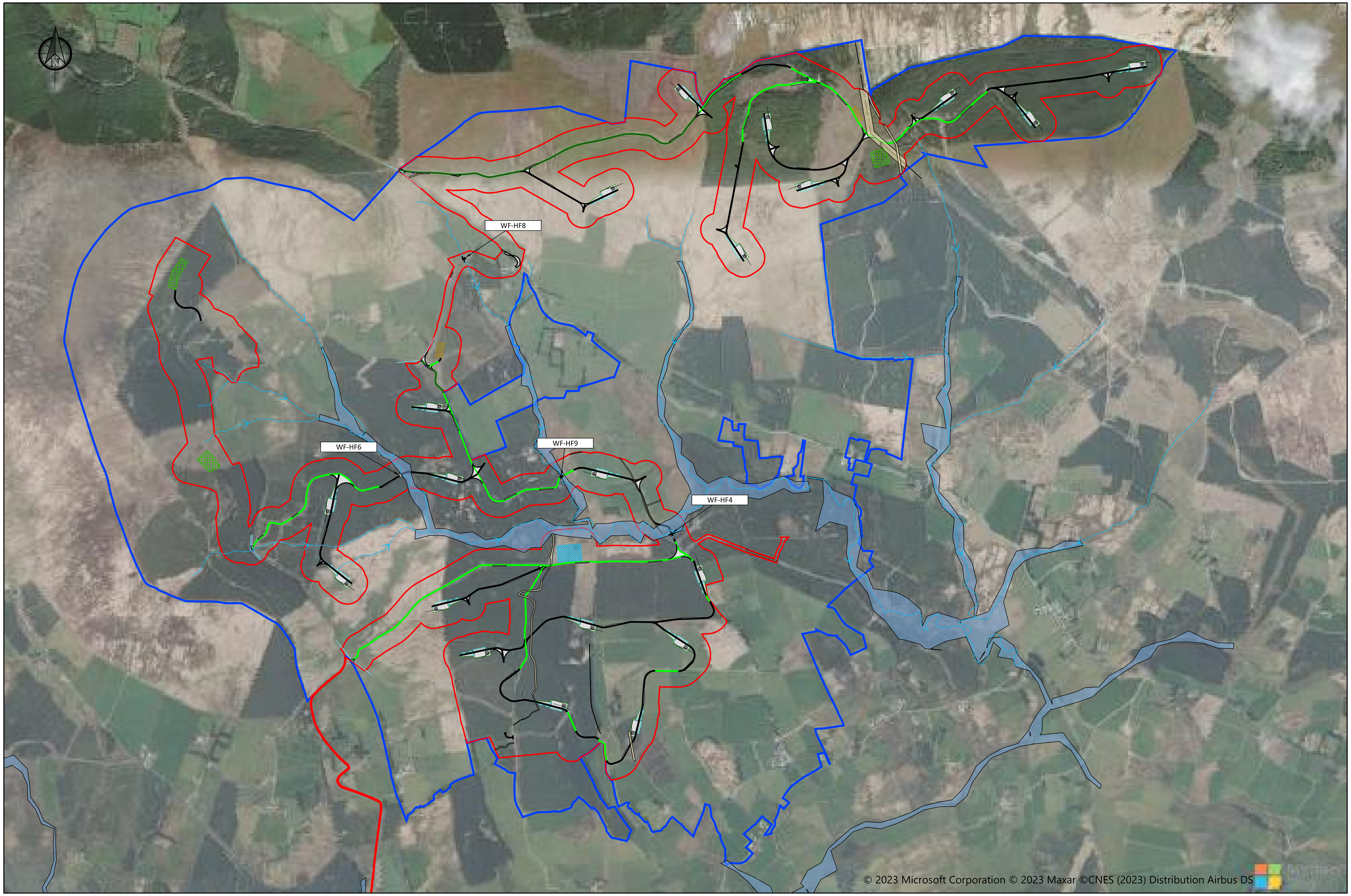
& PLANNING

APPENDIX 2

OPW FLOOD MAPS



Legend

- Planning Boundary
- Property Boundary
- Turbine And Hardstanding Areas
- Laney River - 1% AEP Flood Extent Source www.Floodinfo.ie
- Laney River
- WF-HFX Watercourse Crossing Locations

0m 125m 250m 375m 500m 625m 750m 875m 1000m 1125m 1250m

Scale 1:12500

If Applicable : Ordnance Survey Ireland Licence No. CYAL50221678 © Ordnance Survey Ireland and Government of Ireland

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Rev.	Description	App By	Date
A	FURTHER INFORMATION	TB	04.08.23

PROJECT	BALLINAGREE WIND FARM - RFI
SHEET	OPW FLOOD MAPPING
CLIENT	BALLINAGREE WIND DAC
Date	04.08.23
Project number	P23-129
Scale (@ A1-)	1:12500
Drawn by	NS
Checked by	TB
Drawing Number	P23-129-0100-0003
Rev	A

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28 November 2023

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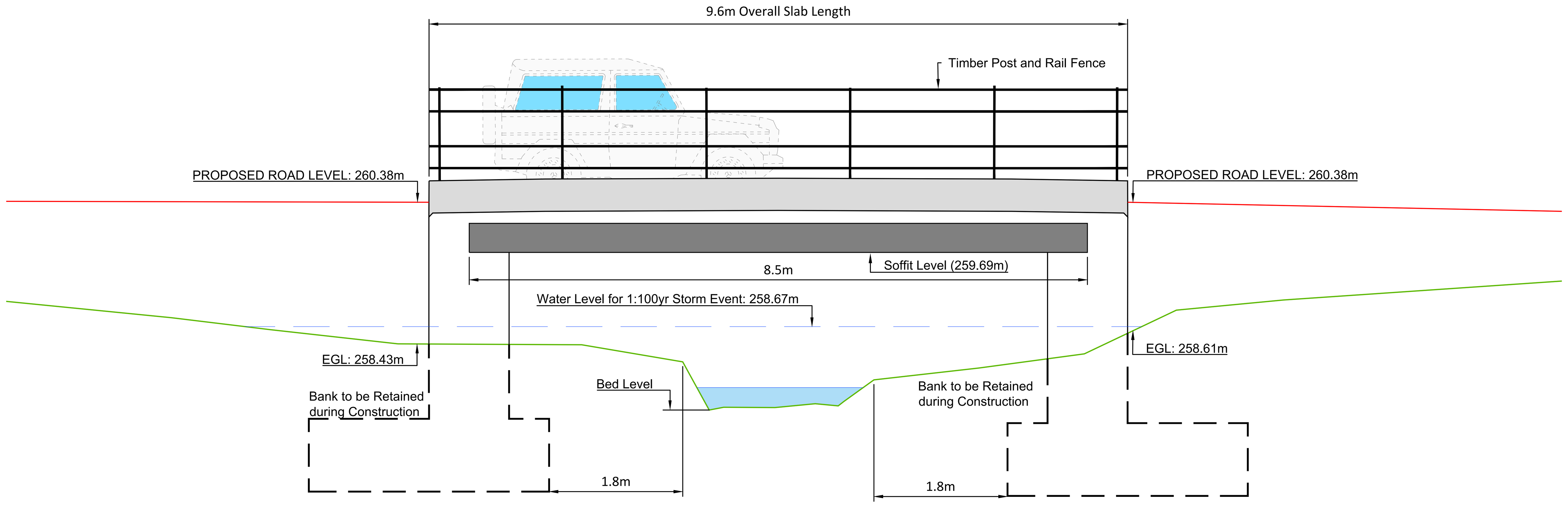
APPENDIX 3

PROPOSED STRUCTURES



SECTION A-A

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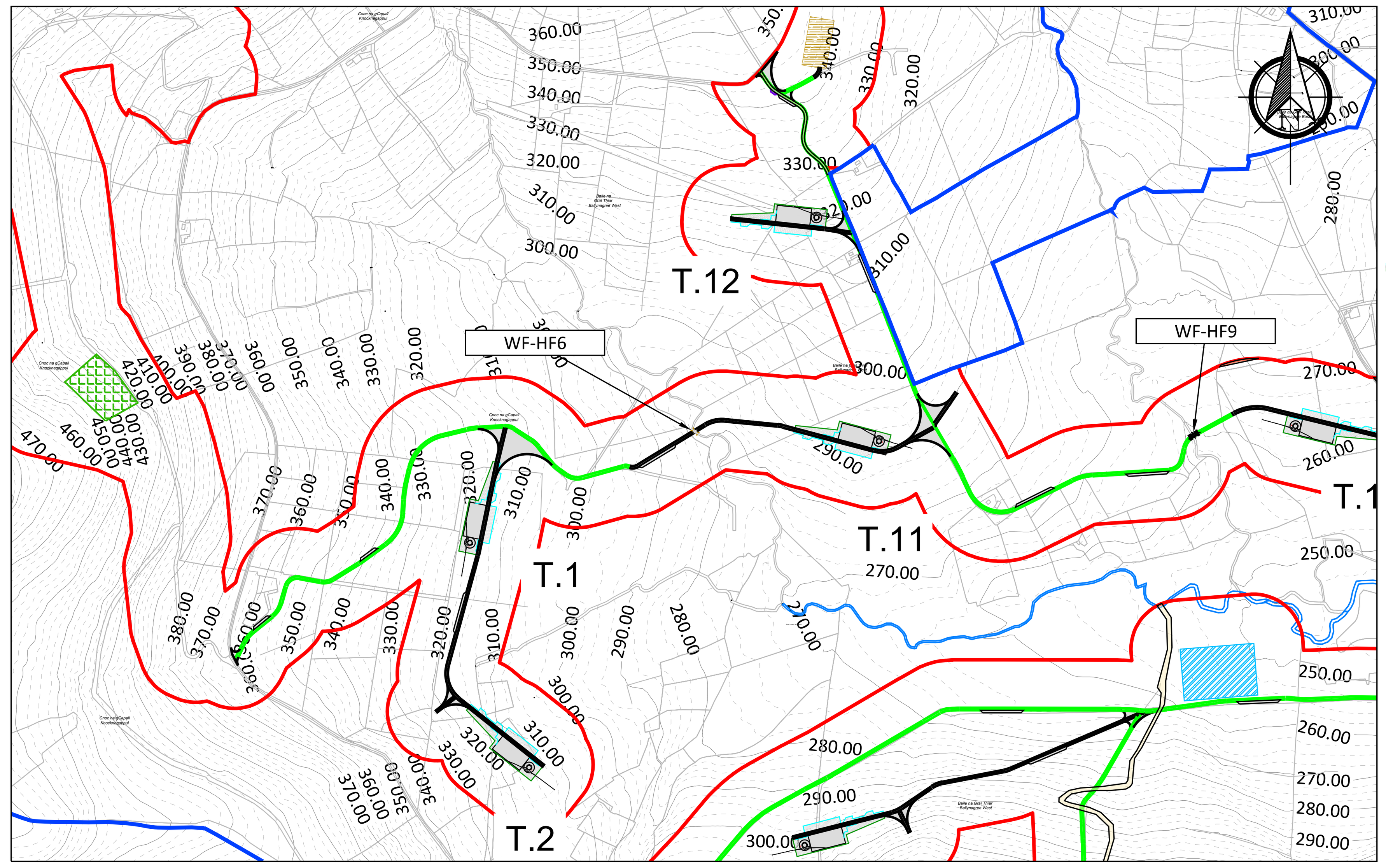
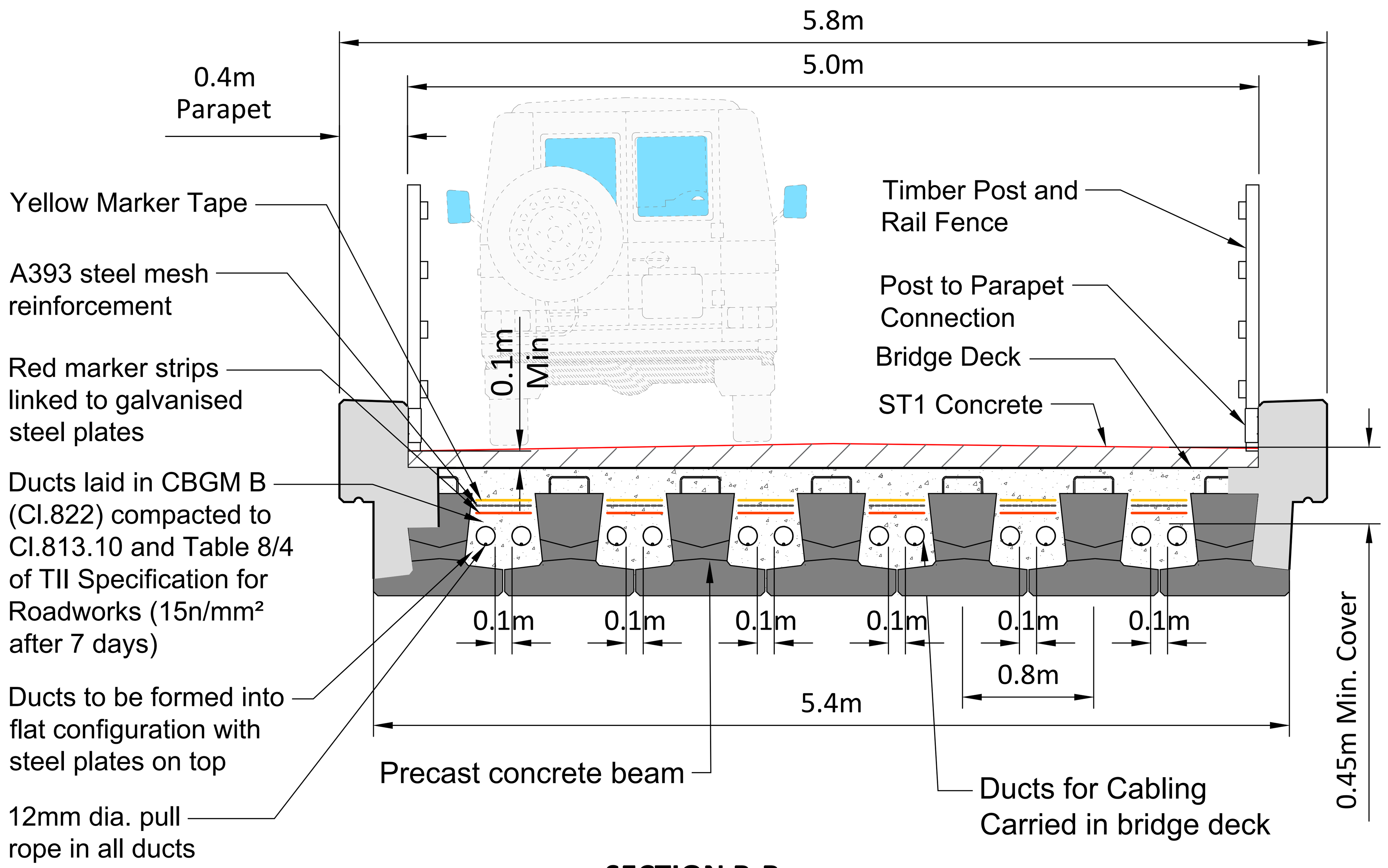


LOCATION PLAN

Scale 1:10000

Legend
- Planning Boundary
- Property Boundary
- Proposed Wind Farm Access Track
- Existing Road To Be Upgraded
- Passing Bays
- Turning Areas
- Turbine And Hardstanding Areas
- Substation Compound
- Existing Wayleave
- Overhead 110kV ESB Powerline
- Proposed Met Mast

Notes.
1. This drawing is for planning purposes only.
2. Dimensions in meters unless otherwise noted.
3. Levels shown relative to ordinance datum (Malin Head).
4. Co-ordinates are to Irish Transverse Mercator (ITM).
5. Extent of earthworks not shown.



SECTION B-B

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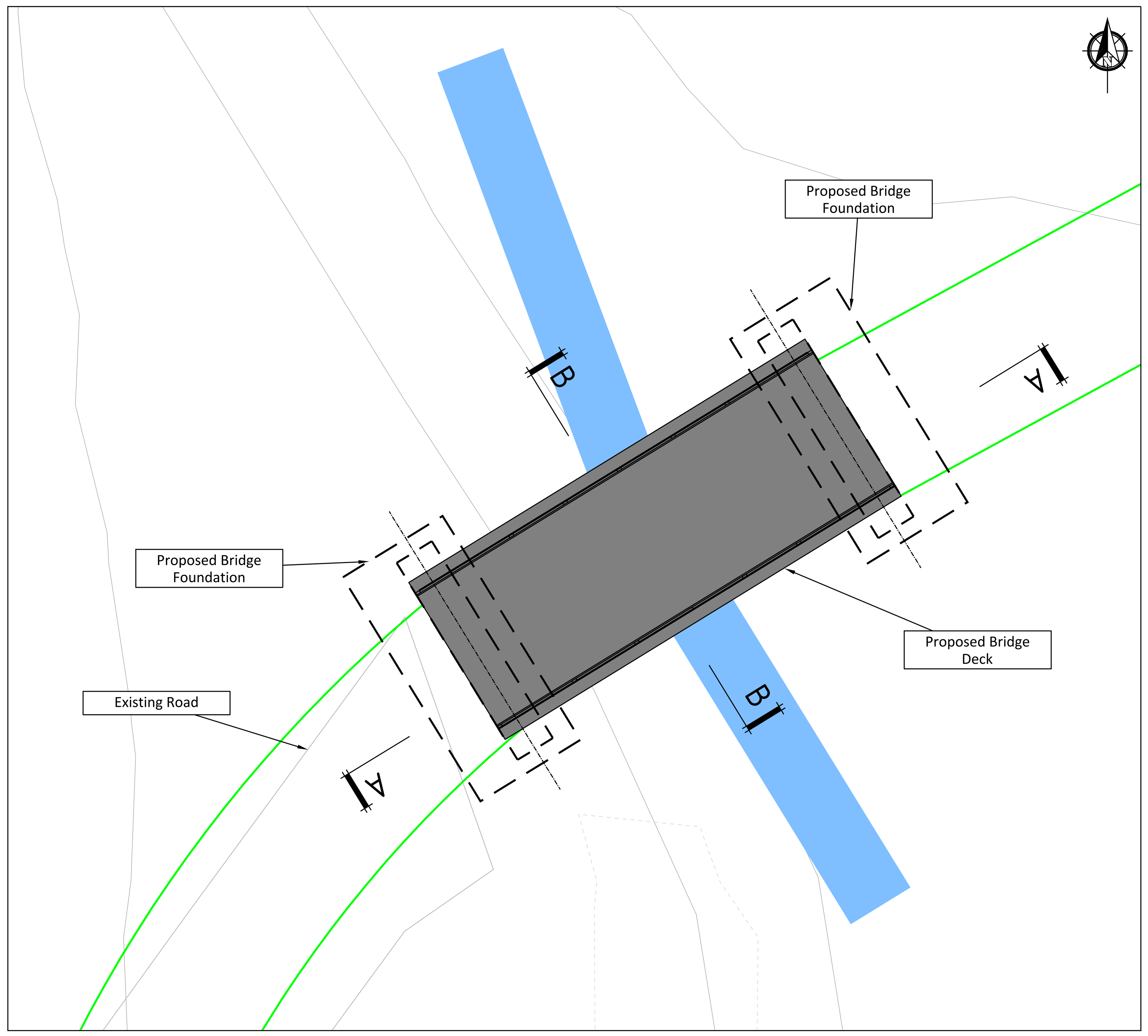

BRIDGE PLAN

Scale 1:125

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Rev.	Description	App By	Date
A	FURTHER INFORMATION	TB	04.08.23

PROJECT	BALLINAGREE WIND FARM - RFI
CLIENT	BALLINAGREE WIND DAC
SHEET	PROPOSED WATERCOURSE CROSSING DETAIL - WF-HF9
Date	04.08.23
Project number	P23-129
Scale (@ A1-)	As Shown
Drawn by	NS
Checked by	TB
Drawing Number	P23-129-0300-0004
Rev	A

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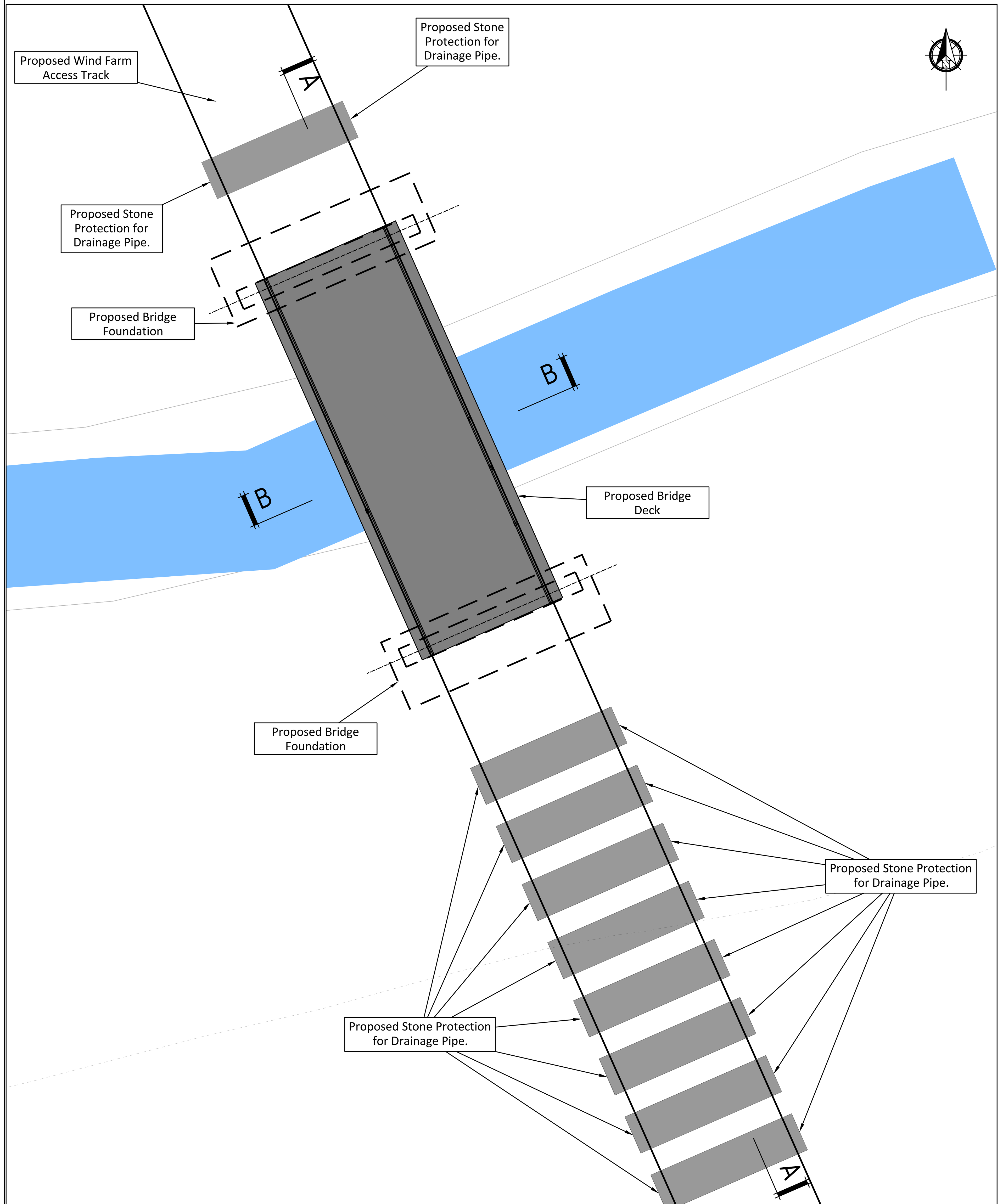
Friday 4 August 2023



BRIDGE PLAN

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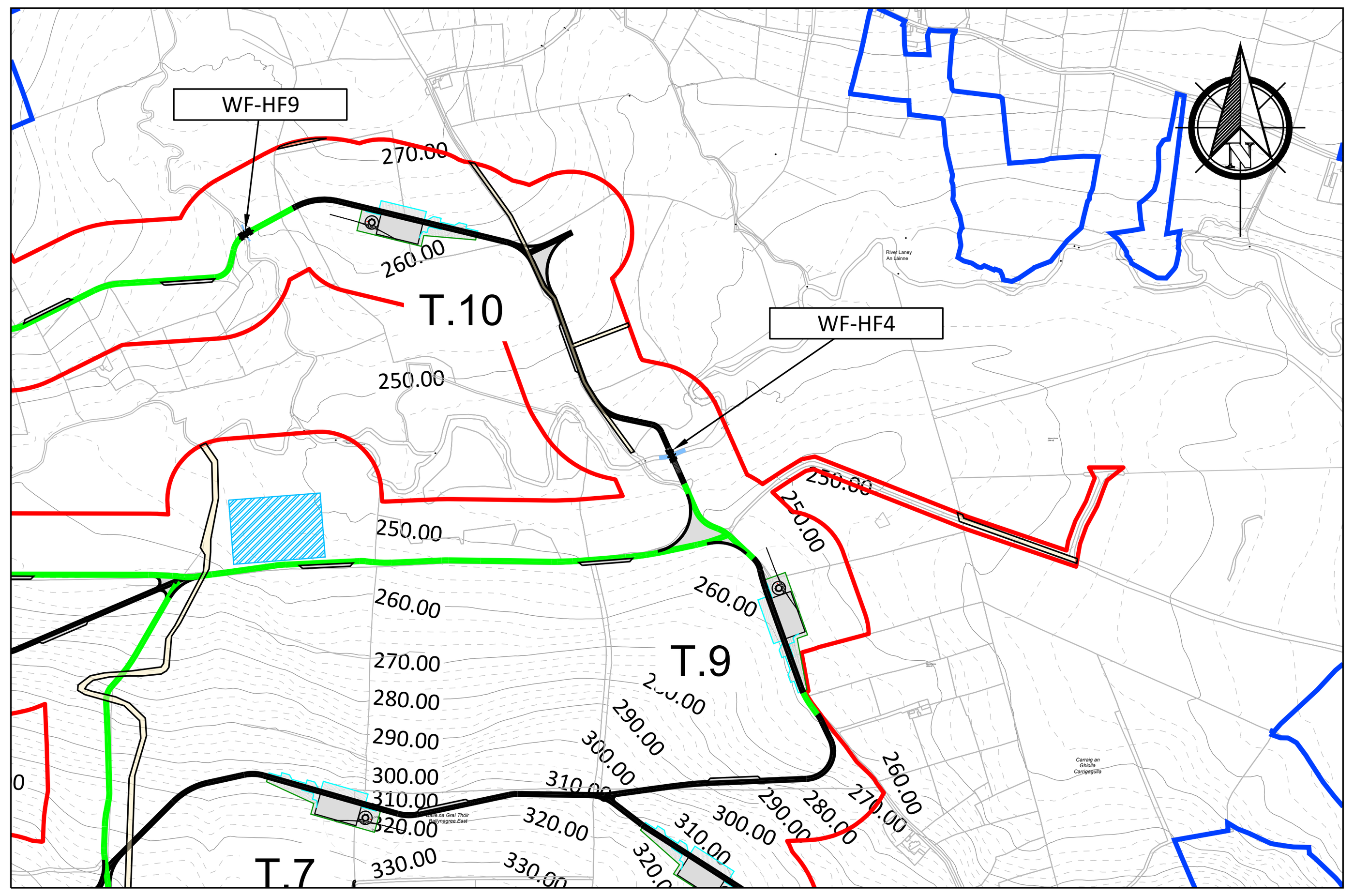


LOCATION PLAN

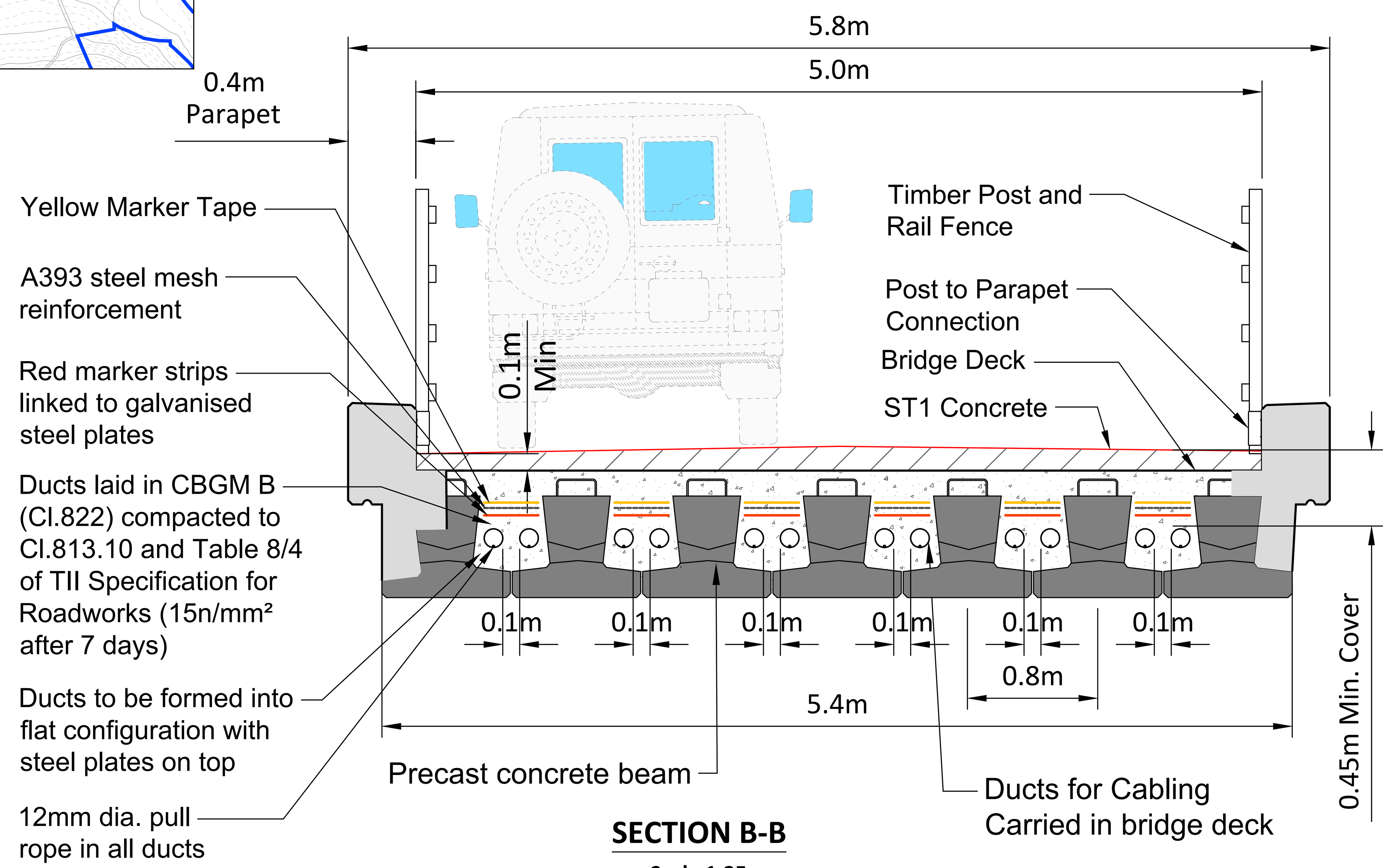
Scale 1:10000

Notes.

1. This drawing is for planning purposes only.
2. Dimensions in meters unless otherwise noted.
3. Levels shown relative to ordinance datum (Malin Head).
4. Co-ordinates are to Irish Transverse Mercator (ITM).
5. Extent of earthworks not shown.

Legend

- Planning Boundary
- Property Boundary
- Proposed Wind Farm Access Track
- Existing Road To Be Upgraded
- Passing Bays
- Turning Areas
- Turbine And Hardstanding Areas
- Substation Compound
- Existing Wayleave
- Overhead 110kV ESB Powerline
- Proposed Met Mast



SECTION B-B

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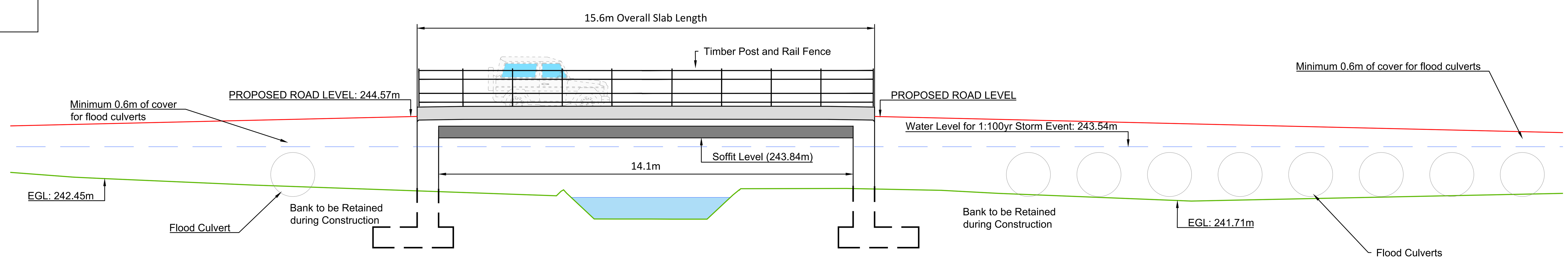

SECTION A-A

Scale 1:100

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Rev.	Description	App By	Date
A	FURTHER INFORMATION	TB	04.08.23

PROJECT: BALLINAGREE WIND FARM - RFI

CLIENT: BALLINAGREE WIND DAC

SHEET: PROPOSED WATERCOURSE CROSSING DETAIL - WF-HF4

Date	Project number	Scale (@ A1-)
04.08.23	P23-129	As Shown

Drawn by	Checked by	Drawing Number	Rev
NS	TB	P23-129-0300-0001	A

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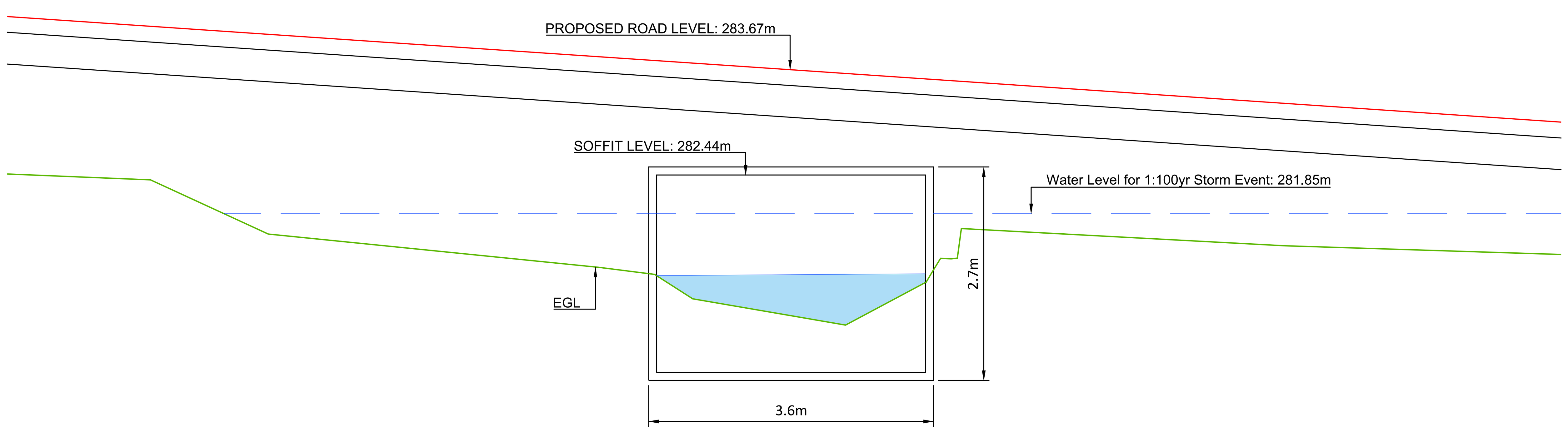
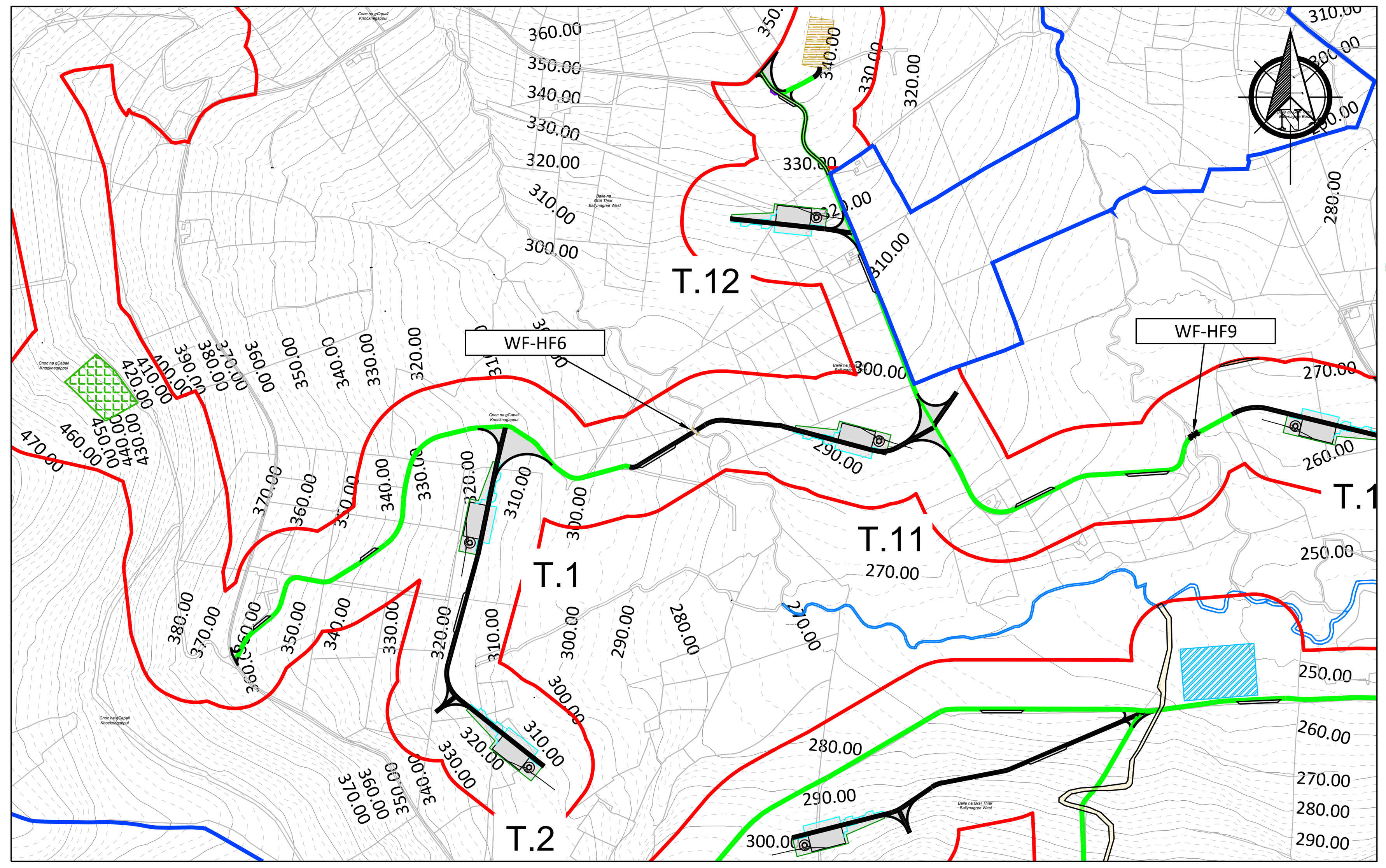
05 January 2024



SECTION A-A

Scale 1:50



Legend

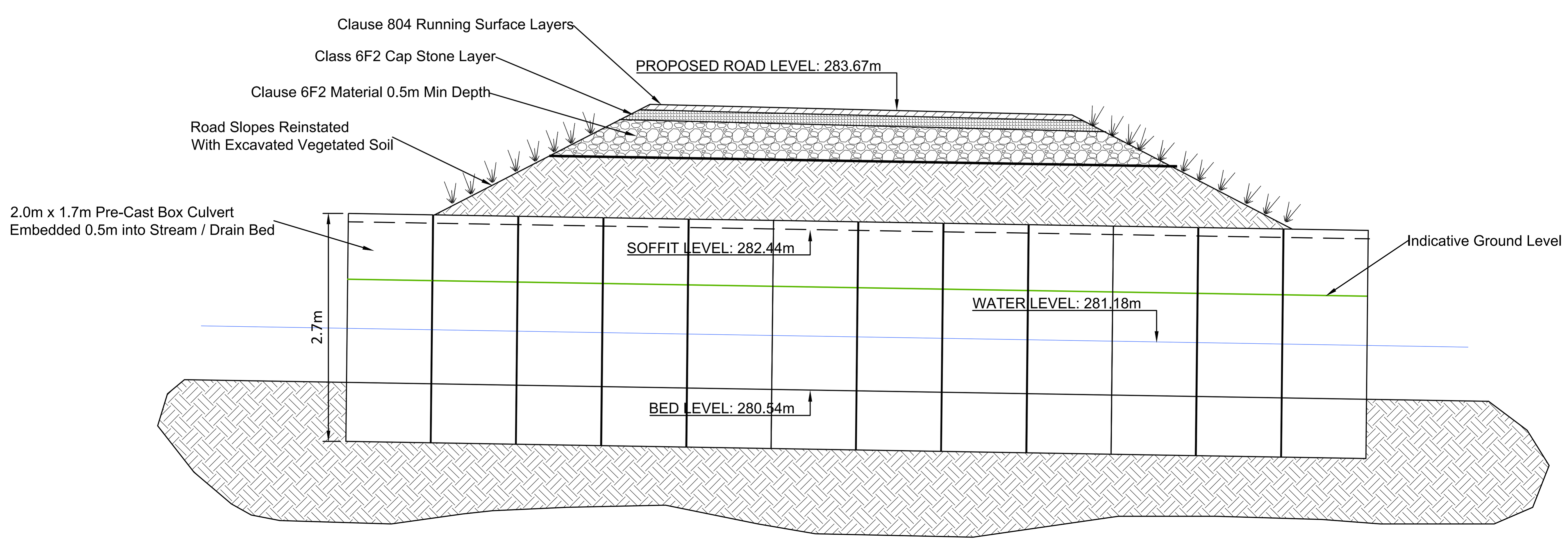
- Planning Boundary
- Property Boundary
- Proposed Wind Farm Access Track
- Existing Road To Be Upgraded
- Passing Bays
- Turning Areas
- Turbine And Hardstanding Areas
- Substation Compound
- Existing Wayleave
- Overhead 110kV ESB Powerline
- Proposed Met Mast

Notes.

1. This drawing is for planning purposes only.
2. Dimensions in meters unless otherwise noted.
3. Levels shown relative to ordinance datum (Malin Head).
4. Co-ordinates are to Irish Transverse Mercator (ITM).
5. Extent of earthworks not shown.

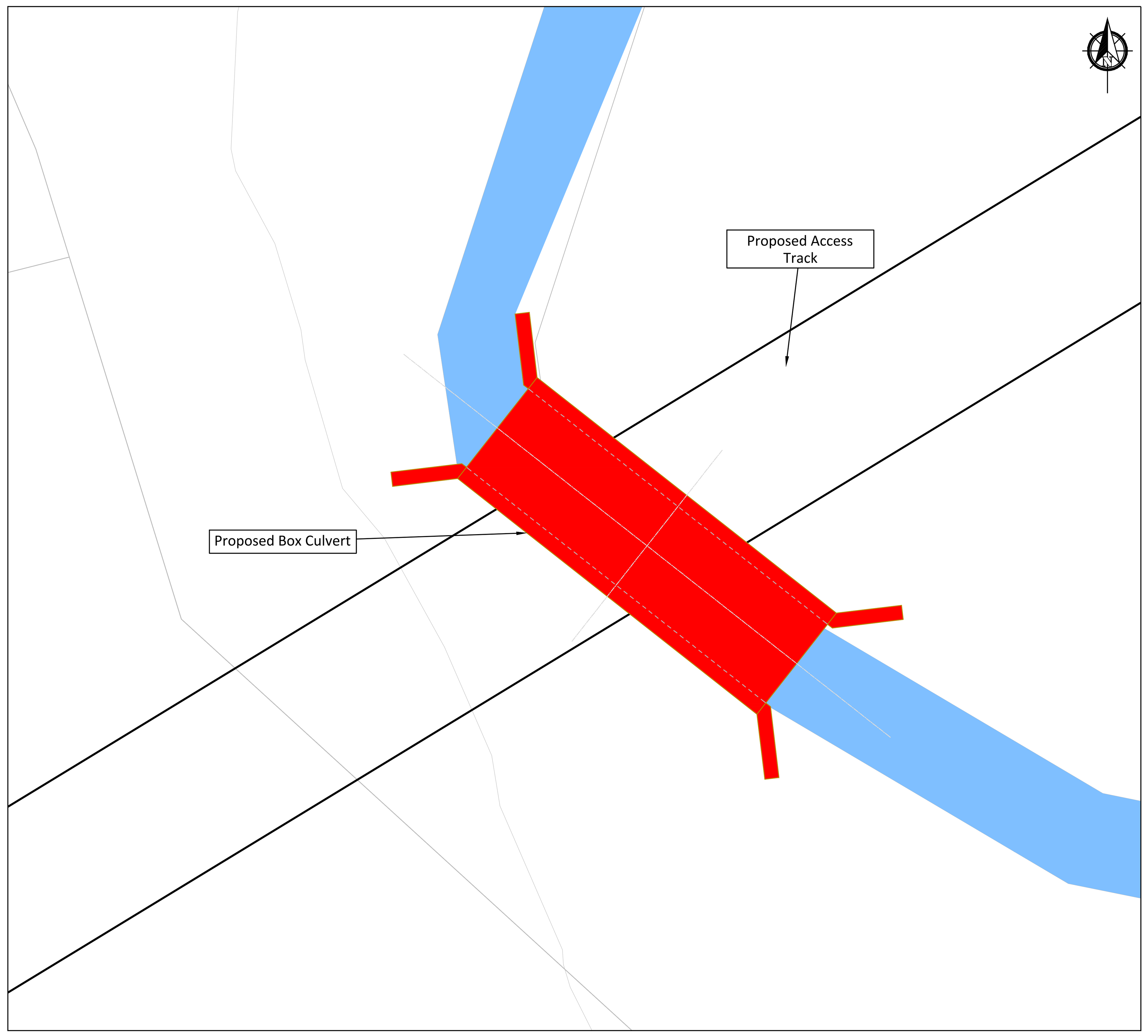
LOCATION PLAN

Scale 1:10000



SECTION B-B

Scale 1:50



BRIDGE PLAN

Scale 1:125

FEHILY TIMONEY

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Rev.	Description	App By	Date
A	FURTHER INFORMATION	TB	04.08.23

PROJECT: BALLINAGREE WIND FARM - RFI

CLIENT: BALLINAGREE WIND DAC

SHEET: PROPOSED WATERCOURSE CROSSING DETAIL - WF-HF6

Date	Project number	Scale (@ A1-)
04.08.23	P23-129	As Shown

Drawn by: NS

Checked by: TB

Drawing Number: P23-129-0300-0002

Rev: A

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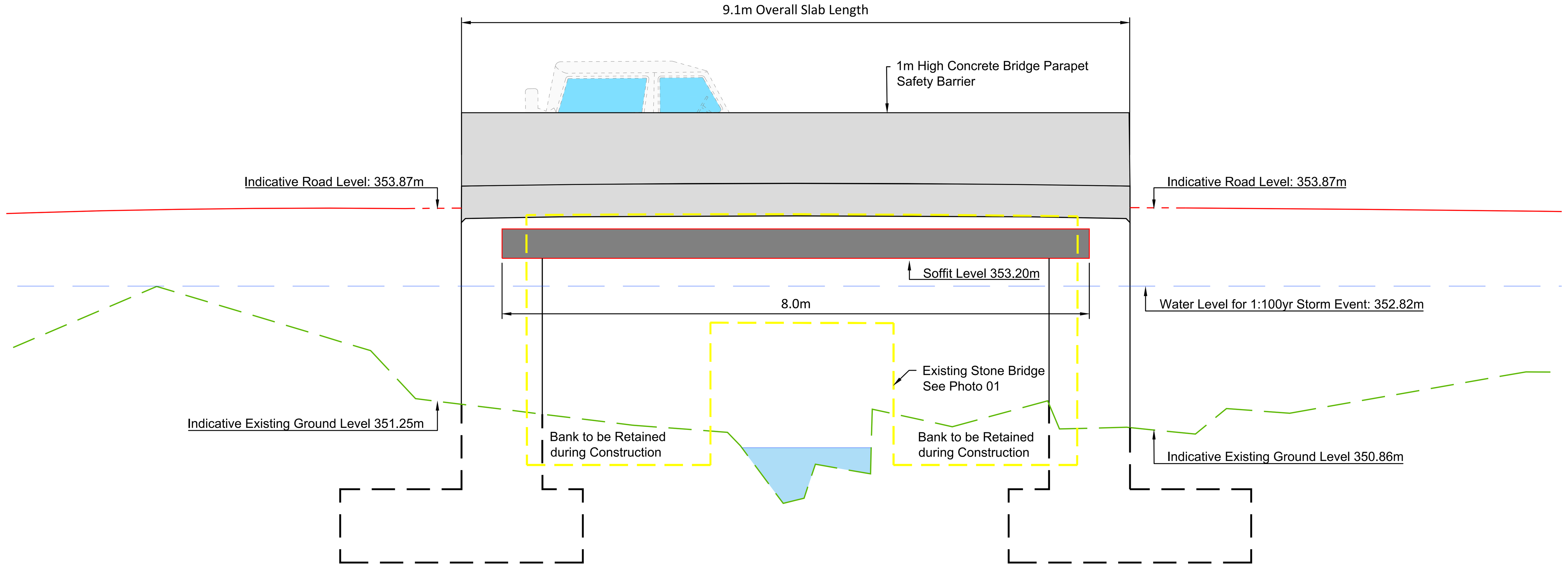
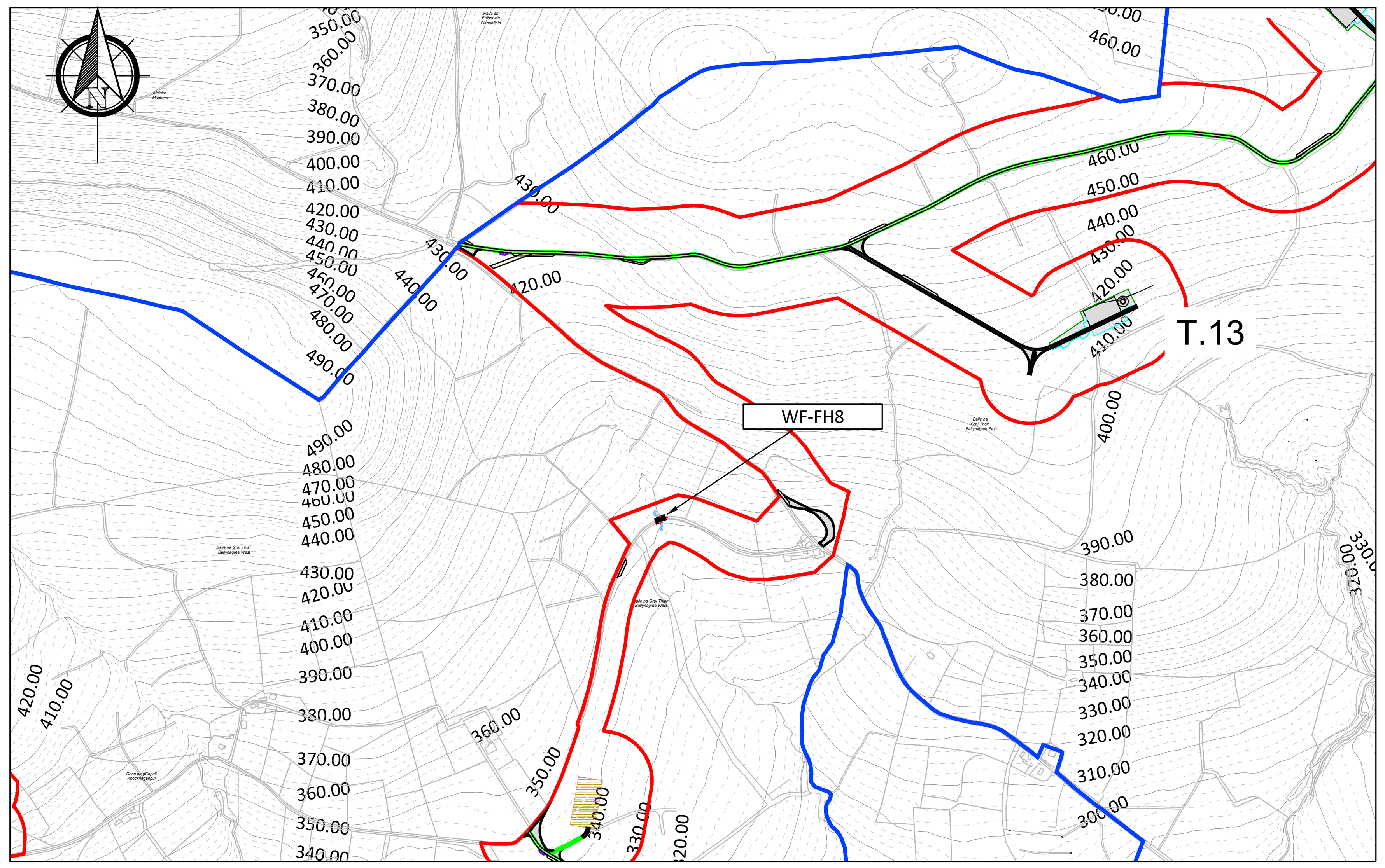
Friday 4 August 2023



SECTION A-A

Scale 1:50



LOCATION PLAN

Scale 1:10000

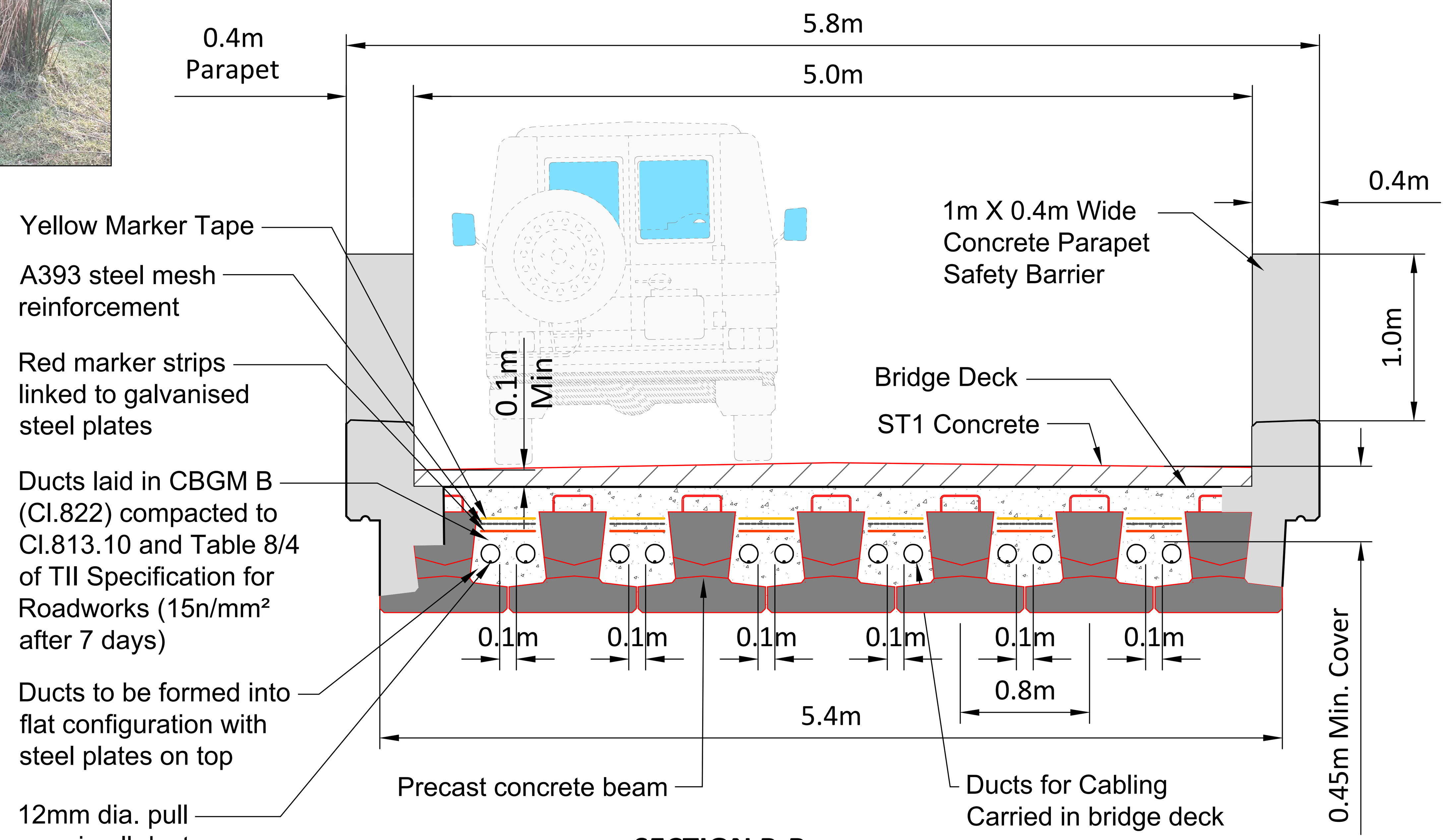
Legend

- Planning Boundary
- Property Boundary
- Proposed Wind Farm Access Track
- Existing Road To Be Upgraded
- Passing Bays
- Turning Areas
- Turbine And Hardstanding Areas
- Temporary Compound Area
- Borrow Pit Area
- Substation Compound
- Existing Wayleave
- Overhead 110kV ESB Powerline
- Proposed Met Mast

Notes.

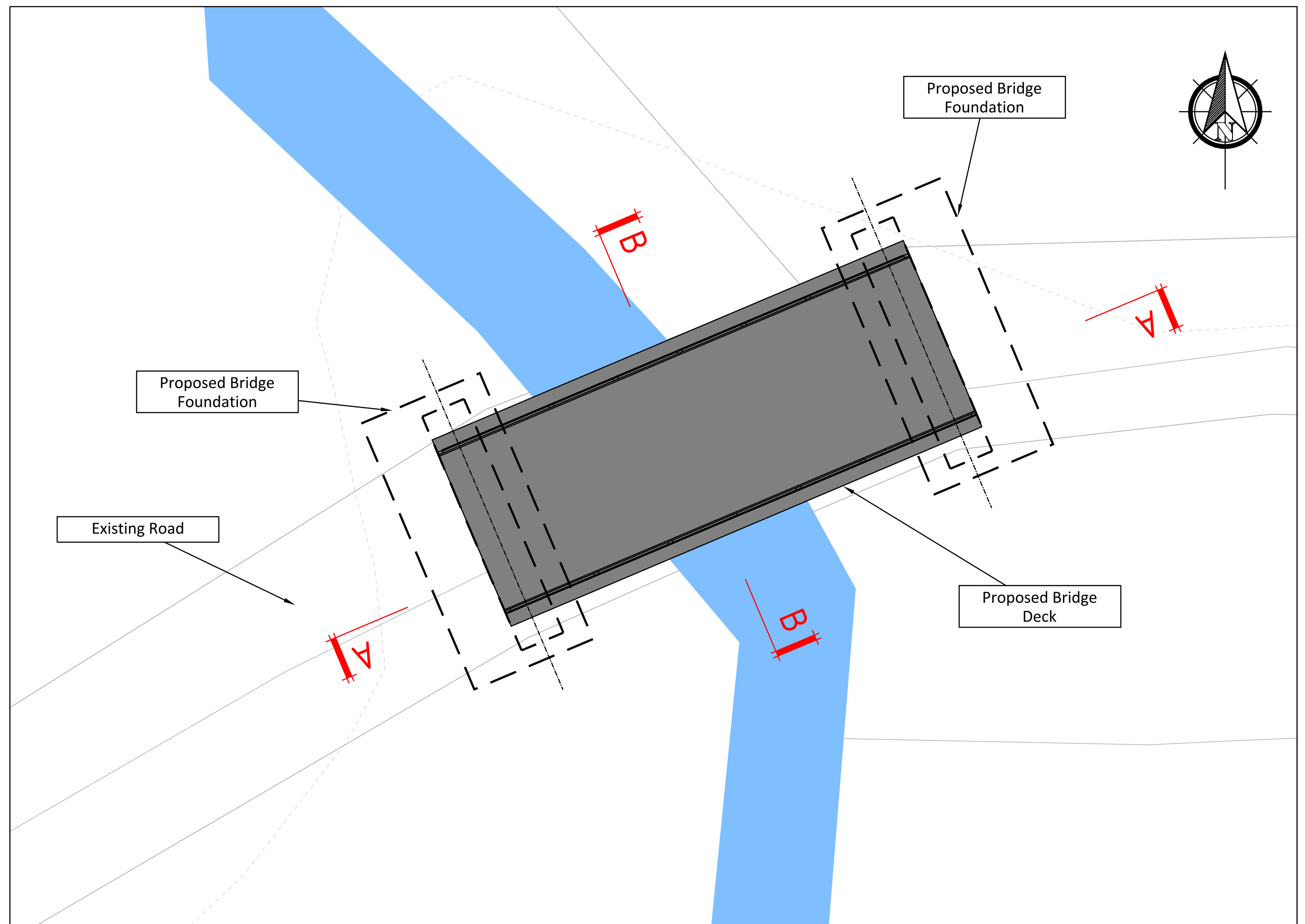
1. This drawing is for planning purposes only.
2. Dimensions in meters unless otherwise noted.
3. Levels shown relative to ordinance datum (Mal
4. Co-ordinates are to Irish Transverse Mercator (
5. Extent of earthworks not shown.

EXISTING STONE BRIDGE PHOTO 01



SECTION B-B

Scale 1:25



BRIDGE PLAN

Scale 1:125

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Rev.	Description	App By	Date
A	FURTHER INFORMATION	TB	04.08.23

PROJECT	BALLINAGREE WIND FARM - RFI
CLIENT	BALLINAGREE WIND DAC
SHEET	PROPOSED WATERCOURSE CROSSING DETAIL - WF-HF8
Date	04.08.23
Project number	P23-129
Scale (@ A1-)	AS SHOWN
Drawn by	NS
Checked by	TB
Drawing Number	P23-129-0300-0003
Rev	A

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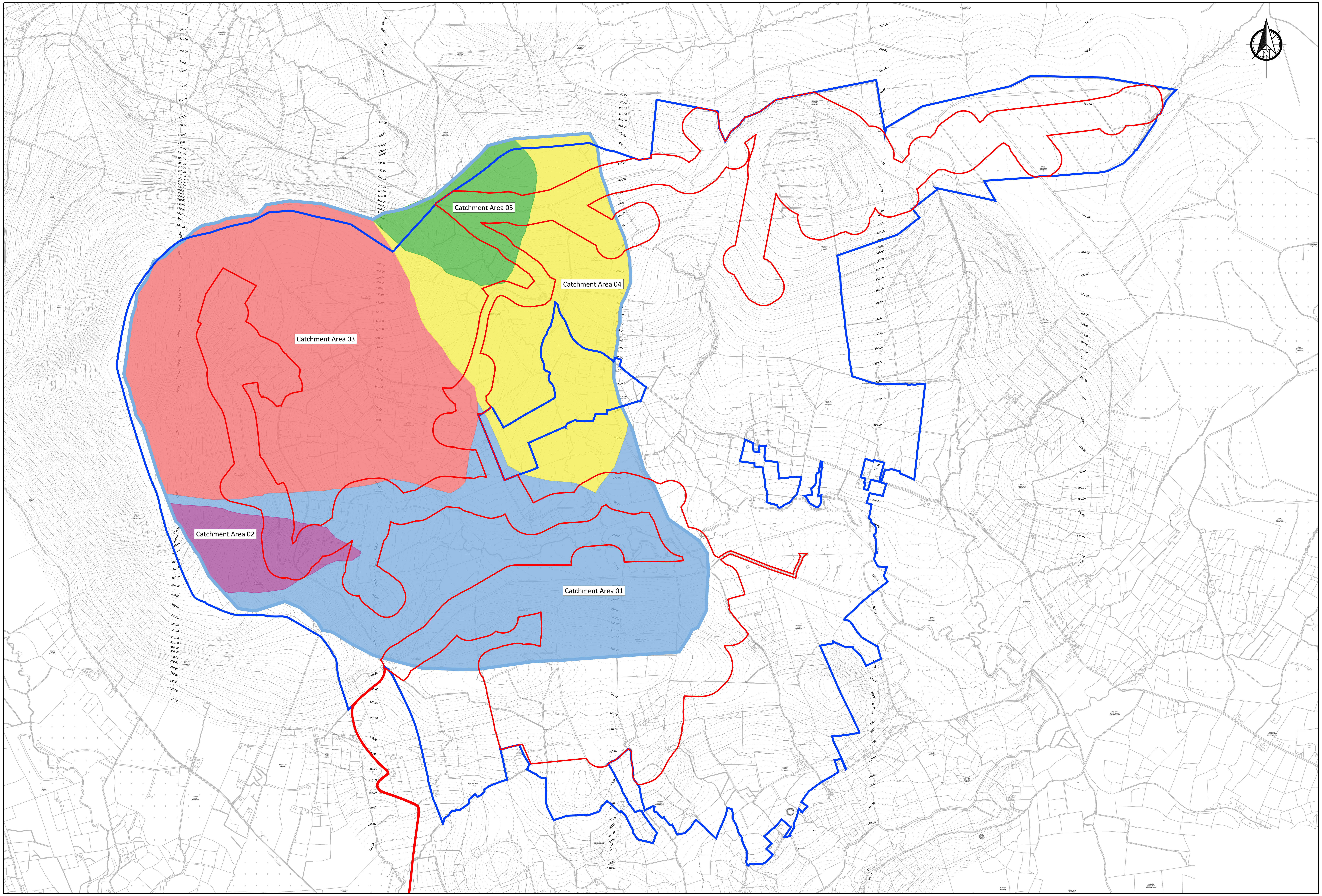
Friday 4 August 2023

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 4

HYDROLOGY ANALYSIS



Legend

Planning Boundary

Property Boundary

Catchment	Area (Km²)
Catchment Area 01 (Inclusive of All Areas)	9.68
Catchment Area 02	0.44
Catchment Area 03	3.55
Catchment Area 04	2.55
Catchment Area 05	0.58

0m 125m 250m 375m 500m 625m 750m 875m 1000m 1125m 1250m

Scale 1:12500

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Rev.	Description	App By	Date
A	FURTHER INFORMATION	TB	04.08.23

PROJECT: BALLINAGREE WIND FARM - RFI

CLIENT: BALLINAGREE WIND DAC

SHEET: HYDROLOGICAL ANALYSIS MAPPING

Date: 04.08.23
Project number: P23-129
Scale (@ A1-) 1:12500
Drawn by: NS
Checked by: TB
Drawing Number: P23-129-0100-0002
Rev: A

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Friday 4 August 2023

Project	P23-129 Ballinagree		
Subject	Calculation of Flow Estimation Watercrossing - WF-HF4		
Prepared by:	RM	Job No	P23-129
Checked by:	PD	Date	17/07/2023
Approved by:	PD	Revision	P01

1.0 PHYSICAL CATCHMENT DESCRIPTORS (PCD'S):

1.1 Hydrological PCD's

S1085 - Mainstream Slope	107.686	m/km

1.2 Spatial PCD's

AREA - Catchment Area	9.680	km^2
SAAR - Standard Annual Average Rainfall	1612.22	mm
FARL - Flood Attenuation by Rivers and Lakes	1	-

1.3 Spatial PCD's Representing Soil, Subsoil & Aquifer Types

BFI_{SOIL}	0.5875	-
URBEXT	0	-
SOIL	0.405	-
DRAIND	1.313	km/km^2
ARTDRAIN2	0	-

1.4 Catchment characteristics

Width	4943.127	m
Height	399	m
Time of Concentration	12.3	min

3.0 INSTITUTE OF HYDROLOGY REPORT 124 (IoH 124)

$QBAR_{RURAL}$	6.482	m^3/s

5.0 FSU - 3 VARIABLES EQUATION

QMED	*3.412*	m^3/s
QBAR	**3.555**	m^3/s

7.0 FSU - 7 VARIABLE EQUATION

$QMED_{RURAL}$	*6.828*	m^3/s
QMED	*6.828*	m^3/s
QBAR	**7.112**	m^3/s

8.0 ADAS

Q 75 year	*28.721*	m^3/s

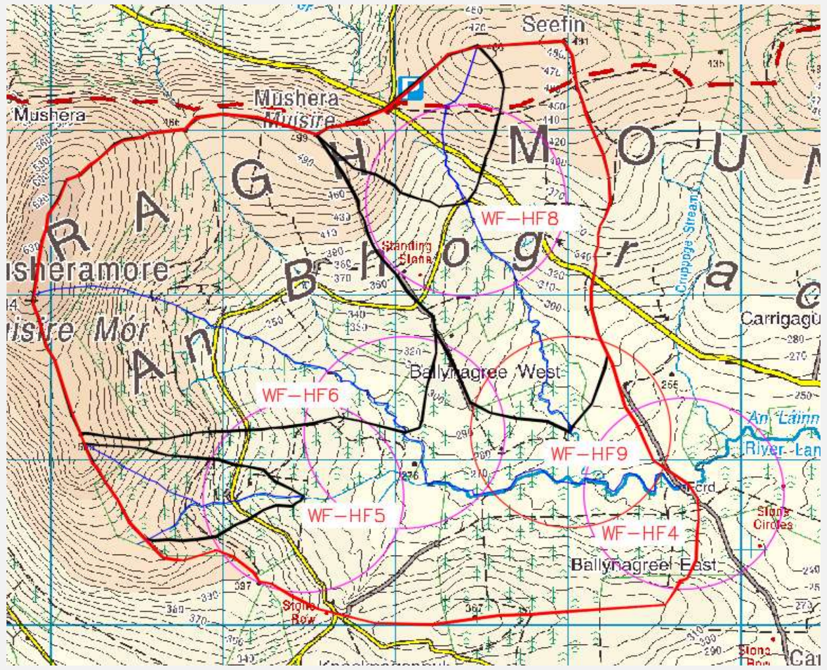
Stream Length (km)	10%	85%	DS Level (m)	US Level (m)	Slope (m/km)
4.9	0.4940282	4.1992397	245	644	107.686

Calculation of Flow Estimation

Method	QBAR/QMED	FSE	$QBAR_{FSE}$ (68% C.I.)	Growth Factor Q100	100 Year Flow(68% C.I)	OPW maintenance factor (No maintained = 1, Maintained =1.6) does not apply for FSU Methods.	100 Year Flow(68% C.I) + Maintenance factor	FSU Adjustment Factor (only applicable to 7 Variables Equation) - Source: FSW web protal	100 Year Flow(68% C.I) + Maintenance factor +Adjusted factor	Climate Change	Design Flow (68% C.I.) (m3/s)
IoH 124	6.482 m3/s	1.65	10.695 m3/s	1.96	20.963	1.0	20.963	N/A	20.963	1.2	**25.16 m3/s**
FSU 3-Variable Method	3.555 m3/s	2.05	7.287 m3/s	1.96	14.282	1.0	14.282	N/A	14.282	1.2	**17.14 m3/s**
FSU - 7 Variable Equation	7.112 m3/s	1.37	9.744 m3/s	1.92	18.708	1.0	18.708	1.000	18.708	1.2	**22.45 m3/s**

QMED = 0.96QBAR as per "Flood Estimation in Small and Urbanised Catchments in Ireland" by the OPW
This catchment is ungauged and there was no subject site created on the watercourse, hence the following values were utilised:
Flood Estimation in Small and Urbanised Catchments in Ireland
* Value taken from adjacent FSU catchment location 19_916_3

CAD Catchement



Project	P23-129 Ballinagree		
Subject	Calculation of Flow Estimation Watercrossing - WF-HF4		
Prepared by:	RM	Job No	P23-129
Checked by:	PD	Date	17/07/2023
Approved by:	PD	Revision	P01

1.0 PHYSICAL CATCHMENT DESCRIPTORS (PCD'S):

1.1 Hydrological PCD's

S1085 - Mainstream Slope	107.686	m/km

1.2 Spatial PCD's

AREA - Catchment Area	9.680	km^2
SAAR - Standard Annual Average Rainfall	1612.22	mm
FARL - Flood Attenuation by Rivers and Lakes	1	-

1.3 Spatial PCD's Representing Soil, Subsoil & Aquifer Types

BFI_{SOIL}	0.5875	-
URBEXT	0	-
SOIL	0.405	-
DRAIND	1.313	km/km^2
ARTDRAIN2	0	-

1.4 Catchment characteristics

Width	4943.127	m
Height	399	m
Time of Concentration	12.3	min

3.0 INSTITUTE OF HYDROLOGY REPORT 124 (IoH 124)

$QBAR_{RURAL}$	6.482	m^3/s

5.0 FSU - 3 VARIABLES EQUATION

QMED	*3.412*	m^3/s
QBAR	3.555	m^3/s

7.0 FSU - 7 VARIABLE EQUATION

$QMED_{RURAL}$	6.828	m^3/s
QMED	6.828	m^3/s
QBAR	7.112	m^3/s

8.0 ADAS

Q 75 year	28.721	m^3/s

Stream Length (km)	10%	85%	DS Level (m)	US Level (m)	Slope (m/km)
4.9	0.4940282	4.1992397	245	644	107.686

Calculation of Flow Estimation

Method	QBAR/QMED	FSE	$QBAR_{FSE}$ (68% C.I.)	Growth Factor Q1000	1000 Year Flow(68% C.I)	OPW maintenance factor (No maintained = 1, Maintained =1.6) does not apply for FSU Methods.	1000 Year Flow(68% C.I) + Maintenance factor	FSU Adjustment Factor (only applicable to 7 Variables Equation) - Source: FSW web protal	1000 Year Flow(68% C.I) + Maintenance factor +Adjusted factor	Climate Change	Design Flow (68% C.I.) (m3/s)
IoH 124	6.482 m3/s	1.65	10.695 m3/s	2.6	27.808	1.0	27.808	N/A	27.808	1.2	**33.37 m3/s**
FSU 3-Variable Method	3.555 m3/s	2.05	7.287 m3/s	2.42	17.634	1.0	17.634	N/A	17.634	1.2	**21.16 m3/s**
FSU - 7 Variable Equation	7.112 m3/s	1.37	9.744 m3/s	2.42	23.580	1.0	23.580	1.000	23.580	1.2	**28.30 m3/s**

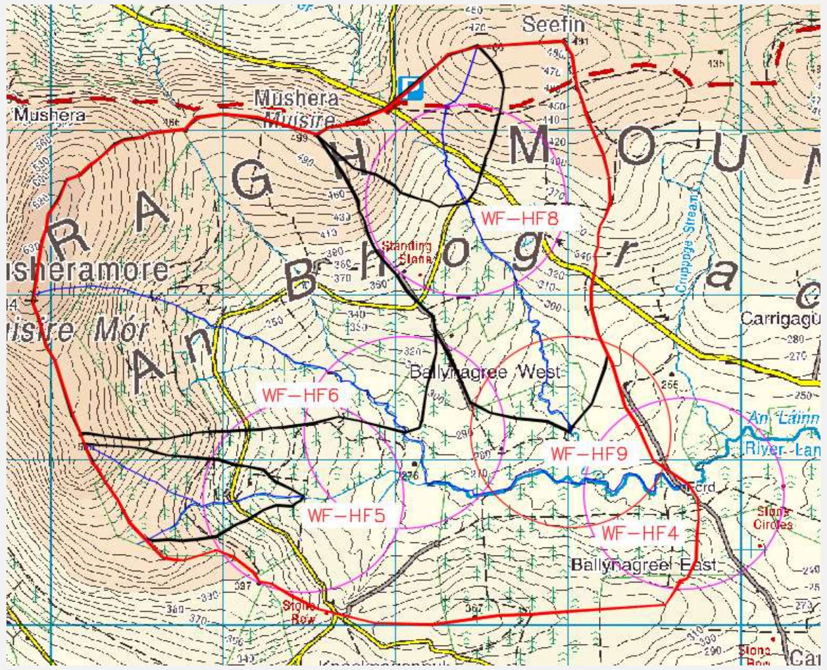
QMED = 0.96QBAR as per "Flood Estimation in Small and Urbanised Catchments in Ireland" by the OPW

This catchment is ungauged and there was no subject site created on the watercourse, hence the following values were utilised:

Flood Estimation in Small and Urbanised Catchments in Ireland

* Value taken from adjacent FSU catchment location 19_916_3

CAD Catchement



Project	P23-129 Ballinagree		
Subject	Calculation of Flow Estimation Watercrossing - WF-HF6		
Prepared by:	RM	Job No	P23-129
Checked by:	PD	Date	17/07/2023
Approved by:	PD	Revision	P01

1.0 PHYSICAL CATCHMENT DESCRIPTORS (PCD'S):

1.1 Hydrological PCD's

S1085 - Mainstream Slope	190.718	m/km

1.2 Spatial PCD's

AREA - Catchment Area	3.55	km^2
SAAR - Standard Annual Average Rainfall	1599.74	mm
FARL - Flood Attenuation by Rivers and Lakes	1	-

1.3 Spatial PCD's Representing Soil, Subsoil & Aquifer Types

BFI_{SOIL}	0.5811	-
URBEXT	0	-
SOIL	0.405	-
DRAIND	1.236	km/km^2
ARTDRAIN2	0	-

1.4 Catchment characteristics

Width	2544.77	m
Height	364	m
Time of Concentration	7.6	

3.0 INSTITUTE OF HYDROLOGY REPORT 124 (IoH 124)

$QBAR_{RURAL}$	**2.631**	**m^3/s**

5.0 FSU - 3 VARIABLES EQUATION

QMED	*1.500*	*m^3/s*
QBAR	**1.563**	**m^3/s**

7.0 FSU - 7 VARIABLE EQUATION

$QMED_{RURAL}$	*2.904*	*m^3/s*
QMED	*2.904*	*m^3/s*
QBAR	**3.025**	**m^3/s**

8.0 ADAS

Q 75 year	*14.703*	*m^3/s*

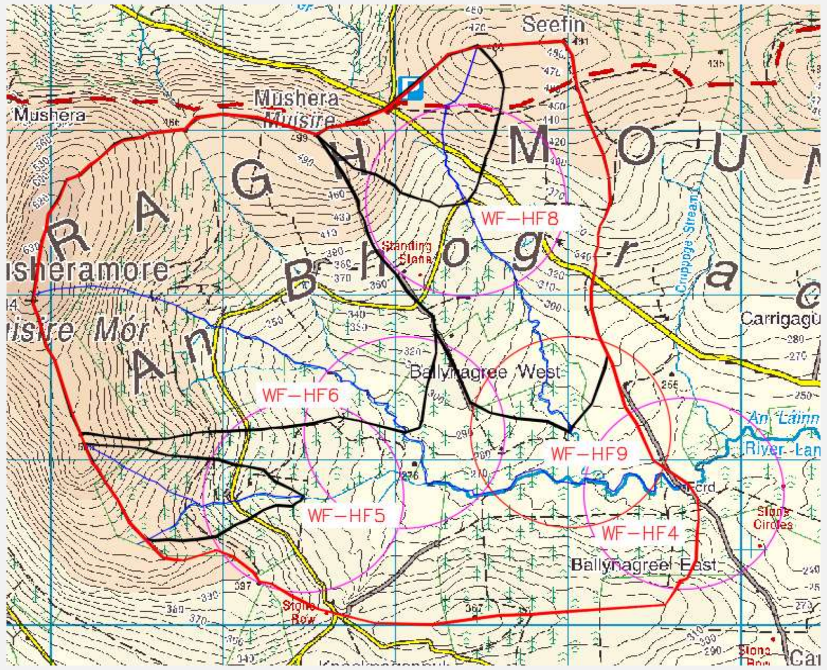
Stream Length (km)	10%	85%	DS Level (m)	US Level (m)	Slope (m/km)
2.5	0.2544768	2.1630528	280	644	190.718

Calculation of Flow Estimation

Method	QBAR/QMED	FSE	$QBAR_{FSE}$ (68% C.I.)	Growth Factor Q100	100 Year Flow(68% C.I)	OPW maintenance factor (No maintained = 1, Maintained =1.6) does not apply for FSU Methods.	100 Year Flow(68% C.I) + Maintenance factor	FSU Adjustment Factor (only applicable to 7 Variables Equation) - Source: FSW web protal	100 Year Flow(68% C.I) + Maintenance factor +Adjusted factor	Climate Change	Design Flow (68% C.I.) (m3/s)
IoH 124	2.631 m3/s	1.65	4.340 m3/s	1.96	8.507	1.0	8.507	N/A	8.507	1.2	**10.21 m3/s**
FSU 3-Variable Method	1.563 m3/s	2.05	3.204 m3/s	1.96	6.280	1.0	6.280	N/A	6.280	1.2	**7.54 m3/s**
FSU - 7 Variable Equation	3.025 m3/s	1.37	4.145 m3/s	1.92	7.958	1.0	7.958	1.000	7.958	1.2	**9.55 m3/s**

QMED = 0.96QBAR as per "Flood Estimation in Small and Urbanised Catchments in Ireland" by the OPW
This catchment is ungauged and there was no subject site created on the watercourse, hence the following values were utilised:
Flood Estimation in Small and Urbanised Catchments in Ireland
* Value taken from adjacent FSU catchment location 19_916_3

CAD Catchement



Project	**P23-129 Ballinagree**		
Subject	**Calculation of Flow Estimation**		
	Watercrossing - WF-HF6		
Prepared by:	RM	Job No	P23-129
Checked by:	PD	Date	17/07/2023
Approved by:	PD	Revision	P01

1.0 PHYSICAL CATCHMENT DESCRIPTORS (PCD'S):

1.1 Hydrological PCD's

S1085 - Mainstream Slope	190.718	m/km

1.2 Spatial PCD's

AREA - Catchment Area	3.55	km^2
SAAR - Standard Annual Average Rainfall	1599.74	mm
FARL - Flood Attenuation by Rivers and Lakes	1	-

1.3 Spatial PCD's Representing Soil, Subsoil & Aquifer Types

BFI_{SOIL}	0.5811	-
URBEXT	0	-
SOIL	0.405	-
DRAIND	1.236	km/km^2
ARTDRAIN2	0	-

1.4 Catchment characteristics

Width	2544.77	m
Height	364	m
Time of Concentration	7.6	

3.0 INSTITUTE OF HYDROLOGY REPORT 124 (IoH 124)

$QBAR_{RURAL}$	**2.631**	**m^3/s**

5.0 FSU - 3 VARIABLES EQUATION

QMED	*1.500*	*m^3/s*
QBAR	**1.563**	**m^3/s**

7.0 FSU - 7 VARIABLE EQUATION

$QMED_{RURAL}$	*2.904*	*m^3/s*
QMED	*2.904*	*m^3/s*
QBAR	**3.025**	**m^3/s**

8.0 ADAS

Q 75 year	*14.703*	*m^3/s*

Stream Length (km)	10%	85%	DS Level (m)	US Level (m)	Slope (m/km)
2.5	0.2544768	2.1630528	280	644	190.718

Calculation of Flow Estimation

Method	QBAR/QMED	FSE	$QBAR_{FSE}$ (68% C.I.)	Growth Factor Q1000	1000 Year Flow(68% C.I)	OPW maintenance factor (No maintained = 1, Maintained =1.6) does not apply for FSU Methods.	1000 Year Flow(68% C.I) + Maintenance factor	FSU Adjustment Factor (only applicable to 7 Variables Equation) - Source: FSW web protal	1000 Year Flow(68% C.I) + Maintenance factor +Adjusted factor	Climate Change	Design Flow (68% C.I.) (m3/s)
IoH 124	2.631 m3/s	1.65	4.340 m3/s	2.6	11.285	1.0	11.285	N/A	11.285	1.2	**13.54 m3/s**
FSU 3-Variable Method	1.563 m3/s	2.05	3.204 m3/s	2.42	7.754	1.0	7.754	N/A	7.754	1.2	**9.30 m3/s**
FSU - 7 Variable Equation	3.025 m3/s	1.37	4.145 m3/s	2.42	10.030	1.0	10.030	1.000	10.030	1.2	**12.04 m3/s**

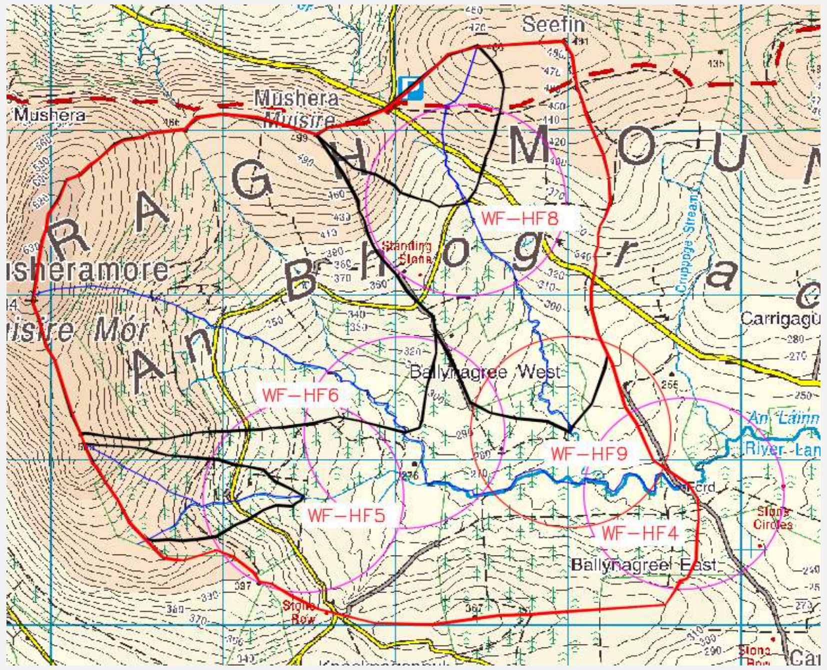
QMED = 0.96QBAR as per "Flood Estimation in Small and Urbanised Catchments in Ireland" by the OPW

This catchment is ungauged and there was no subject site created on the watercourse, hence the following values were utilised:

Flood Estimation in Small and Urbanised Catchments in Ireland

* Value taken from adjacent FSU catchment location 19_916_3

CAD Catchement



Project	P23-129 Ballinagree		
Subject	Calculation of Flow Estimation Watercrossing - WF-HF8		
Prepared by:	RM	Job No	P23-129
Checked by:	PD	Date	17/07/2023
Approved by:	PD	Revision	P01

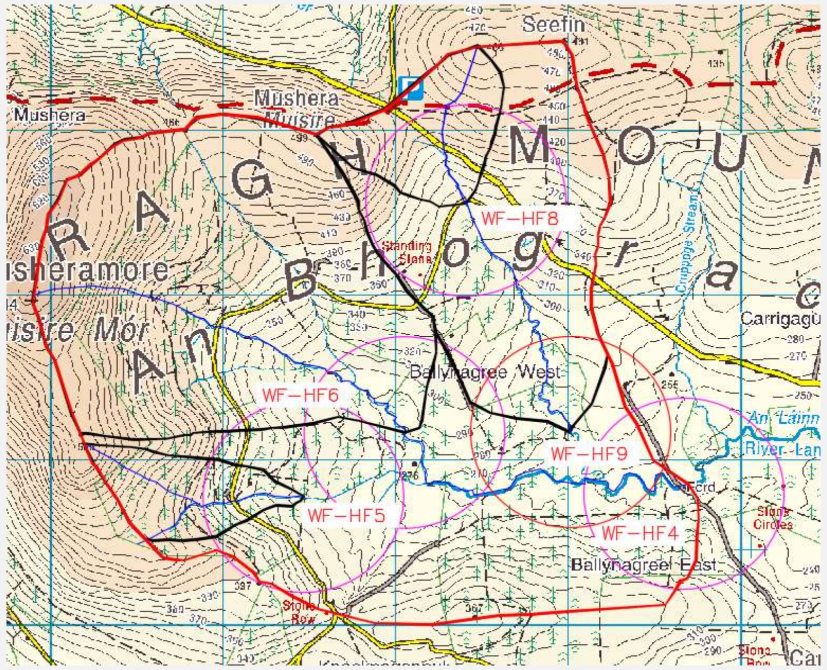
Stream Length (km)	10%	85%	DS Level (m)	US Level (m)	Slope (m/km)
1.1	0.1062127	0.90280795	350	480	163.195

Calculation of Flow Estimation

Method	QBAR/QMED	FSE	$QBAR_{FSE}$ (68% C.I.)	Growth Factor Q100	100 Year Flow(68% C.I)	OPW maintenance factor (No maintained = 1, Maintained =1.6) does not apply for FSU Methods.	100 Year Flow(68% C.I) + Maintenance factor	FSU Adjustment Factor (only applicable to 7 Variables Equation) - Source: FSW web protal	100 Year Flow(68% C.I) + Maintenance factor +Adjusted factor	Climate Change	Design Flow (68% C.I.) (m3/s)
IoH 124	0.516 m3/s	1.65	0.851 m3/s	1.96	1.669	1.0	1.669	N/A	1.669	1.2	**2.00 m3/s**
FSU 3-Variable Method	0.505 m3/s	1.65	0.833 m3/s	1.96	1.634	1.0	1.634	N/A	1.634	1.2	**1.96 m3/s**
FSU - 7 Variable Equation	0.631 m3/s	1.37	0.864 m3/s	1.92	1.660	1.0	1.660	1.000	1.660	1.2	**1.99 m3/s**

QMED = 0.96QBAR as per "Flood Estimation in Small and Urbanised Catchments in Ireland" by the OPW
This catchment is ungauged and there was no subject site created on the watercourse, hence the following values were utilised:
Flood Estimation in Small and Urbanised Catchments in Ireland
* Value taken from adjacent FSU catchment location 19_916_3

CAD Catchement



1.0 PHYSICAL CATCHMENT DESCRIPTORS (PCD'S):

1.1 Hydrological PCD's

S1085 - Mainstream Slope	163.195	m/km

1.2 Spatial PCD's

AREA - Catchment Area	0.58	km^2
SAAR - Standard Annual Average Rainfall	1571.2	mm
FARL - Flood Attenuation by Rivers and Lakes	1	-

1.3 Spatial PCD's Representing Soil, Subsoil & Aquifer Types

BFI_{SOIL}	0.4527	-
URBEXT	0	-
SOIL	0.405	-
DRAIND	1.059	km/km^2
ARTDRAIN2	0	-

1.4 Catchment characteristics

Width	1062	m
Height	130	m
Time of Concentration	5.8	

3.0 INSTITUTE OF HYDROLOGY REPORT 124 (IoH 124)

$QBAR_{RURAL}$ **0.516** m^3/s

5.0 FSU - 3 VARIABLES EQUATION

QMED *0.485* m^3/s

QBAR **0.505** m^3/s

7.0 FSU - 7 VARIABLE EQUATION

$QMED_{RURAL}$ *0.606* m^3/s

QMED *0.606* m^3/s

QBAR **0.631** m^3/s

8.0 ADAS

Q 75 year *2.864* m^3/s

Project	P23-129 Ballinagree		
Subject	Calculation of Flow Estimation Watercrossing - WF-HF8		
Prepared by:	RM	Job No	P23-129
Checked by:	PD	Date	17/07/2023
Approved by:	PD	Revision	P01

1.0 PHYSICAL CATCHMENT DESCRIPTORS (PCD'S):

1.1 Hydrological PCD's

S1085 - Mainstream Slope	163.195	m/km

1.2 Spatial PCD's

AREA - Catchment Area	0.58	km^2
SAAR - Standard Annual Average Rainfall	1571.2	mm
FARL - Flood Attenuation by Rivers and Lakes	1	-

1.3 Spatial PCD's Representing Soil, Subsoil & Aquifer Types

BFI_{SOIL}	0.4527	-
URBEXT	0	-
SOIL	0.405	-
DRAIND	1.059	km/km^2
ARTDRAIN2	0	-

1.4 Catchment characteristics

Width	1062	m
Height	130	m
Time of Concentration	5.8	

3.0 INSTITUTE OF HYDROLOGY REPORT 124 (IoH 124)

$QBAR_{RURAL}$	**0.516**	m^3/s

5.0 FSU - 3 VARIABLES EQUATION

QMED	*0.485*	m^3/s
QBAR	**0.505**	m^3/s

7.0 FSU - 7 VARIABLE EQUATION

$QMED_{RURAL}$	*0.606*	m^3/s
QMED	*0.606*	m^3/s
QBAR	**0.631**	m^3/s

8.0 ADAS

Q 75 year	*2.864*	m^3/s

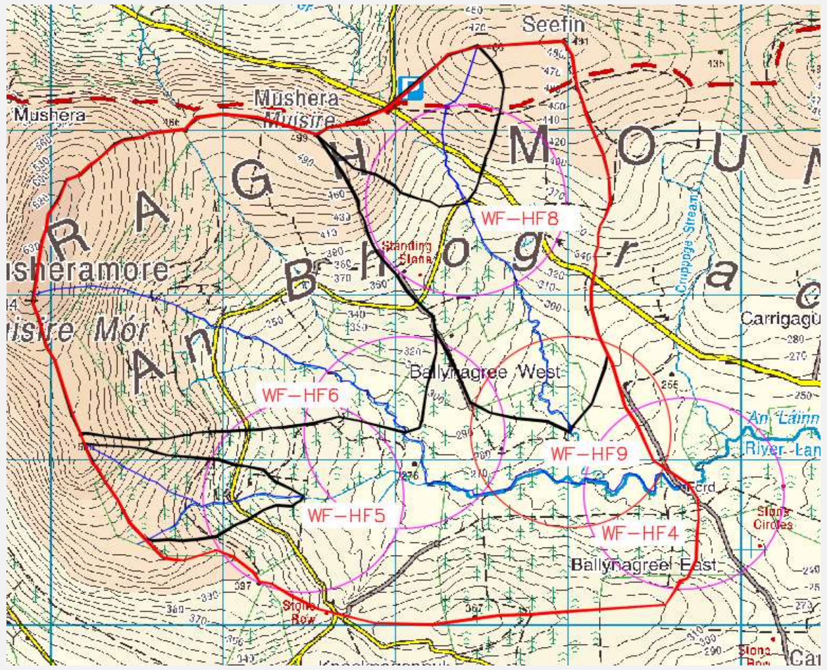
Stream Length (km)	10%	85%	DS Level (m)	US Level (m)	Slope (m/km)
1.1	0.1062127	0.90280795	350	480	163.195

Calculation of Flow Estimation

Method	QBAR/QMED	FSE	$QBAR_{FSE}$ (68% C.I.)	Growth Factor Q1000	1000 Year Flow(68% C.I)	OPW maintenance factor (No maintained = 1, Maintained =1.6) does not apply for FSU Methods.	1000 Year Flow(68% C.I) + Maintenance factor	FSU Adjustment Factor (only applicable to 7 Variables Equation) - Source: FSW web protal	1000 Year Flow(68% C.I) + Maintenance factor +Adjusted factor	Climate Change	Design Flow (68% C.I.) (m3/s)
IoH 124	0.516 m3/s	1.65	0.851 m3/s	2.6	2.214	1.0	2.214	N/A	2.214	1.2	**2.66 m3/s**
FSU 3-Variable Method	0.505 m3/s	1.65	0.833 m3/s	2.42	2.017	1.0	2.017	N/A	2.017	1.2	**2.42 m3/s**
FSU - 7 Variable Equation	0.631 m3/s	1.37	0.864 m3/s	2.42	2.092	1.0	2.092	1.000	2.092	1.2	**2.51 m3/s**

QMED = 0.96QBAR as per "Flood Estimation in Small and Urbanised Catchments in Ireland" by the OPW
This catchment is ungauged and there was no subject site created on the watercourse, hence the following values were utilised:
Flood Estimation in Small and Urbanised Catchments in Ireland
* Value taken from adjacent FSU catchment location 19_916_3

CAD Catchement



Project	P23-129 Ballinagree		
Subject	Calculation of Flow Estimation Watercrossing - WF-HF9		
Prepared by:	RM	Job No	P23-129
Checked by:	PD	Date	17/07/2023
Approved by:	PD	Revision	P01

1.0 PHYSICAL CATCHMENT DESCRIPTORS (PCD'S):

1.1 Hydrological PCD's

S1085 - Mainstream Slope	103.054	m/km

1.2 Spatial PCD's

AREA - Catchment Area	2.55	km^2
SAAR - Standard Annual Average Rainfall	1586.04	mm
FARL - Flood Attenuation by Rivers and Lakes	1	-

1.3 Spatial PCD's Representing Soil, Subsoil & Aquifer Types

BFI_{SOIL}	0.5815	-
URBEXT	0	-
SOIL	0.405	-
DRAIND	1.238	km/km^2
ARTDRAIN2	0	-

1.4 Catchment characteristics

Width	2864	m
Height	220	m
Time of Concentration	10.2	

3.0 INSTITUTE OF HYDROLOGY REPORT 124 (IoH 124)

$QBAR_{RURAL}$	**1.940**	**m^3/s**

5.0 FSU - 3 VARIABLES EQUATION

QMED	*1.130*	*m^3/s*
QBAR	**1.178**	**m^3/s**

7.0 FSU - 7 VARIABLE EQUATION

$QMED_{RURAL}$	*1.879*	*m^3/s*
QMED	*1.879*	*m^3/s*
QBAR	**1.958**	**m^3/s**

8.0 ADAS

Q 75 year	*8.479*	*m^3/s*

Stream Length (km)	10%	85%	DS Level (m)	US Level (m)	Slope (m/km)
2.8	0.2846393	2.41943405	260	480	103.054

Calculation of Flow Estimation

Method	QBAR/QMED	FSE	$QBAR_{FSE}$ (68% C.I.)	Growth Factor Q100	100 Year Flow(68% C.I)	OPW maintenance factor (No maintained = 1, Maintained =1.6) does not apply for FSU Methods.	100 Year Flow(68% C.I) + Maintenance factor	FSU Adjustment Factor (only applicable to 7 Variables Equation) - Source: FSW web protal	100 Year Flow(68% C.I) + Maintenance factor +Adjusted factor	Climate Change	Design Flow (68% C.I.) (m3/s)
IoH 124	1.940 m3/s	1.65	3.201 m3/s	1.96	6.274	1.0	6.274	N/A	6.274	1.2	**7.53 m3/s**
FSU 3-Variable Method	1.178 m3/s	2.05	2.414 m3/s	1.96	4.732	1.0	4.732	N/A	4.732	1.2	**5.68 m3/s**
FSU - 7 Variable Equation	1.958 m3/s	1.37	2.682 m3/s	1.92	5.150	1.0	5.150	1.000	5.150	1.2	**6.18 m3/s**

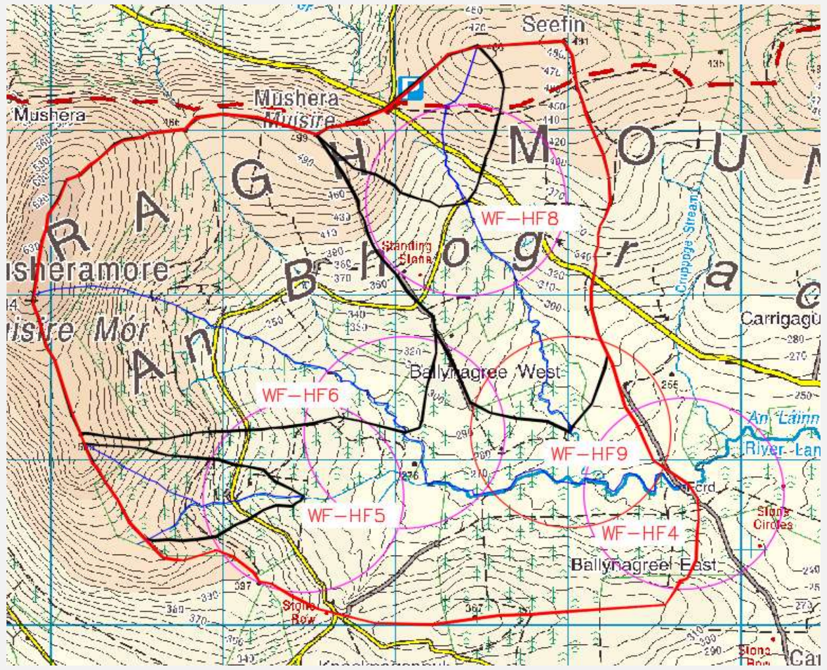
QMED = 0.96QBAR as per "Flood Estimation in Small and Urbanised Catchments in Ireland" by the OPW

This catchment is ungauged and there was no subject site created on the watercourse, hence the following values were utilised:

Flood Estimation in Small and Urbanised Catchments in Ireland

* Value taken from adjacent FSU catchment location 19_916_3

CAD Catchement



Project	P23-129 Ballinagree		
Subject	Calculation of Flow Estimation Watercrossing - WF-HF9		
Prepared by:	RM	Job No	P23-129
Checked by:	PD	Date	17/07/2023
Approved by:	PD	Revision	P01

1.0 PHYSICAL CATCHMENT DESCRIPTORS (PCD'S):

1.1 Hydrological PCD's

S1085 - Mainstream Slope	103.054	m/km

1.2 Spatial PCD's

AREA - Catchment Area	2.55	km^2
SAAR - Standard Annual Average Rainfall	1586.04	mm
FARL - Flood Attenuation by Rivers and Lakes	1	-

1.3 Spatial PCD's Representing Soil, Subsoil & Aquifer Types

BFI_{SOIL}	0.5815	-
URBEXT	0	-
SOIL	0.405	-
DRAIND	1.238	km/km^2
ARTDRAIN2	0	-

1.4 Catchment characteristics

Width	2864	m
Height	220	m
Time of Concentration	10.2	

3.0 INSTITUTE OF HYDROLOGY REPORT 124 (IoH 124)

$QBAR_{RURAL}$	**1.940**	**m^3/s**

5.0 FSU - 3 VARIABLES EQUATION

QMED	*1.130*	*m^3/s*
QBAR	**1.178**	**m^3/s**

7.0 FSU - 7 VARIABLE EQUATION

$QMED_{RURAL}$	*1.879*	*m^3/s*
QMED	*1.879*	*m^3/s*
QBAR	**1.958**	**m^3/s**

8.0 ADAS

Q 75 year	*8.479*	*m^3/s*

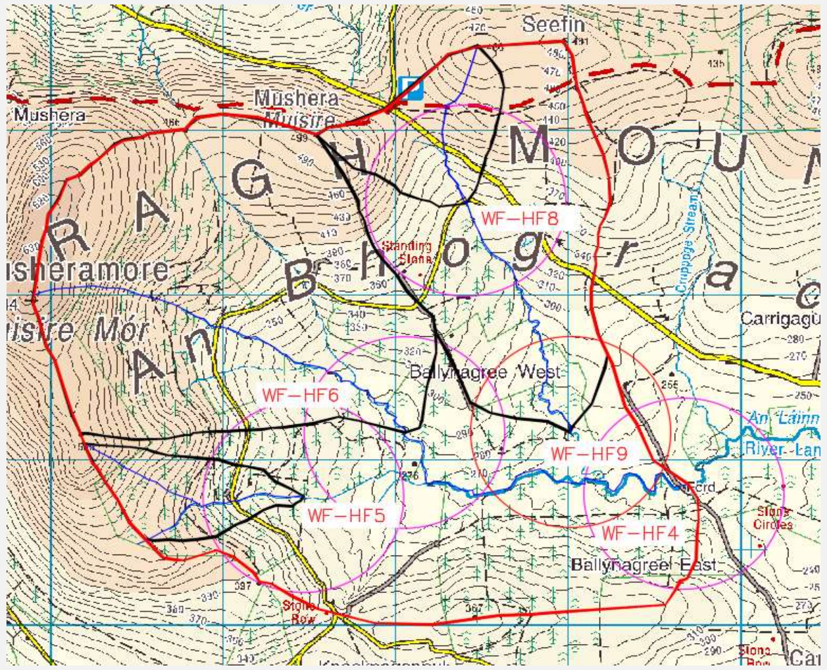
Stream Length (km)	10%	85%	DS Level (m)	US Level (m)	Slope (m/km)
2.8	0.2846393	2.41943405	260	480	103.054

Calculation of Flow Estimation

Method	QBAR/QMED	FSE	$QBAR_{FSE}$ (68% C.I.)	Growth Factor Q100	100 Year Flow(68% C.I)	OPW maintenance factor (No maintained = 1, Maintained =1.6) does not apply for FSU Methods.	100 Year Flow(68% C.I) + Maintenance factor	FSU Adjustment Factor (only applicable to 7 Variables Equation) - Source: FSW web protal	100 Year Flow(68% C.I) + Maintenance factor +Adjusted factor	Climate Change	Design Flow (68% C.I.) (m3/s)
IoH 124	1.940 m3/s	1.65	3.201 m3/s	2.6	8.322	1.0	8.322	N/A	8.322	1.2	**9.99 m3/s**
FSU 3-Variable Method	1.178 m3/s	2.05	2.414 m3/s	2.42	5.842	1.0	5.842	N/A	5.842	1.2	**7.01 m3/s**
FSU - 7 Variable Equation	1.958 m3/s	1.37	2.682 m3/s	2.42	6.491	1.0	6.491	1.000	6.491	1.2	**7.79 m3/s**

QMED = 0.96QBAR as per "Flood Estimation in Small and Urbanised Catchments in Ireland" by the OPW
This catchment is ungauged and there was no subject site created on the watercourse, hence the following values were utilised:
Flood Estimation in Small and Urbanised Catchments in Ireland
* Value taken from adjacent FSU catchment location 19_916_3

CAD Catchement



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APPENDIX 5

HYDRAULIC ANALYSIS

Water Level Comparison - Existing Vs. Proposed Scenario Structure HW-HF4 100-year storm event

Cross Section / Chainages	Location	Water Surface Elevation (Existing) (m)	Water Surface Elevation (Proposed) (m)	Difference of Water Surface Elevation (Proposed - Existing) (m)
60	Upstream	243.57	243.71	0.14
50	Upstream	243.49	243.66	0.17
39.97	Upstream	243.42	243.61	0.19
32.52	Upstream	243.37	243.54	0.17
28.75	Proposed Culvert	Proposed Bridge	Proposed Bridge	Proposed Bridge
17.52	Upstream	243.3	243.34	0.04
10	Upstream	243.25	243.25	0
0.14	Upstream	243.15	243.15	0

Water Level Comparison - Existing Vs. Proposed Structure HW-HF4 1000-year storm event

Cross Section / Chainages	Location	Water Surface Elevation (Existing) (m)	Water Surface Elevation (Proposed) (m)	Difference of Water Surface Elevation (Proposed - Existing) (m)
60	Upstream	243.78	244.04	0.26
50	Upstream	243.7	244	0.3
39.97	Upstream	243.63	243.96	0.33
32.52	Upstream	243.58	243.89	0.31
28.75	Proposed Bridge	Proposed Bridge	Proposed Bridge	Proposed Bridge
17.52	Upstream	243.44	243.54	0.1
10	Upstream	243.44	243.44	0
0.14	Upstream	243.34	243.34	0

Water Level Comparison - Existing Vs. Proposed Structure HW-HF6 100-year storm event

Cross Section / Chainages	Location	Water Surface Elevation (Existing) (m)	Water Surface Elevation (Proposed) (m)	Difference of Water Surface Elevation (Proposed - Existing) (m)
26.85	Upstream	281.83	281.94	0.11
22.5	Upstream	281.78	281.91	0.13
15	Proposed Culvert	Proposed Culvert	Proposed Culvert	Proposed Culvert
7.5	Downstream	281.44	281.44	0
0	Downstream	281.32	281.32	0

Water Level Comparison - Existing Vs. Proposed Structure HW-HF6 1000-year storm event

Cross Section / Chainages	Location	Water Surface Elevation (Existing) (m)	Water Surface Elevation (Proposed) (m)	Difference of Water Surface Elevation (Proposed - Existing) (m)
26.85	Upstream	281.97	282.25	0.28
22.5	Upstream	281.92	282.23	0.31
15	Proposed Culvert	Proposed Culvert	Proposed Culvert	Proposed Culvert
7.5	Downstream	281.6	281.6	0
0	Downstream	281.48	281.48	0

Water Level Comparison - Existing Vs. Proposed Structure HW-HF8 100-year storm event

Cross Section / Chainages	Location	Water Surface Elevation (Existing) (m)	Water Surface Elevation (Proposed) (m)	Difference of Water Surface Elevation (Proposed - Existing) (m)
58.37	Upstream	353.21	353.21	0
50	Upstream	352.67	352.67	0
40	Upstream	352.83	352.82	-0.01
35	Proposed Bridge	Proposed Bridge	Proposed Bridge	Proposed Bridge
30	Downstream	352.44	352.44	0
20	Downstream	350.42	350.42	0
10	Downstream	348.66	348.66	0
0	Downstream	347.61	347.61	0

Water Level Comparison - Existing Vs. Proposed Structure HW-HF8 1000-year storm event

Cross Section / Chainages	Location	Water Surface Elevation (Existing) (m)	Water Surface Elevation (Proposed) (m)	Difference of Water Surface Elevation (Proposed - Existing) (m)
58.37	Upstream	353.25	353.25	0.00
50	Upstream	352.74	352.74	0.00
40	Upstream	352.98	352.98	0.00
35	Proposed Bridge	Proposed Bridge	Proposed Bridge	Proposed Bridge
30	Upstream	352.65	352.65	0.00
20	Upstream	350.47	350.47	0.00
10	Upstream	348.68	348.68	0.00
0	Upstream	347.65	347.65	0.00

Water Level Comparison - Existing Vs. Proposed Structure HW-HF9 100-year storm event

Cross Section / Chainages	Location	Water Surface Elevation (Existing) (m)	Water Surface Elevation (Proposed) (m)	Difference of Water Surface Elevation (Proposed - Existing) (m)
24.99	Upstream	258.84	258.86	0.02
22.49	Upstream	258.7	258.74	0.04
15	Proposed Bridge	Proposed Bridge	Proposed Bridge	Proposed Bridge
7.5	Downstream	258.49	258.49	0
0	Downstream	257.97	257.97	0

Water Level Comparison - Existing Vs. Proposed Structure HW-HF9 1000-year storm event

Cross Section / Chainages	Location	Water Surface Elevation (Existing) (m)	Water Surface Elevation (Proposed) (m)	Difference of Water Surface Elevation (Proposed - Existing) (m)
24.99	Upstream	258.99	259.00	0.01
22.49	Upstream	258.82	258.86	0.04
15	Proposed Bridge	Proposed Bridge	Proposed Bridge	Proposed Bridge
7.5	Downstream	258.60	258.60	0
0	Downstream	258.03	258.03	0

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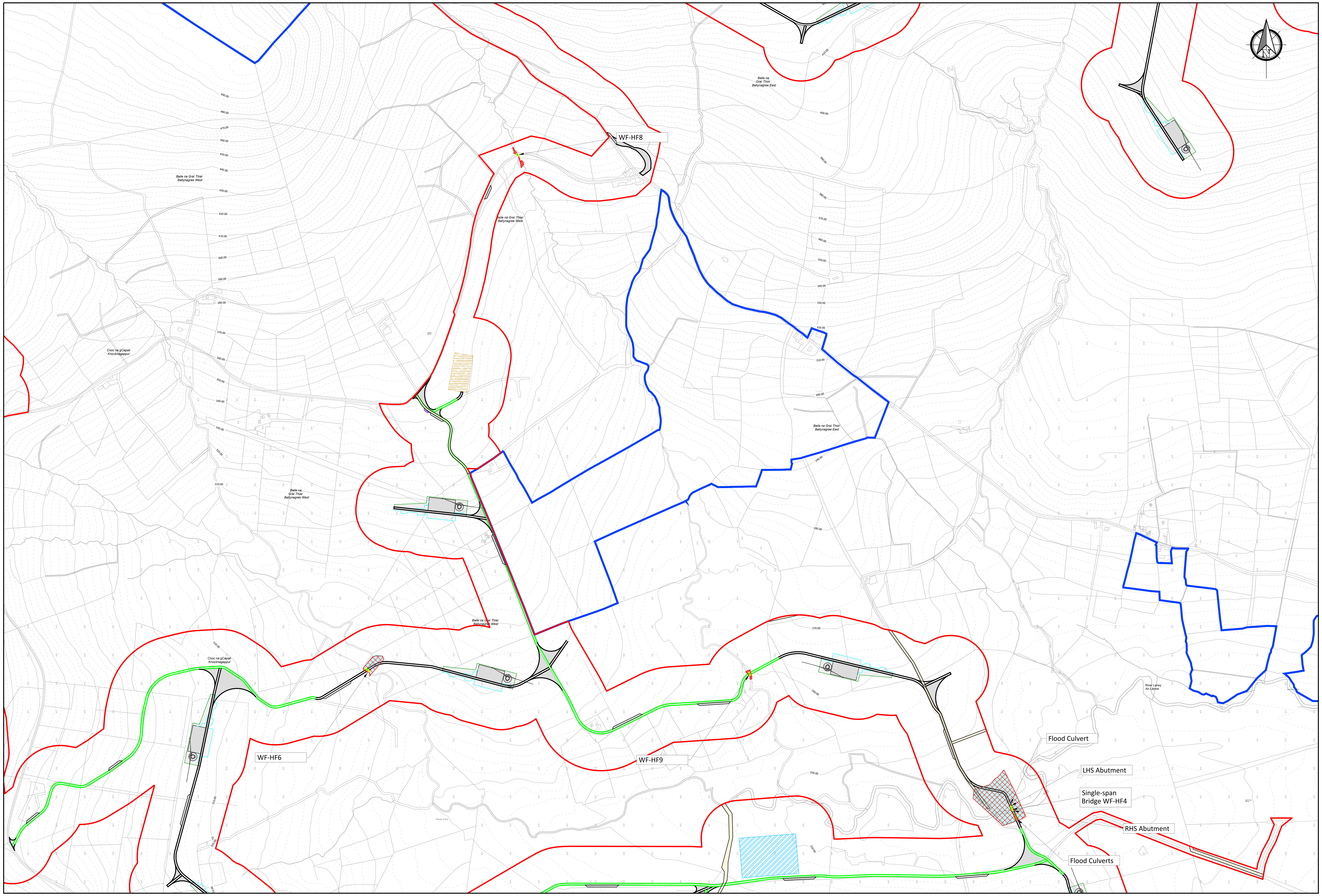
APPENDIX 6

FLOOD MAPS



Legend

- Planning Boundary
- Property Boundary
- Existing Scenario - 10yr Storm Event
- Existing Scenario - 10yr Storm Event
- Proposed Structure/Culvert
- Flood Culvert
- Flow Arrow

0m 50m 100m 150m 200m 250m 300m 350m 400m 450m 500m

Scale 1:5000

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www.fehilytimoney.ie

Rev.	Description	App By	Date
A	FURTHER INFORMATION	TB	04.08.23

PROJECT

BALLINAGREE WIND FARM - RFI

CLIENT

BALLINAGREE WIND DAC

SHEET

FLOOD MAPPING - 1:10yr FLOOD EVENT

Date 04.08.23

Project number P23-129

Scale (@ A1-) 1:5000

Drawn by NS

Checked by TB

Drawing Number P23-129-0100-0004

Rev A

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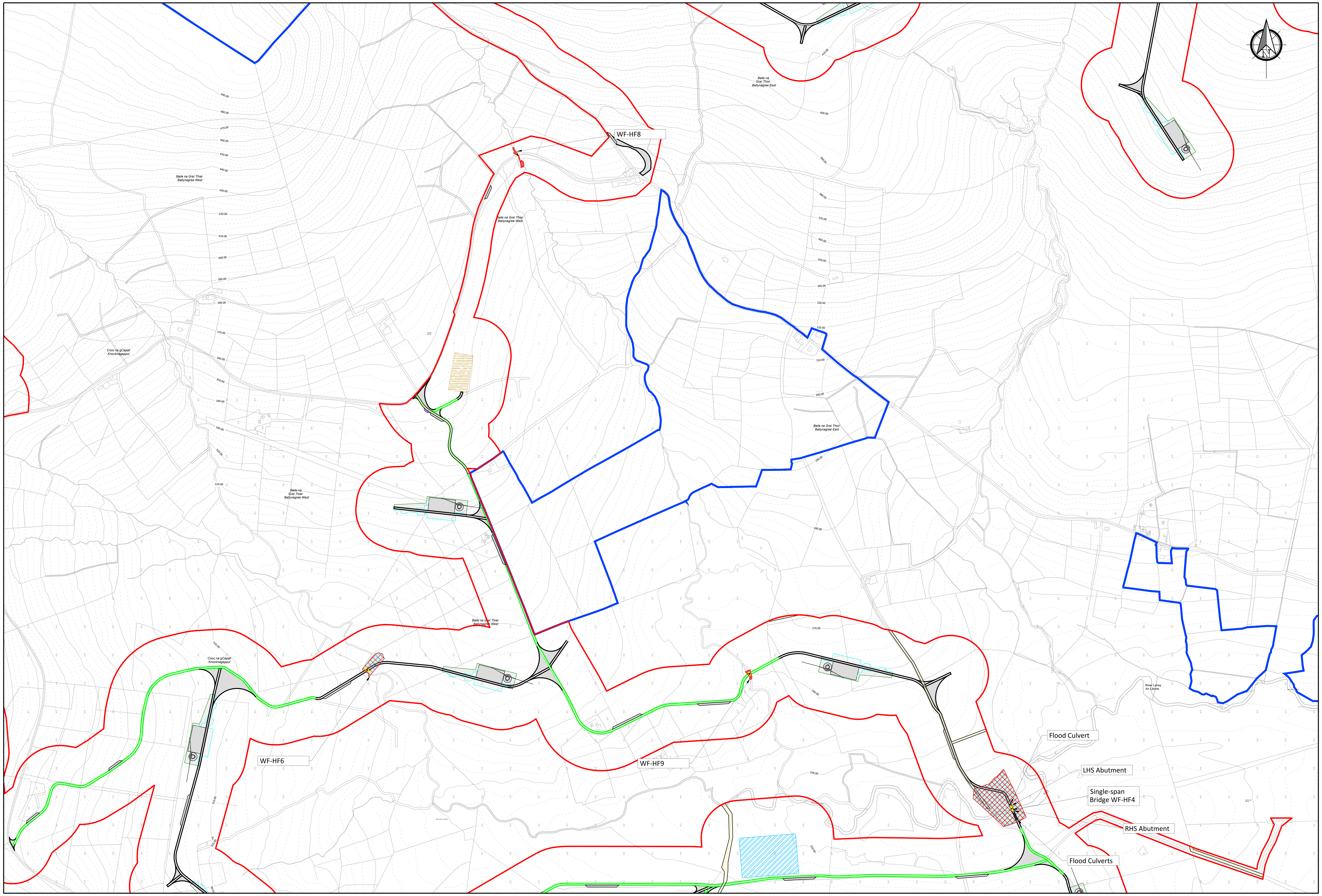
26 October 2023



Legend

- Planning Boundary
- Property Boundary
- Existing Scenario - 100yr Storm Event
- Existing Scenario - 100yr Storm Event
- Proposed Structure/Culvert
- Flood Culvert
- Flow Arrow

0m 50m 100m 150m 200m 250m 300m 350m 400m 450m 500m

Scale 1:5000

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Rev.	Description	App By	Date
A	FURTHER INFORMATION	TB	04.08.23

PROJECT	BALLINAGREE WIND FARM - RFI
CLIENT	BALLINAGREE WIND DAC
SHEET	FLOOD MAPPING - 1:100yr FLOOD EVENT
Date	04.08.23
Project number	P23-129
Scale (@ A1-)	1:5000
Drawn by	NS
Checked by	TB
Drawing Number	P23-129-0100-0005
Rev	A

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26 October 2023

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& PLANNING

APPENDIX 7

SITE PHOTOS

PHOTOGRAPHIC LOG	Consultants in Engineering, Environmental Science & Planning FEHILY TIMONEY

Client Name: Ballinagree Wind Farm DAC	**Site Location:** Ballinagree, Co. Cork	**Project Number:** P23-129

Hydrology feature: WF-HF4

Description:

Main Watercourse

Upstream View

Downstream View

PHOTOGRAPHIC LOG	Consultants in Engineering, Environmental Science & Planning FEHILY TIMONEY

Client Name: Ballinagree Wind Farm DAC	**Site Location:** Ballinagree, Co. Cork	**Project Number:** P23-129

Hydrology feature: WF-HF6

Description:

Watercourse

Upstream View

Downstream View

PHOTOGRAPHIC LOG	Consultants in Engineering, Environmental Science & Planning FEHILY TIMONEY	
Client Name: Ballinagree Wind Farm DAC	**Site Location:** Ballinagree, Co. Cork	**Project Number:** P23-129

Hydrology feature: WF-HF8

Description:

Watercourse

Upstream View

Downstream View

PHOTOGRAPHIC LOG	Consultants in Engineering, Environmental Science & Planning FEHILY TIMONEY	
Client Name: Ballinagree Wind Farm DAC	**Site Location:** Ballinagree, Co. Cork	**Project Number:** P23-129

Hydrology feature: WF-HF9

Description:

Watercourse

Upstream View

Downstream View

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 6

Ecology Ireland Response to Cork County Council Observations

Ballinagree Wind Farm

Further Information Request - Response

Ecological Issues raised in the Cork County Council Submission

Prepared by:

Ecology Ireland Wildlife Consultants Ltd.

ecologyireland

July 2023

Ballinagree Wind Farm

Further Information Request - Response

Ecological Issues raised in the Cork County Council Submission

Document Rev. No.	Details	Contributors	Date
1	For issue	KMK, TOD, GF	20.07.2023
2	Minor edits	KMK	20.07.2023

1. INTRODUCTION

Item 4 of the Request for Further Information received from An Bord Pleanála states:

You are requested to provide a detailed response to the matters raised in the submission made by Cork County Council. In particular, this should include a response to the list of items contained in Appendix B of said submission.

The Cork County Council (CCC) submission raises concerns over potential impact and effects on a number of species, particularly Hen Harrier *Circus cyaneus* and Golden Plover *Pluvialis apricaria*. To a lesser extent, in relation to bats and Badger *Meles meles*. It suggests that additional information is required to take into consideration a number of direct, indirect and cumulative impacts to complete both Appropriate Assessment (AA) and Environmental Impact Assessment of the proposed development. The submission requests that four of the turbines are omitted (T02, T03, T13 & T17) at a minimum to ensure the avoidance of impact on upland peatland habitats of biodiversity value.

Appendix A of the CCC submission sets out conditions that CCC wish to see applied by the Board in relation to the proposed development in the event planning is granted. Appendix B referred to in Item 4 of the RFI elaborates on items which CCC suggest requires further information. In addition, Appendix C of the CCC submission provides the Internal Report of the Ecology Office of CCC that informs the items raised in its Appendix B.

Appendix B is split into a number of ecological related points derived from the Internal Report of the Ecology Office of CCC (*i.e.* Appendix C). Point 1 is related to concerns regarding potential impacts and effects that the proposed windfarm development may have on populations of a number of species recorded at the site with particular reference to Hen Harrier and Golden Plover and to a lesser extent Bats and Badger within the locality and their ability to maintain viable populations. The concern in relation to potential direct, indirect and cumulative impacts upon Hen Harrier is associated with the contention that the project will lead to a reduction in prey availability. Appendix B is shown below.

We present in this response, further information to help clarify and address points raised in the CCC submission in relation to the potential impacts on species and habitats present in the area of the proposed development. We draw upon the information presented in the EIAR (particularly Chapter 8A) and associated appendices.

Appendix B of the CCC submission:

<u>Appendix B</u>

Suggested items of Further Information

1. The assessment of the proposal has identified concerns in relation to the potential impacts and effects that the proposed windfarm development will have on populations of a number of species recorded at the site with particular reference to Hen Harrier and Golden Plover and to a lesser extent Bats and Badger within the locality and their ability to maintain viable populations. It is considered that additional information is required which takes into consideration a number of direct, indirect, and cumulative impacts to complete both Appropriate Assessment and Environmental Impact Assessment of this proposal. The following information would be required:

- A more detailed assessment in respect of potential impact of loss of foraging habitat and a reduction in prey availability to breeding and wintering Hen Harrier in the area through direct, indirect, and cumulative effects. This should be informed by a foraging habitat analysis.
- A more detailed assessment in respect of collision risk analysis (for all avian species of conservation concern) and displacement of Hen Harrier given the known historic and current use of the site and surrounding landscape by both breeding and foraging Hen Harrier.
- A more detailed assessment in respect of potential loss (direct and indirect) of staging habitat for Golden Plover given what is proposed in-combination with the large concentration of existing wind turbines in an area.
- A more detailed assessment regarding the potential displacement of Golden Plover from migratory routes i.e. the barrier effect, and subsequent reduction in foraging and roosting time and additional energy expenditure from increased flight times etc.
- A detailed assessment in respect of avian species of conservation concern recorded at the site such as Kestrel from both a construction and operational standpoint.
- A more detailed assessment in respect of potential disturbance / displacement impacts on Hen Harrier, Golden Plover and other avian and faunal species which would be generated during the post construction phase by the proposed amenity trails.
- A revised impact assessment having regard to the core sustenance zone (CSZ) of bat species identified as occurring within the site and the potential impact of loss of habitat, reduction in prey abundance, collision risk and the potential for colony collapse. Cumulative impacts should also be addressed. The revised assessment should also confirm whether the mitigation measures proposed are sufficient to ensure the avoidance of significant effects on any potentially vulnerable species and their resting place. The mitigation measures should have cognisance to the resilience and conservation status of bat roosts.
- A revised impact assessment on the short to long term impacts on badger social group(s) recorded within the site and immediate vicinity of the site. This assessment should be informed by quantifying the loss of badger territory/habitat associated with each social group.

2. Furthermore, it is considered that layout should be revised to omit 4 no turbines (T2, T3, T13 & T17) at a minimum to ensure the avoidance of impacts on upland peatland habitats of biodiversity value. Additional turbines may need to be omitted on completion of impact assessment in relation to species such as Hen Harrier and Golden Plover.

2. Point 1 (Appendix B, CCC Submission)

2.1. Point 1 - First Bullet Point

A more detailed assessment in respect of potential impact of loss of foraging habitat and a reduction in prey availability to breeding and wintering Hen Harrier in the area through direct, indirect, and cumulative effects. This should be informed by a foraging habitat analysis.

Hen Harrier at the study site

Section 8A.3.3 of Chapter 8A of the EIAR describes in detail the results of the multi-year field surveys carried out to inform the ecological impact assessment. Figure 8A.11 and Figure 8A.12 clearly demonstrate the consistently low occurrence of Hen Harrier in the vicinity of the proposed Ballinagree Wind Farm development. Chapter 8A and associated appendices provide details on the observations of Hen Harrier seen within and in the vicinity of the study area and also in the wider hinterland area.

A large 'study area' which encompasses the much smaller development footprint was surveyed (see Figure 8A.1) and this demonstrated clearly that this was not an area which was regularly used by either foraging or commuting Hen Harriers. Over four successive breeding seasons the proportion of the observation time that Hen Harriers were present within the study area ranged from 0.2-1.3%. The proportion of time spent by Hen Harriers within the study area in the winter months ranged between 0.2-0.6% of the observation period across four winter seasons. This represents a consistently low pattern of occurrence of Hen Harriers within the study area. It should also be noted that this low rate of occurrence continued throughout the entire study period, even as the number of nesting pairs in the wider area (>2km from the wind farm study site) was known to have increased from 1-2 in 2017 to 5 pairs in 2020 (see Section 8A.3.3.2 of Chapter 8A of the EIAR).

Activity levels on site were low (see Table 8A.1) during all VP surveys and seasons and primarily related to foraging and commuting birds, which were typically observed at flight heights below rotor-swept height. No courtship/display behaviour was noted during the VP surveys and no nesting activity took place at the study area or within 2km of the study area boundary in any of the survey years (summer 2017 to winter 2020/21 inclusive). Hen Harrier activity was broadly distributed across the site, with no areas of high or focused activity noted.

It is highlighted in Section 8A.3.3 that while the number of vantage points used increased from six (in 2017 and 2018) to 10 in the 2019 and 2020 breeding seasons as a result in an expansion of the study area boundary, there was no increase recorded in relation to the number of observations of Hen Harrier flight-lines. Indeed, an overall decline in Hen Harrier activity on the site was in fact observed throughout the study period (see Table 8A.2 and Figure 8A.11). Again, it must be noted that this decrease in the proportion of time where Hen Harriers were noted in the study site, occurred during a period in marked upturn in the number of breeding pairs active in the wider local area. This we would argue is strong evidence of the low resource value of the development site for the species based on the best available evidence collected over multiple seasons of survey data.

It is not contested that Hen Harrier occur in the area and that they will on occasion occur within the wind farm site. However, the evidence from the intensive survey effort carried out to inform the EIAR has demonstrated that the development area does not appear to be an important foraging area, or on a regular commuting route for Hen Harriers. Similarly, no Hen Harrier nest site was located within 2km of the study area during the survey period of several years (summer 2017 to winter 2020/21 inclusive).

Foraging observations & foraging habitats at the study site

There is a suggestion that any assessment of the potential impacts upon Hen Harrier should include a more detailed assessment in respect of potential impact of loss of foraging habitat and a reduction in prey availability, to breeding and wintering Hen Harrier in the area through direct, indirect, and cumulative effects. This, CCC contend, should be informed by a foraging habitat analysis.

It is unclear, based on the findings presented in the EIAR what the concern in relation to potential loss of foraging habitat is, or potential reduction on prey availability on breeding or wintering Hen Harrier. The survey results have clearly demonstrated that even in the context of the 'study area', that the site is not an important area for foraging Hen Harrier, either in the breeding or winter seasons. There is no pattern in the available data to conclude that there are preferred, or important foraging areas for Hen Harrier close to any of the proposed wind farm infrastructure. It is acknowledged that turbines in areas of open habitat would appear to present more attractive foraging opportunities than turbines located in closed canopy forestry. However, the site overall was used very little by foraging Hen Harrier at any time of year across a prolonged period of survey observation.

As we highlight in Section 8A.6.2.3 of the EIAR, the wind farm footprint is dominated by conifer plantation (WD4) of mixed ages and rotations, as well as improved agricultural grassland (GA1), with 16 of the 20 proposed turbines and associated access tracks being located in these habitats and with approximately 11.8km of existing access tracks (habitat type: buildings and artificial surfaces BL3) being utilised and upgraded at the site. The proposed site substation, meteorological masts and construction compounds are also located in conifer plantation habitat. The habitats described are not suitable for foraging or breeding Hen Harrier, with perhaps the exception of young second rotation (pre-thicket) forestry that can be used by Hen Harrier, but which is limited in extent at the site. Hen Harriers in particular are unable to hunt effectively in closed canopy woodlands or agriculturally improved grassland habitats (Madders 2000; Arroyo *et al.* 2009) and although they are known to nest and forage within pre-thicket forestry, this habitat is sub-optimal in terms of prey availability (McCarthy *et al.* 2021) and nesting success (Carravaggi *et al.* 2019, Wilson *et al.* 2012) where forestry in general can harbour nest predators such as Pine Marten *Martes martes* (McCarthy *et al.*, 2021).

Wind farms: prey & habitat changes

The WindHarrier research programme at UCC investigated the breeding performance of Hen Harrier pairs in Ireland in relation to wind energy development, using three measures of breeding performance (nest success, fledged brood size and productivity) and no statistically significant relationships with distance to wind turbines were observed (Wilson *et al.* 2015). They also investigated the potential for impacts on prey density and availability and habitat. Areas with wind turbines tend to be subject to higher levels of noise (from higher wind speeds or from turbine operation). They suggest that Hen Harriers, which rely heavily on acoustic cues for locating prey (Rice, 1982), would have lower foraging success in these areas. Habitat selection by Hen Harriers is positively correlated with foraging success rates and they have been shown to actively select habitats where they experience the highest prey strike and capture rates (Madders, 2000). Therefore, it is likely that Hen Harriers will choose to spend less time actively foraging around operational turbines irrespective of subtle changes in prey density that may be associated with changes brought about by the construction and operation of the wind farm. Pearce-Higgins *et al.* (2009) suggested that foraging Hen Harriers might be displaced up to 250m around operational turbines.

Wilson *et al.* (2015) also stated that the direct loss of habitat caused by wind energy development is unlikely to significantly impact bird populations (Percival, 2005, Madders & Whitfield, 2006) but speculated that the indirect effects of reduced habitat quality, relating to reduced prey availability or hunting efficiency, which ultimately impact diet and breeding success, may be significant. Reduced breeding success is of greater concern for bird species with low reproductive rates, or those with already vulnerable or declining populations. This would include species such as Hen Harrier. It has been hypothesised that wind turbines may affect the breeding success of birds that are not displaced from areas close to wind turbines (Drewitt & Langston, 2006). However, there is little evidence to support this in the literature, with some recent studies reporting no observed effect of wind turbines on nesting success (Martínez-Abraín *et al.*, 2012, Hatchett *et al.*, 2013, Northrup & Wittemyer, 2013, Bennett *et al.*, 2014, Gillespie & Dinsmore, 2014, Wilson *et al.* 2017).

In Ireland, small mammals, birds, reptiles and amphibians are all included in the diet of Hen Harriers during the breeding season. However, bird species, including Meadow Pipit and Skylark, make up a significant part of the diet of Hen Harriers and impacts of wind energy development on breeding birds may have knock-on effects on Hen Harriers whose populations are reliant on the availability of suitable prey (Wilson *et al.* 2015). Fernández-Bellon *et al.* (2019) showed that densities of woodland bird species were lower up to 100m from constructed turbines. There was evidence that negative impacts on densities of open-habitat bird species operate at a larger scale. There has been a number of other published reviews of the impact of construction and operation of wind farms on bird population densities. Pearce-Higgins *et al.* (2012) drew attention to the lack of evidence for consistent post-construction population declines in any species, suggesting for the first time that wind farm construction may have greater impacts upon birds than wind farm operation.

Bird prey species at the study site

We have assessed the locally occurring bird population using standard recommended survey methodology (*e.g.* SNH 2017). We presented the results of the general breeding and winter bird survey transects and point counts in Table 8A.9 and Table 8A.11. The potential for impacts on the diversity and density of locally occurring birds, including species such as Skylark and Meadow Pipit was assessed. In Section 8A.6.2.3 we highlight that it is not expected that there will be any significant reduction of breeding species diversity within the proposed development site as a result of the clearance and construction activities within the conifer plantation. We also point out that the introduction of open spaces or 'edge-effect' into a previously closed canopy plantation can in fact increase the abundance of some species and could benefit the overall species diversity of the forest (Fuller 2003). The clearance of ecological corridors through areas of mature plantation will also serve to increase the areas available for 'open habitat' specialist species including birds such as Meadow Pipit and Skylark.

Foraging distances

The potential loss, or degradation of potential foraging habitat at the wind farm site, even in the absence of current usage by foraging Hen Harrier, was also considered. We reviewed what is known about foraging distances of Hen Harrier in Ireland, especially in the context of the location of nest sites in the wider hinterland of the proposed development site.

In Appendix C of the CCC submission there are statements on the typical foraging distances of Hen Harriers from their nest sites. Studies of foraging distances based on tagged birds have been published in Ireland and in the UK (*e.g.* Irwin *et al.* 2012; Arroyo *et al.* 2014). The sample sizes tend to be extremely low and authors have acknowledged that the distances travelled by tagged birds to forage are likely to be heavily influenced by the prey availability and nature of the habitat around the nest site. Nevertheless, these surveys have consistently reported that for females, the vast majority of the foraging effort is well within 2km from the nest site. Males appear to be somewhat less constrained in their foraging range, but they too carry out the bulk of their foraging close to the nest site. What is sometimes quoted as a male foraging range of (say) up to 10km is a misrepresentation of these data. It is not representative to describe an isolated record of a single foraging trip at this distance as a tendency. In the Scottish study (with ten tagged pairs) a male was recorded foraging up to 8.5km from a nest site but the overwhelming majority of foraging trips were within 3km of the nest site. From a very small sample of tagged birds in the heavily forested Ballyhouras (Irwin *et al.* 2012) the bulk of foraging trips made by both sexes (89%) were within 5km of the nest sites.

From our data, only one active nest site was located just over 2km from the study area boundary with others in the 4-5km range. It is clear that the bulk of foraging occurs close to the nest sites, but it is acknowledged that a small proportion of foraging may occur at greater distances (>2km) from nest sites, particularly by male birds. While there are areas of habitat present within the development which we perceive as suitable for foraging Hen Harrier, the intensive field surveys have shown that Hen Harriers, even after the resurgence in their local breeding numbers, did not forage at this site with any regularity. We therefore do not agree that a 'notional' change in the prey availability in an area, one clearly not preferred by Hen Harrier, can logically be used to claim that this would somehow impact on the 'carry capacity of the site and the wider area' for Hen Harrier.

Disturbance/displacement re foraging
The northern turbines of T13 and T17 are in an area of intensive sheep grazing and do not present as attractive foraging habitat for Hen Harrier. The areas around T02 and T03 appear to contain more suitable foraging habitat, but again, there was no evidence of these areas being used to any significant extent in any of the survey seasons.

Conclusion
Given that the overwhelming evidence from the multi-year studies does not suggest that there are areas of elevated importance to foraging Hen Harrier at any time of year the risks of significantly impacting upon the local population, directly, indirectly or cumulatively with other projects is in our view unfounded. While some studies have shown an impact on population density of birds and mammals in the vicinity of wind farms post construction, the bulk of the turbines are to be located in areas of closed canopy plantation. The effect of opening these areas and the edge effect is likely to see localised increases in species diversity and abundance of certain species, particularly passerines. It is also likely that due to the construction and operation of the turbines that there will be localised displacement of some birds and small mammal species. A 'design by constraints' approach was taken when arriving at the final layout for the wind farm and direct impacts on high value unmodified habitats were avoided. There is little evidence from the available scientific literature to support the contention that the development has the potential to have significant direct, indirect or cumulative impacts on the Hen Harrier population in the wider area through loss of foraging habitat, or reduction in prey availability.

2.2. Point 1 – Second Bullet Point

A more detailed assessment in respect of collision risk analysis (for all avian species of conservation concern) and displacement of Hen Harrier given the known historic and current use of the site and surrounding landscape by both breeding and foraging Hen Harrier.

As described in Section 8A.2.4.2, Dr Gavin Fennessy is an authority on collision risk and birds. He carried out Post-Doctoral research on collision risk and aircraft and has presented papers at a number of international conferences on wildlife strike hazard. He is retained as the advisor to Dublin Airport Authority on management of bird-strike risk at airports in Ireland and sits on the National Bird and Wildlife Hazard Committee.

Dr Fennessy is critical of the reliance of Collision Risk Modelling (CRM) which is prevalent in the UK. The 'Band' model and variants thereof, which is widely used in avian collision risk assessments for UK wind farms is not evidence based and the driver of the model ('avoidance rate') is generally derived with little if any observational data (Band *et al.* 2007). The weaknesses inherent on a reliance on CRM are recognised (*e.g.* Cook *et al.* 2014; Masden & Cook 2016) but the methodology is still widely used, albeit less so in Ireland than in the UK. There is a lack of studies measuring the accuracy of the outputs of such models, even after the widespread adoption of the method in the UK for the past 15 years. As recognised by Band *et al.* (2007) in their original paper there are significant difficulties in collecting accurate data and the assumptions that underpin the model are considerable.

Hen Harrier & collision risk at the study site

We assess the potential for collision risk by preferring to rely on the detailed field observations that describe the occurrence and flight behaviour of the birds in the vicinity of the proposed wind farm site and with an understanding of the ecology and behaviour of the species. For instance, in the case of Hen Harrier we presented data in Chapter 8A and associated appendices detailing flightline observation descriptions and with corresponding flightline maps. In addition, the proportion of time spent by Hen Harriers and other Annex I species on and off the site during the survey is calculated and described.

We examined the distribution of observed Hen Harrier flightlines, highlighting those that intersected with areas close to proposed turbine locations (<50m) and the total number of flightlines that approached areas in the vicinity of turbine locations (within c. 200m). Overall, only 37 of the 75 Hen Harrier flightlines (49%) intersected with areas in the vicinity with the proposed turbines. Of these observations, an estimated 15 (20%) of the flightlines intersected with areas close to the proposed turbine locations. Four (5%) Hen Harrier flightlines intersected with areas close to the turbines located in the more open peatland habitats (T02, T03, T13 & T17).

Of a total of 75 Hen Harrier flightline observations recorded during VP surveys (across 8 survey seasons, both within and outside of the study area), 58 of these were estimated as occurring below 25m above ground level (AGL) and 62 of the 75 observed flights were below 30m AGL. This demonstrates very clearly that across 8 survey seasons that there were few observations of Hen Harrier over all the wider area viewed from the VP locations, where only 12 of these flights were within the potential rotor swept envelope. We examined these flightlines of Hen Harriers that were recorded flying at heights within the potential rotor swept envelope to investigate to what extent these observations were of flights in areas close to or in the vicinity of proposed turbine locations. In all, only 6 of the flightlines at rotor swept height intersected with areas in the vicinity of proposed turbines.

Factoring in that the majority of the flightlines were recorded well away from the proposed turbine locations and the unknown, but likely high capacity of birds to avoid turbines, any model of potential collision risk would estimate the risk to Hen Harrier from collision at this site as extremely low.

Wintering Golden Plover & collision risk at the study site
A total of 178 Golden Plover flightlines were recorded over the four years of survey effort. Of these 178 flightlines, a total of 113 (63.5%) Golden Plover flightlines were estimated as occurring at potential rotor-swept heights.

We then examined the distribution of the flightline observations, looking at flightlines that intersected with areas close (<50m) to proposed turbine locations and those that occurred in areas in the vicinity of the proposed turbines (<200m). This confirmed that the flightline observations were mostly recording birds in areas well away from the turbine locations. Overall, only 69 flightlines (39%) were recorded intersecting with areas in the vicinity of the proposed turbine locations and of these, a total of 27 flightlines (15%) crossed areas close to the proposed turbine locations. Several of these flightlines (c. 10) were completely outside of the rotor swept height as they intersected the proposed turbine locations and therefore the actual number of flights observed closely intersecting the proposed turbine locations at rotor swept height over the four winter periods was substantially below 20. As Golden Plover flocks can rapidly change flight height this figure represents a best estimate based on the flightline descriptions. Thus, based on the results of the field observations, even in the absence of any avoidance behaviour the actual exposure of flocks of Golden Plover to collision risk at this site appears to be relatively low. As summarised in Table 8A.6 of the EIAR, the proportion of the winter season observation period where Golden Plovers were present within the study area ranged from 0.1% to 12.1% and the proportion of the observation period when Golden Plover were seen outside of the study area ranged from 1.4% to 26%.

Given the occurrence pattern and flight characteristics of wintering Golden Plover, potential collision impacts on locally wintering Golden Plover as a result of the operation of the proposed wind farm was considered to be negative but not significant (see Chapter 8A of the EIAR). The flock size of Golden Plover observed ranged from 1-500 birds over this period (Median: 27 birds). Golden Plover are highly mobile and are considered to be adept at avoiding collision with turbines (have an estimated avoidance rate of 98%; SNH 2018) making them less susceptible to turbine collision. This supposition is supported by post-construction monitoring at 15 upland windfarms where no significant decline in Golden Plover numbers occurred (Pearce-Higgins *et al.* 2012) and also during 3-years of post-construction surveys at one UK windfarm site (Douglas *et al.* 2011) where no decline in Golden Plover populations was recorded. It should also be noted that much of the Golden Plover activity recorded during the VP surveys for the proposed Ballinagree Wind Farm development occurred off site and as such these flightlines would not be at risk of collision with turbines.

Mitigation & monitoring
Mitigation measures are included to minimise the collision risk with birds commuting through the site at night or in low-light conditions by the installation of a number of aviation warning lights on turbines. A fatality monitoring programme will also be instigated for the first three years of operation of the wind farm. At least a portion of the fatality searches will be carried out using specially trained cadaver dogs and their handlers. This will involve monthly searches around each turbine base during the winter period (October-March) and three further breeding season (April-August) carcass searches. All feather

spots and bird (and bat) carcasses will be photographed and logged and an annual fatality search report will be prepared and submitted for the attention of NPWS and the planning authority. Any fatalities noted by site staff or maintenance crews will be logged on the wildlife register and this register will be made available to the ecologist carrying out the monitoring program.

2.3. Point 1 – Third and Fourth Bullet Point

A more detailed assessment in respect of potential loss (direct and indirect) of staging habitat for Golden Plover given what is proposed in-combination with the large concentration of existing wind turbines in an area.

A more detailed assessment regarding the potential displacement of Golden Plover from migratory routes i.e. the barrier effect and subsequent reduction in foraging and roosting time and additional energy expenditure from increased flight times etc.

Staging of wintering Golden Plover at the study site

'Staging habitat' typically refers to places where migrant birds stop to rest, drink, and eat (Warnock, 2010). For long distance migrants these can include coastal habitats where birds congregate to feed for a number of days or weeks before continuing on their migratory journey. While Golden Plover may be more mobile and widely occurring towards the end of the overwintering period there is no evidence of them using this area as a particular stopover, or staging site, for migration.

Wintering & breeding Golden Plover in Ireland (relative to the study site)

Golden Plover is listed on Annex 1 of the Birds Directive. However, they are classified as being of Least Concern internationally (Birdlife, 2023). Wintering Golden Plover in Ireland are primarily Icelandic bred individuals (Wernham *et al.* 2002) and recent evidence confirms that the wintering numbers of Golden Plover in Ireland are relatively stable with some minor increases in the wintering distribution throughout the country (Balmer *et al.* 2013). Across their range, the population is showing slight increase overall (BirdLife International 2023).

There are two populations of Golden Plover that occur in Ireland. During the breeding season, small numbers of the nominate race breed at a number of upland areas, largely restricted to northwest Ireland. This breeding population winters in northwest Europe, although numbers wintering in Ireland are believed to be small (www.birdwatchireland.ie). Ringing recoveries have shown that most Irish wintering Golden Plover are from the altifrons population, which breeds in Iceland and the Faeroe Islands. Wintering Golden Plover are highly dispersed and total wintering numbers are difficult to quantify exactly (Balmer *et al.* 2013). However, recent evidence confirms that the wintering numbers of Golden Plover in Ireland are in excess of 150,000 and are relatively stable (Balmer *et al.* 2013, Boland & Crowe, 2012).

As well as two distinct populations, there are two distinct risk profiles for Golden Plover – the risk of impacting upon the declining and range-contracting breeding population in Ireland and the contrasting risk of impacting upon the large and stable population of wintering Golden Plover. As described in Section 8A.6.2.3 in Chapter 8A of the EIAR, Golden Plover were consistently recorded in the study area during all survey years, particularly in winter and up until April. The study area is not within the known breeding range of Golden Plover, as the breeding population is largely restricted to northwest Ireland (and where significant population decline and range contraction has occurred;

Balmer *et al.* 2013). Golden Plover was not recorded displaying or breeding at or in the vicinity of the development site.

Wintering Golden Plover at the study site
Golden Plover was the most one of the most commonly recorded species during several of the winter VP survey periods, with flocks present throughout the winter period in most survey months. The number of flightlines ranged from nine (in 2018/2019) to 98 (in 2020/2021 following expansion of the study site boundary) and flock size ranged from single individuals to *c.* 500 birds. This species was typically recorded resting on heath/bog or flying over bog, pasture and conifer plantation associated with upland areas of the site (*i.e.* the northern and northwestern portion of the site in association with Musheramore Mountain and Seefin Hill) as well the southwestern area of the site around VP4.

Golden Plovers were recorded 'on-site' for a maximum of 12.1% of the total survey time (2019/2020 winter season) and significant activity was also noted 'off-site' (mainly to the north of the site near VP 10/Boggeragh Wind Farm and to the northeast around Knocraugh Mountain/VP9), where this species was present for 26% of the total survey time in the 2020/2021 winter season survey. The VP survey results indicate that upland bog/heath/wet grassland habitats within the study area are of ecological importance to wintering and migrating Golden Plover. This habitat is also present in the wider area to the north and northeast of the study area where significant Golden Plover activity was concentrated.

Disturbance/displacement & barrier effect
Pearce-Higgins *et al.* (2008) was one of the first publications to provide data which indicated an avoidance of turbines by Golden Plover with the impact measurable to at least 200m. In Section 8A.6.2.3 we noted that the potential impacts relate to the large and stable wintering Golden Plover population and not to the declining and range-contracting Irish breeding population. It was assessed that the loss/fragmentation of sections of bog/heath/wet grassland within the study area as a result of the proposed project (*i.e.* turbines T02, T03, T13 & T17 and associated access tracks) will have a slight negative impact on the highly mobile wintering population of this species, where large areas of alternative suitable habitat are present in the wider area to the north/northwest of the study area to accommodate any birds displaced around the proposed wind farm during or post-construction.

As discussed in Section 8A.6.2.3 of the EIAR the upland bog/heath/wet grassland habitats within the study area were shown to be attractive to wintering Golden Plover, including those that are perhaps on passage in spring. Construction works taking place within bog/heath/wet grassland habitats at the site (*i.e.* turbines T02, T03, T13 & T17 and associated access tracks) as well as within areas adjacent to known concentrations of Golden Plover *(i.e.* turbines 14-20 in the north and northeast of the study area) have the potential to cause disturbance/displacement impacts to the local population of this wintering/migrating species. It was also recognised that there could be construction related displacement into other areas of suitable habitat during the construction phase. It should again be noted that the potential impacts relate to the large and stable wintering Golden Plover population which occurs in the area and not to the declining and range-contracting Irish breeding population (which is restricted in range to northwest Ireland). Given the presence of suitable alternative habitat in the wider area, the construction phase effects of the proposed project on Golden Plover are likely to result in temporary and localised slight negative disturbance/displacement impacts on the locally occurring Golden Plover in the winter months.

There is no evidence of decline in the wintering population of Golden Plover over the period where wind farms have been developed in this locality, or throughout the species' range (BirdLife

International 2023). Some displacement of wintering Golden Plover may occur around operational turbines although this is unlikely to significantly reduce the area available for foraging or roosting birds. In all, 16 of the turbines are located in conifer forestry/agricultural grassland and are relatively unattractive for foraging or roosting Golden Plover whether wintering or on passage. The areas where flocks were observed at rest were not within 200m of any of the turbine locations. Notwithstanding the presence of a number of other wind farm developments in the wider area, given the availability of the suitable habitats in the locality, it is considered highly likely that any wintering Golden Plover potentially displaced from the proposed wind farm will find suitable alternative habitat in the immediate area.

The 'Barrier Effect' is a concept closely related to displacement in which birds are deterred from using their normal routes to feeding or roosting grounds. It is most often raised as a concern in relation to the sighting of offshore wind turbines which are considerably larger and may present a 'barrier' to commuting and migrating birds (*e.g.* Masden *et al*. 2009). This concern can be increased where a windfarm is located close to a large seabird colony, or in between a seabird colony and a preferred offshore feeding resource (*e.g.* Fox & Petersen 2019; Garthe *et al*. 2023). The research in relation to onshore wind developments has tended to focus on disturbance and displacement effects which are easier to observe at terrestrial sites (*e.g.* Pearce-Higgins *et al*. 2008). There is little evidence in the literature of onshore wind-farms acting as an actual barrier to movement of birds. However, there is some evidence for subtle effects on the behaviour of certain species such as soaring birds (*e.g.* Santos *et al.* 2022). However, birds are adept at avoiding obstacles and the inter-turbine distances are such that most birds can readily navigate through, or over wind farms.

Wintering flocks of Golden Plover are frequently observed at rest, or in flight at operational wind farms (G. Fennessy pers. obs.) and while it is entirely likely that birds will alter their flight direction to avoid turbines, there is a lack of evidence in the scientific literature that this has any significant effects on the energetics of the species.

2.4. Point 1 – Fifth Bullet Point

A detailed assessment in respect of avian species of conservation concern recorded at the site such as Kestrel from both a construction and operational standpoint.

Considerable information on the occurrence in the study area and wider hinterland of species listed on Annex I and birds that are Red-listed species on the Birds of Conservation Concern in Ireland list (Gilbert *et al*. 2021) is provided in the EIAR (see Section 8A.3.3.1 to Section 8A.3.3.7). These species include Hen Harrier and Golden Plover already discussed in detail, as well as Merlin, *Falco columbarius* Marsh Harrier, *Circus aeruginosus*, White-tailed Sea Eagle, *Haliaeetus albicilla*, Red Kite, *Milvus milvus*, Peregrine Falcon, *Falco peregrinus*, Kestrel, *Falco tinnunculus*, Meadow Pipit, *Anthus pratensis*, Grey Wagtail, *Motacilla cinerea*, Redwing, *Turdus iliacus*, Swift, *Apus apus*, Snipe, *Gallinago gallinago*, Lapwing, *Vanellus vanellus*, Stock Dove, *Columba oenas* and Woodcock, *Scolopax rusticola*.

Red Kite, Marsh Harrier & White-tailed Sea Eagle at the study site
A number of these species were recorded as vagrants in the area and do not typically occur locally. These include species such as Red Kite, Marsh Harrier and White-tailed Sea Eagle. These are large and highly mobile raptor species that are recorded at a wide variety of locations across Ireland. Due to the duration and intensity of the survey effort it is to be expected that uncommon, or rarely occurring species such as these were recorded on a small number of occasions. For instance, there was a single

sighting of a juvenile White-tailed Sea Eagle seen during the vantage point surveys (March 2020). This species is especially mobile until reaching breeding age and birds are recorded widely across Ireland. They were reintroduced to Ireland in 2007 and more juveniles were released in 2021. There are an estimated total of 12 breeding pairs established at present (Mee pers comm.).

Another reintroduced raptor species, Red Kite, was also recorded on a single occasion flying through the site in a south-westerly direction in October 2019. A female Marsh Harrier was recorded on a single occasion in May 2019. It is a species that formerly bred in Ireland and is now recorded as a scarce summer visitor. These isolated records of birds of prey that do not breed in the locality and were observed on a single occasion are not of particular ecological significance. All are species that could occur in the area from time to time but the habitats are not particularly attractive for these birds. The size of the population of the reintroduced species such as White-tailed Sea Eagle will influence the likelihood and frequency of these observations. However, it is likely that any future occurrence would also be occasional at most. In this context it is concluded that the construction and operation of the wind farm does not have the potential to significantly impact upon these infrequently occurring and highly mobile species.

Merlin & Peregrine Falcon at the study site
There were a number of sightings of other birds of prey including two species of falcon, Merlin and Peregrine Falcon. Neither species was recorded breeding within or adjacent to the study area and neither species was regularly present in the area in either summer or winter periods. However, both species are likely to occur in this part of the country where suitable habitat is present.

There were a small number of sightings of Merlin over the course of the field surveys. Two confirmed Merlin observations were recorded within the study area across the four breeding seasons VP studies (see Appendix 8A.4). Merlin was only recorded within the study area during the 2020/2021 winter season, however off-site activity was also recorded in the 2018/2019 and the 2019/2020 winter seasons (see Appendix 8A.5). The number of flightline observations varied from one (in March 2019) to four (in 2019/2020). The bulk of the sightings comprised female/immature Merlin, however male Merlin was also recorded. Merlin is a relatively rare breeding bird in Ireland which predominantly nests in woodland adjacent to open moorland, mountain and blanket bog (Lusby *et al.* 2018). The species is more widely distributed in the winter, than in the breeding season (see www.birdwatchireland.ie) and individuals are widely recorded during the winter into the early spring. It is likely based on the pattern and frequency of sightings that Merlin are likely to be infrequently present in the area, particularly during the summer months. It is likely that individual birds will be present in the area for a brief period especially during the winter and early spring. The records of Peregrine Falcon were occasional but there were a small number of sightings in each breeding season with 1-3 flightlines per season (see Appendix 8A.4).

Peregrine Falcon have been consistently recorded on the study area during all winter surveys, however activity levels were generally low (present <0.5% of the total survey time) apart from the winter of 2019/2020 survey when an individual bird was present on the site for over four hours. Both adult and immature birds were observed. No particular areas of importance were noted for this species, although a cluster of sightings was present in the southwest of the site in 2019/2020 and this species was regularly sighted in association with Musheramore Mountain. The most recent available national population estimate of Peregrine Falcon was 390 breeding pairs, representing an all-time high (Madden *et al.* 2009). The population had crashed as a result of the effects of organochlorine pesticides and has gradually increased over recent decades and is believed to be stable or increasing across its range (BirdLife International 2023). Whitfield and Madders (2006) reviewed the evidence from available studies and concluded that Peregrine Falcon appeared to have low sensitivity to displacement effects from wind farms, although the results were not definitive. Reviews of the displacement effects of wind farm development (*e.g.* Marques *et al.* 2021) have reported a variety of outcomes with about half of the studies not finding any significant displacement effects, for wind farms both on land and at sea and while a good proportion of studies (40.6%) have found displacement effects, a small proportion (7.7%) have also detected attraction, *i.e.*, an increased abundance of birds around the wind farms. Birds of prey, including Falcons have been recorded as showing displacement effects around operational turbines (loc cit.).

The potential construction phase impacts were expressly discussed for both Merlin and Peregrine Falcon in Section 8A.6.2.3 of Chapter 8A of the EIAR. Similarly, the potential operational phase impacts on these species, including the potential for disturbance, displacement and collision related impacts are presented in Section 8A.6.3.3. of Chapter 8A of the EIAR. Subsequently, detailed construction phase (see Section 8A.7.1.3) and operational phase (see Section 8A.7.2.3) mitigation measures are presented.

Kestrel at the study site

Kestrel is not listed on Annex I of the Bird's Directive and the species was a new addition to the Birds of Conservation Concern in Ireland (BoCCI) Red-list in 2021 (Gilbert *et al.* 2021). The reason for the change in conservation status of Kestrel is partly due to an increase in the time span of the short-term breeding decline criteria and to more recent severe declines recorded in their breeding populations. Causes for the decline of Kestrel in Ireland in recent years are not well understood, but it has been speculated that this has been due to changes in prey availability, agricultural changes and reduced feeding opportunities, as well as secondary rodenticide poisoning (Gilbert *et al.* 2021). However overall, Kestrel remains one of the most abundant and widespread birds of prey in Ireland.

Kestrels were recorded in every survey season and in most months. Individual Kestrels were noted as perched, or hunting at various locations, within and outside of the study area. As is typical for the species, most sightings were of individual birds foraging or perched in localised areas with foraging activity concentrated in areas of open habitat, clearfell, open peatland and agricultural lands. The peak count of Kestrel recorded across the multiple seasons of transects and point counts carried out within the study area was of a single bird, both in the breeding and in the winter season. The species is present but is not particularly common within the study area.

The construction phase involves clearance of areas of trees and it was recognised that this could cause disturbance, displacement or direct loss to nesting species including Kestrel. To minimise the risk of such potential construction related impacts the mitigation measures presented in Chapter 8A of the EIAR include the clear commitment to carry out such tree-clearance outside of the bird breeding season. Given the dominance of mature conifer plantation within the study area and the location of most of the wind farm development footprint within sub-optimal foraging habitats, there are elements of the design which may provide improved foraging opportunities for Kestrel post-construction. Kestrels like to forage alongside road and trackside margins and the development will see an increase in these habitats.

Kestrel is a species believed to be more vulnerable than other raptor species to collision with turbines due to their foraging behaviour. Kestrels hover while hunting and spend their time focussing on the ground, trying to spot signs of movement of small prey items on the ground below. Collision related fatalities of Kestrels are not cited as the likely reasons for the inclusion of the species on the most recent Red-list and it is highly unlikely that this development directly, indirectly or cumulatively with other wind energy projects will be a significant driver of the population demographics of the species during the construction or operational phase.

Lapwing at the study site

Many of the other Red-listed species recorded in the area were very infrequently observed with only single observations of a small flock of Lapwing casually recorded from outside the study area in the winter of 2020/2021. Lapwings were not observed within the study area during any of the dedicated VP surveys, transect walkovers or point count surveys. No impacts are predicted upon Lapwings as a result of the development, through direct, indirect or cumulative effects.

Stock Dove at the study site

There were also only casual records made of Stock Dove in a single winter period (see Table 8A.12) and the species was absent during the breeding season period and over the course of the transect and point count surveys.

Woodcock at the study site

Woodcock was recorded as a casual record in two of the winter periods and it is likely that a number of wintering Woodcock are present in the study area each winter. Woodcock is included on the BoCCI Red list as a breeding species only, due to large declines in the Irish breeding population observed over recent decades. Wintering Woodcock arrive in Ireland from Fennoscandia and Russia and are relatively numerous in upland conifer plantations throughout the winter months.

Swift at the study site

The were a small number of sightings of Swift, a summer migrant species, recorded as casual sightings in two of the four breeding seasons. Swift are included on the BoCCI Red list due to observed declines in the breeding population in Ireland in recent decades. This is believed to be associated with a decline in available breeding sites associated with changes in modern building practices, combined with more global pressures of climate change and declines in insect abundance. Swifts are occasionally recorded in upland areas well away from known breeding sites, perhaps during passage migration, or on long foraging commutes. Even where recorded, the sightings were of few birds (typically one or two individuals) and it is highly unlikely that the construction or operation of Ballinagree Wind Farm would result in any significant direct, indirect or cumulative effects on the wider local Swift population.

Redwing at the study site

Redwing is a BoCCI Red-listed winter migrant thrush species that was relatively abundant in the study area each winter. It was relatively abundant on the winter transect surveys (see Table 8A.12). Redwing moved from Green-listed to Red-listed on the most recent BoCCI list due to declines across the international range of the species. Within its European range it has experienced moderate declines, and although the majority of the population occurs outside Europe, it is suspected that at least some declines are occurring elsewhere in its range and Redwing has therefore precautionarily uplisted to Near Threatened (BirdLife International 2023).

Redwing is a relatively numerous winter visitor to Ireland and it forms large feeding flocks that are widespread throughout the country and across a range of habitat types. Feeding flocks typically exploit berry crops and also feed in grassland. The construction phase, including the clearance of vegetation in winter could potentially cause some localised disturbance/displacement effects for

Redwing. It is unlikely that any such effects would be anything other than temporary and highly localised. Once operational there is some potential for localised displacement around turbines although this is again likely to be highly localised. Some collision fatalities are also possible, but highly unlikely to significantly impact on the numbers recorded locally. The construction and operational phase mitigation strategy will also minimise the potential impacts on Redwing. The BEMP includes a range of measures including the planting and bolstering of hedgerows and areas of woodland that will potentially yield a benefit to Redwing occurring in the wider area.

Snipe at the study site

Snipe is a resident wading bird species that is included on the BoCCI Red list. Snipe were not recorded as a breeding species (no display flights observed etc.) during the four breeding season surveys. They were noted as a casual record each summer but were not recorded during the dedicated breeding season transects and point count surveys (see Table 8A.10). They were more frequently recorded in winter, with a maximum count of 4 birds noted on transect during the winter season walkovers (see Table 8A.11). Snipe were previously Amber-listed but are now included on the Red-list due to observed declines in both the breeding and wintering populations in Ireland in recent decades (Gilbert *et al.* 2021).

The Irish population is supplemented to by an influx of winter migrants from northern Europe and Iceland. The species prefers areas of wetland, wet grassland and upland heath and bog. Observed declines have been attributed to increased drainage of wetland habitats, afforestation and exploitation of peatland habitats. The species does not appear to be common anywhere within the development footprint and no significant numbers were present at any time of year. The dominance of improved agricultural grassland and commercial conifer plantation with the wind farm site means that there is low potential for any significant numbers of Snipe to occur across most of the proposed development site.

Pearce-Higgins *et al.* (2012) reported declines in Snipe presence on wind farm sites during the construction site and Pearce-Higgins *et al.* (2009) reported post construction declines in Snipe breeding densities in areas up to 500m from operational turbines. Given the low numbers and occurrence of Snipe recorded in the study area it is unlikely that there will be any significant construction or operational phase impacts on the species, through direct, indirect or cumulative effects.

Meadow Pipit & Grey Wagtail at the study site

Two additional BoCCI Red listed passerine species were regularly recorded at the site, Meadow Pipit and Grey Wagtail (Gilbert *et al.* 2021). Meadow Pipit was the most numerous species recorded during breeding season (see Section 8A.3.3.4) and winter periods (see Table 8A.11). Grey Wagtail was recorded as a casual record each breeding season (see Table 8A.10) and in 3 of the 4 winter seasons (see Table 8A.12). Grey Wagtails were recorded on and close to the River Laney.

Meadow Pipit is one of the most common and widespread resident passerines in Ireland. The species experienced a significant decline in population believed to have been associated with poor survival rates over the two severe winters in 2009/2010 and 2010/2011. The Countryside Bird Census (CBS) has recorded a substantial recovery in the population of breeding Meadow Pipit over the past decade (see Figure 1 below). It is likely that given the substantial recovery of Meadow Pipit populations that the future iteration of the BoCCI list will see an improvement in the conservation status of the species. The mitigation strategy as described in Chapter 8A of the EIAR will ensure that no significant direct, indirect or cumulative effects will occur on Meadow Pipits as a result of Ballinagree Wind Farm development.

Grey Wagtail is a passerine species closely associated with rivers and streams. They are Red listed due to observed declines in breeding population and range in Ireland in recent decades. They are rarely recorded fat from the river corridor. The design of the wind farm and the mitigation strategy to protect the surface water quality will be effective in minimising the risk of indirect impacts on the aquatic habitats and prey availability of the species during the construction and operational phases of the project. There is no likelihood of significant residual direct, indirect or cumulative effects on the local Grey Wagtails as a result of the proposed development.

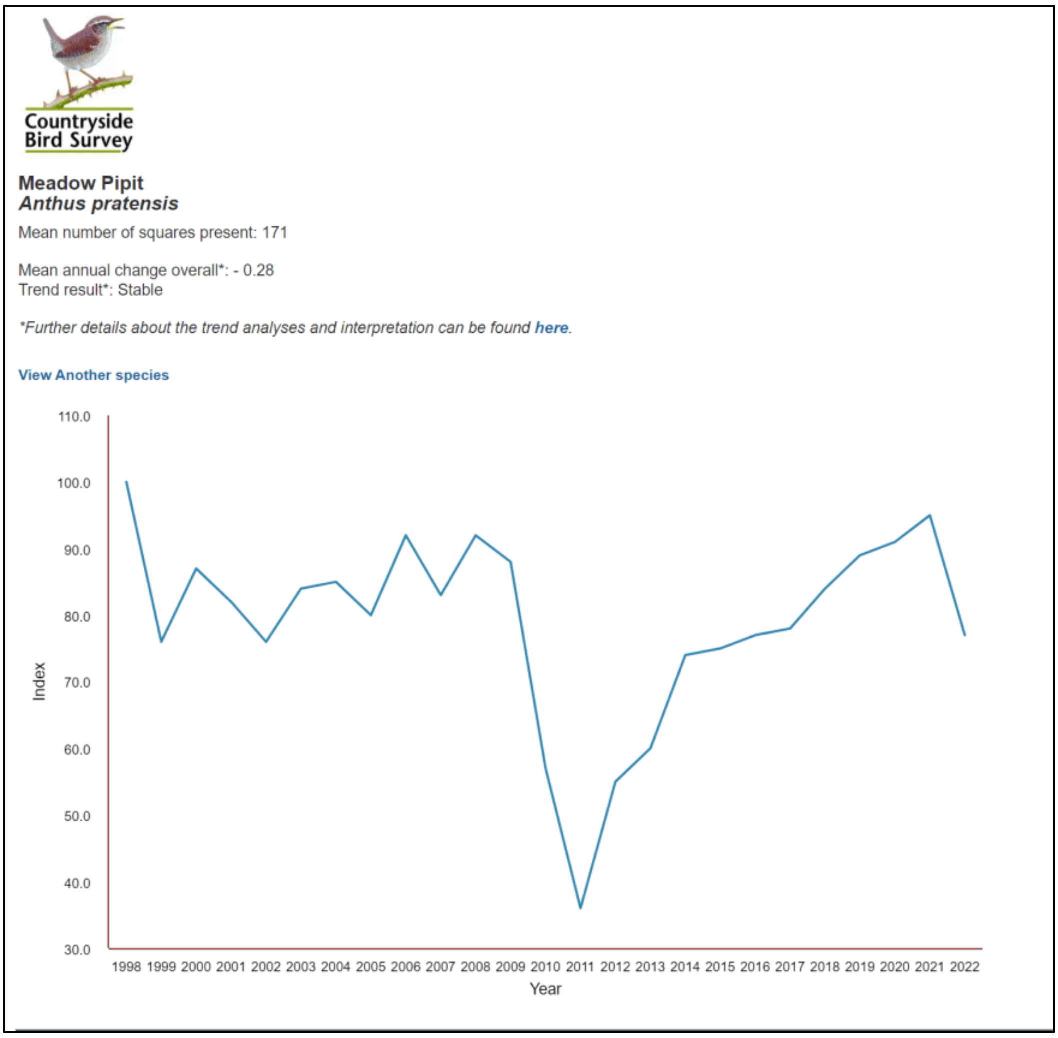


Figure 1 Countryside Bird Survey population trend for Meadow Pipit (www.birdwatchireland.ie).

2.5. Point 1 – Sixth Bullet Point

A more detailed assessment in respect of potential disturbance / displacement impacts on Hen Harrier, Golden Plover and other avian and faunal species which would be generated during the post construction phase by the proposed amenity trails.

The concerns raised in relation to the pressure from visitors/walkers and the potential impact on avian species and other faunal species are in our opinion readily addressed. There are already walking routes across Mushera and Coillte adopts an 'Open Forest' policy. There is no reasonable expectation that the users of the amenity trails will give rise to problematic levels of disturbance or displacement of species such as Hen Harrier or Golden Plover. There was no nesting pair of Hen Harrier located within 2km of the study area and the proposed amenity trails will not bring walkers into areas proximate to the nest sites recorded in the wider area of the study site in recent years. Golden Plovers are present in the wider area during the winter period when it would be anticipated that the usage of the amenity trails would be far lower than in the summer months.

The proposed trails are shown in Figure 11.5 in Chapter 11 of the EIAR and are a combination of upgrades of existing trails and new trails set largely within the existing conifer plantation and agricultural grassland. Trails are not located in the upland peatland areas which would be most attractive to wintering Golden Plover and also foraging Hen Harrier. The existing Duhallow Way walking route traverses much more attractive habitat for species such as wintering Golden Plover and foraging and commuting Hen Harrier.

The likelihood is, just as is observed at other operational wind farms, that the walking trails will be used predominantly used by local people and to a lesser extent visitors to the area. The routes provided at the Northern, Southern and Western Loops will encourage amenity use but are highly unlikely to result in any significant disturbance/displacement pressure on key avian species. Users will be screened from view over large sections of the route by the existing conifer plantation and setting the walking loops within the overall wind farm area with recognised parking locations and trail-heads also provides the opportunity to inform and educate users of the amenity.

For instance, as specified as part of the mitigation strategy (see Sections 8A.7.1.4, 8A.7.2.2, 8A.7.2.3, 8A.7.2.4 and 8A7.2.5) visitor information signage will be erected near the amenity car park describing the diversity of species and habitats in this area. Visitors will be made aware of the sensitivity of the habitats and species and be advised of appropriate behaviour around such habitats and species. Similarly, there is no likelihood of any significant disturbance or displacement effects on protected mammal species associated with usage of the amenity trails. The trails are not located proximate to the resting or breeding places of any protected mammal species.

In addition, it is reasonable to assume that the users of the trails will be present predominantly during daylight hours. This in itself removes the potential for significant direct interactions between users of the amenity trails and mammal species such as Badger (also see response Point 1 – Eighth Bullet Point below), Otter and bats, which are all predominantly nocturnal.

2.7. Point 1 – Seventh Bullet Point

A revised impact assessment having regard to the core sustenance zone (CSZ) of bat species identified as occurring within the site and the potential impact of loss of habitat, reduction in prey abundance, collision risk and the potential for colony collapse. Cumulative impacts should also be addressed. The revised assessment should also confirm whether the mitigation measures proposed are sufficient to ensure the avoidance of significant effects on any potentially vulnerable species and their resting place. The mitigation measures should have cognisance to the resilience and conservation status of bat roosts.

Bat surveys at the study site

A comprehensive and robust survey effort was carried out which broadly meets or exceeds the industry recognised best-practice standards in relation to survey of bats at onshore windfarms (NatureScot, 2021), with adaptations for an Irish context. In addition to passive detector surveys, which are mandatory following NatureScot (2021), active (transect) surveys were carried out and survey at height (using the met mast) was carried out. Emergence surveys were also carried out at relevant bat roost features, including a structure located to the north-east of T10. This was incorrectly estimated at *c*. 700m in Chapter 8 of the EIAR and we are happy to clarify that it is in fact located over 930m from T10.

The purpose of surveys outside the immediate development footprint is to record roosts which might be indirectly affected by the development, at sites considered likely a priori to be important to local populations, *e.g.* close to areas designated as SSSI and/or SAC for their bat interest. In relation to potential for impacts on bat roosts, NatureScot (and the more recent NIEA 2022) guidelines, recommends a search area of at least 200m plus one rotor diameter, which in the current proposal represents a distance of 277.5m from the "site boundary". Bat Conservation Ireland (BCI) historic roost records for this area were also consulted (see Figure 2).

Overall, a moderate to high level of bat activity was recorded at the site, and a high level of species diversity. The level of activity noted varies through the seasons and in the experience of the bat specialist (Mr. Tom O'Donnell, B.Sc. M.Sc. CEnv MCIEEM) is comparable with the level of activity expected in other similar habitats in Ireland. The site generally lacks suitable structures or natural bat roosting features and primarily represents a foraging habitat. There is nothing to suggest that the site is of particularly high importance to bats.

Core Sustenance Zone for Irish Bats

NatureScot (2021) recommends that additional surveys, above and beyond the standard methodology presented, should be undertaken at sites considered likely to be important to local populations, *e.g.* where the location of the nearest proposed turbine is within the core sustenance zone of a site which is nationally or internally designated for bats, see Collins (2016). For the avoidance of doubt, no national or European conservation sites (where bats are a qualifying interest) occur within 15km of the site boundary with the exception of 'Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment' SAC & pNHA. The site boundary is located c. 33km from the potential foraging range of Lesser Horseshoe Bats associated with roosts within Killarney National Park, Macgillycuddy's Reeks & Caragh River Catchment SAC.

A Core Sustenance Zone, as applied to bats, refers to the area surrounding communal roosting within which the habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost (Bat Conservation Trust, 2016). Bat Conservation Trust (2016) provides estimates of the CSZ of bat species in a UK context (which in the absence of Ireland specific information, is considered to be a useful proxy). This information is summarised in Table 1 below.

Table 1 Core Sustenance Zones of Irish Bat Species.

Species	CSZ radius (km)	Confidence
Lesser Horseshoe Bat	2	Good
Brown Long-eared Bat	3	Poor
Daubenton's Bat	2	Poor
Natterer's Bat	4	Good
Whiskered/Brands Bat	1	Poor
Common Pipistrelle	2	Poor
Soprano Pipistrelle	3	Good
Nathusius Pipistrelle	3	Poor
Leisler's Bat	3	Moderate

After BCT (2016).

Core Sustenance Zone & the study site

A small number of Common and Soprano Pipistrelles were noted to emerge from a structure which is located approximately 930m north-east of proposed T10. As the roost consists of mixed species, the larger of the two CSZ values, 3km (see Table 1, is applied here. The total footprint of the proposed development is calculated as 42.42ha (see Figure 3). This area is calculated on a 'worst-case scenario' basis, and consists of hardstands, roads, borrow pit, substation, construction compound, permanent compound and an allowance has been made to account for all existing and proposed roads to factor in drainage *etc*. In reality, construction compound and borrow pit will be remediated post-works. This total footprint of proposed habitat loss, which represents a worst-case scenario' represents *c*. 1.5% of the total habitat available to Pipistrelle bats within the 3km CSZ. This scale of habitat loss, in the context of a relatively small Pipistrelle roost, is highly unlikely to have any measurable impact on the roost in question, or any other roost. A loss of 1.5% of the total foraging habitat available would certainly not be of a scale which could cause colony collapse. In the case of the identified roost, the only likely threat to that roost is further dereliction of the structure, or refurbishment.

Collision risk & mitigation

Collision risk assessment in relation to bats is presented in the EIAR and represents industry best practice for the assessment of potential impacts on bats as a result of onshore wind developments in Ireland (see Section 8A.6.3.5). The collision risk assessment considers the proposed project type, the potential for cumulative impacts as well as the result of dedicated passive bat monitoring. The assessment concluded that collision risk is 'Low' to 'Moderate to High' for relevant high-risk species (Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat).

The collision risk assessment provided in the EIAR (see Section 8A.6.3.5) considers the proposed project type, the potential for cumulative effects as well as the result of dedicated passive bat monitoring. The assessment concluded that collision risk is 'Low' to 'Moderate to High' for relevant high-risk species (Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat). In response to the identification of a certain level of collision risk, a suite of mitigation measures were proposed in line with best practice standards (*e.g.* NatureScot, 2021) to reduce the potential effect of collision, including ‘feathering’ of idling blades. This measure is a well-established technique, which can be implemented reliably and demonstrably as part of the operation of the proposed wind farm. Peer-reviewed studies have shown that applying these measures resulted in at least 50% reductions in bat fatalities (*e.g.* Bennun *et al.*, 2021 and NIEA, 2022).

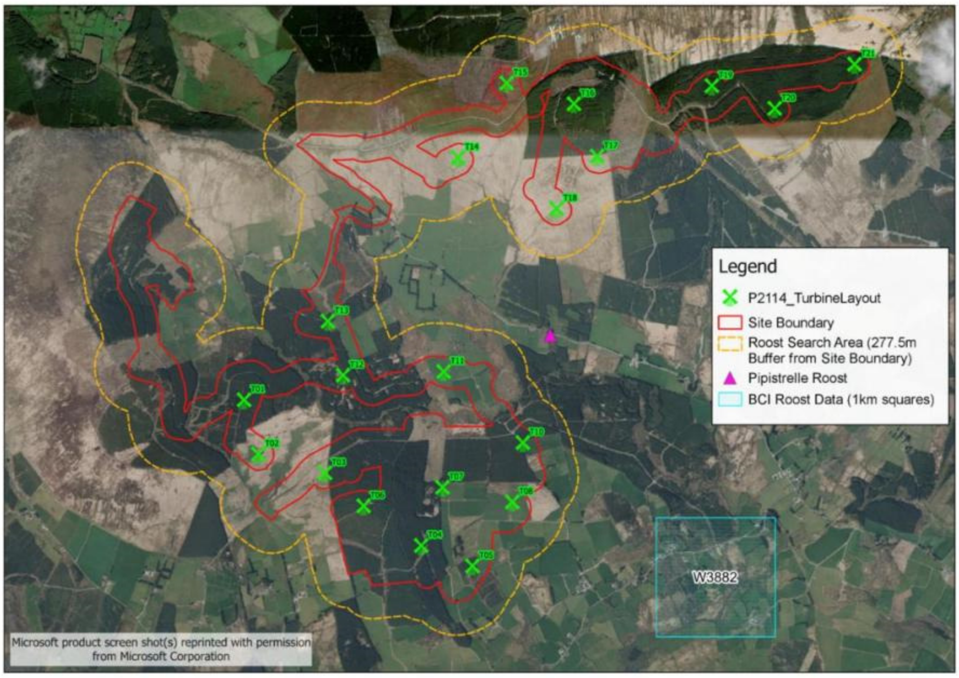


Figure 2 Primary Roost Search Area (according to NatureScot 2021 recommendations).

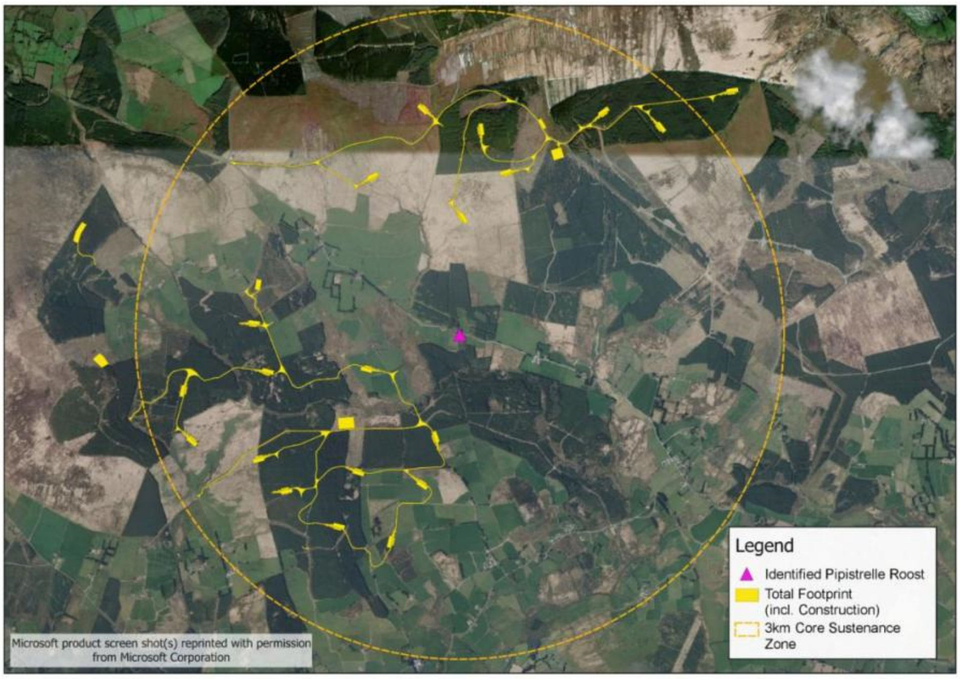


Figure 3 Core Sustenance Zone and Footprint of Proposed Works.

2.8. Point 1 – Eighth Bullet Point

A revised impact assessment on the short to long term impacts on badger social group(s) recorded within the site and immediate vicinity of the site. This assessment should be informed by quantifying the loss of badger territory/habitat associated with each social group.

In Appendix C of the CCC submission, it is worth noting that the above statement is informed by various thoughts including the following "*Given the scale of the proposal and the associated loss of habitat, there is potential that there will be a significant impact on the social group within the site*." and "*Therefore, the loss of habitat on each social group has not been adequately assessed as the territory of each group has not been defined. It is noted that where loss of habitat is likely to be greater than 25%, the impact may be considered as significant on the affected social group.*" Appendix C of the CCC submission also notes the following "*…should take into consideration operational impacts through increased human disturbance onsite from amenity trails…*".

Badgers at the study site

The locations of the two Badger setts noted at the wind farm study site were not provided in Section 8A.3.4 of Chapter 8 of the EIAR due to the sensitivity of publishing such data in the context of illegal persecution that can occur in relation to Badger setts. It is acknowledged that this may have allowed a degree of confusion on our findings in relation to Badger setts as outlined in Section 8A.3.4 of Chapter 8 of the EIAR. To clarify, a total of two setts were found relatively close to each other (within 40m), which were intermittently active over the study years. The presence of these setts was supported by other evidence such as latrines and trail camera registrations (see Section 8A.3.4 of Chapter 8 of the EIAR). These two setts are unquestionably part of the same social group given the territorial nature of Badgers that live in social groups and associated territories (see Clark 1988) combined with the relative closeness of the two setts in question. The setts were located in association with pasture farmland at the southern part of the wind farm study site where areas of natural woodland are also present. As Badger setts in the Irish context are highly associated with woody field boundaries (hedgerow, treelines) along with woodland and scrub, and are known to be negatively associated with upland vegetation types (see Byrne *et al.* 2012)– it is of no surprise to find that Badger setts here were located at the southern part of the study site where such features are present, in comparison to the rest of the site where conifer plantation and upland (heath/bog) habitats are more dominant.

As acknowledged in Section 8A.3.4 of Chapter 8 of the EIAR, a Badger was noted on a trail camera at the northwestern part of the study site that is in a different area to where the setts are located. Given its location away from the two setts in the southern part of the stie, this individual is likely to be associated with a different social group or could have been a vagrant individual from outside of the study area (see Section 8A.3.4 of Chapter 8 of the EIAR). Therefore, while the two setts at the southern area of the site relate to one social group, the Badger recorded by trail camera at the northwestern part of the site may relate to a second social group.

At various locations within Chapter 8A of the EIAR (*e.g.* Section 8A.3.4, Section 8A.6.2.4), it will be noted that there is a specific and repeated point that no setts were located within 50m of any proposed wind farm infrastructure. This 50m threshold is informed by guidelines pertaining to works (and associated licence where required) within 50m of active setts (see NRA 2005). The closest wind farm infrastructure to the two setts referred to above is Turbine T5 with associated hardstands, which are approximately 90m away.

Habitat loss & Badgers

Direct habitat loss arising from wind farm development is known to be relatively low (*e.g.* Drewitt & Langston 2006), which is due to the nature of such development that predominantly comprises of access tracks and turbine bases (hardstands) during its operational phase. Ballinagree Wind Farm is no different, where for example new (5m wide) access tracks and turbine bases will encompass approximately 3.7% of the wind farm development area. While such habitat loss will involve habitat types that are of some ecological value for Badger (*e.g.* grassland foraging areas), it is clear to see that the potential habitat loss for Badger here is well below the cited threshold of >25% in Appendix C of the CCC submission (where the impact may be considered as significant on the affected social group).

It is also important to highlight that wind farm developments, such as the one proposed here, do not give rise to barrier effects on mammals (including Badger) as the area is left open with no bespoke fencing or other boundary treatments required that could impede mammal movements (as acknowledged in Section 8A.6.3.4 of Chapter 8A of the EIAR). Therefore, any Badger social groups present will be able to continue accessing their surrounding environment as before.

Human disturbance from amenity trails during operational phase

As previously mentioned, Appendix C of the CCC submission suggests consideration to be given regarding "…*operational impacts through increased human disturbance onsite from amenity trails*…". This is effectively no different to the potential disturbance impacts arising from increased traffic during the construction phase (acknowledged in Sub Section Disturbance/Displacement Impacts in Section 8A.6.2.4 of Chapter 8A of the EIAR). The bulk of human activity and usage of the proposed amenity trails during the operational phase will occur in daylight hours when Badgers are generally underground within their setts (as Badgers are predominantly active at night).

It is also worth noting that the amenity trails in question overlap with the proposed wind farm access tracks (*i.e.* not additional to the wind farm access tracks), the closest of which relate to Turbine T5 with associated hardstands that are approximately 90m away from the setts identified at the study site.

Conclusion

The potential for habitat loss of ecological value for Badgers (<4%) is well below the cited threshold of >25% where the effect of such impact on an affected social Badger group may be considered as significant. It is therefore considered that no revised impact assessment is required on the short to long term impacts on Badger social groups recorded within the site and immediate vicinity of the site.

It is also important to remember that wind farm developments do not give rise to barrier effects on Badgers as the area is left open with no bespoke fencing or other boundary treatments that could impede Badger movements such that any Badger social groups present will be able to continue accessing their surrounding environment as before.

Finally, human activity and usage of the proposed amenity trails is not considered to be of any particular relevance to Badgers, as such activity will be concentrated during daylight hours when Badgers are generally underground within their setts.

3. Point 2

Furthermore, it is considered that layout should be revised to omit 4 no turbines (T02, T03, T13 & T17) at a minimum to ensure the avoidance of impacts on upland peat and habitats of biodiversity value. Additional turbines may need to be omitted on completion of impact assessment in relation to species such as Hen Harrier and Golden Plover.

Note that the following response here deals with the first aspect related to upland peat in the above statement. The second aspect related to the omission of turbines for species such as Hen Harrier & Golden Plover is covered by the preceding responses to Point One: First, Second, Third & Fourth, and Sixth Bullet Points (where no turbine omissions are suggested for any species).

In Appendix C of the CCC submission, it is important to note that the above statement is informed by the following "*As per the pre-planning advice issued by the Cork County Council Ecology Office, this office recommends that no such development take place on intact peatland habitats and be avoided on degraded peatland habitats or any habitats of high natural value.*"

Pre-planning advice

Pre-planning advice was sought from and issued by the CCC Ecology Office, which is outlined and summarised in Section 5.2.1 (sub-section Cork County Council Biodiversity Officer) and Section 5.3.3 of Chapter 5 of the EIAR. Written feedback was received by email on three occasions overall (emails dated 23rd March 2020, 27th May 2020 & 3rd July 2020), where the same worded response was received on each occasion and is provided in Section 5.2.1 (sub-section Cork County Council Biodiversity Officer) of Chapter 5 of the EIAR. In this written response, the pre-planning advice relating to peatland habitats stated "*It is generally recommended that development on peat habitats is avoided. In particular, the site should be designed to avoid direct intervention within intact peat habitats and on other habitats of high natural value*." As can be seen from the wording in the pre-planning advice, there was no explicit mention of 'degraded peatland' as suggested above by the CCC submission.

Iterative design process

On foot of the pre-planning advice received, consideration was given throughout the iterative design process to avoid significant effects potentially arising from the proposed wind farm on peatland habitats of significance (*i.e.* intact and/or high natural value). As described in Section 2.3.4 of Chapter 2 of the EIAR, a constraints led design philosophy was used to avoid environmental sensitivities of significance and minimise potential significant negative environmental effects as a result of the design, with mitigation by avoidance the primary goal of the iterative design process. The constraints led design approach involved the identification of environmental sensitivities (including peat habitats) within the project development study area by the design team in liaison with the Project Ecologists.

The design approach and evolution of design iterations is described in detail in Section 2.3.4 of Chapter 2 of the EIAR. In brief, the first design iteration of the Project was developed once the developable area was established. The developable area was then further refined as additional constraints were identified throughout the environmental impact assessment process, where the project design team worked closely with the Project Ecologists. This involved incorporating data from detailed site surveys and habitat mapping by the Project Ecologists to determine appropriate areas to locate infrastructure.

Detailed habitat site surveys

Habitat site surveys included detailed surveys of areas that could potentially support higher value habitats/flora (*e.g.* indicator plant species, Flora Protection Order species, Annex I habitat) where any turbines or infrastructure were proposed, which ultimately led to dedicated quadrat surveys at two upland locations (see Section 8A.3.2 of Chapter 8A of the EIAR, including sub section Dedicated Quadrat Surveys). These detailed surveys coincided with Turbines T02, T03, T13 & T17 areas, including dedicated quadrat surveys for the T03 & T13 areas. The other 16 turbine areas were located at conifer plantation and/or improved agricultural grassland areas.

The quadrat data collected was uploaded, analysed and assigned to a division group and community type via input to the online database resource Engine for Relevés to Irish Communities Assignment (ERICA), with additional information on potential Annex I habitat quality obtained with reference to the Perrin *et al.* (2014) where applicable (see Section 8A.3.2 of Chapter 8A of the EIAR).

The outcome of the detailed high-resolution surveys is available in sub section 'Dedicated Quadrat Surveys' of Section 8A.3.2 of Chapter 8A of the EIAR. For convenience, a summary of the key findings is presented in the following text.

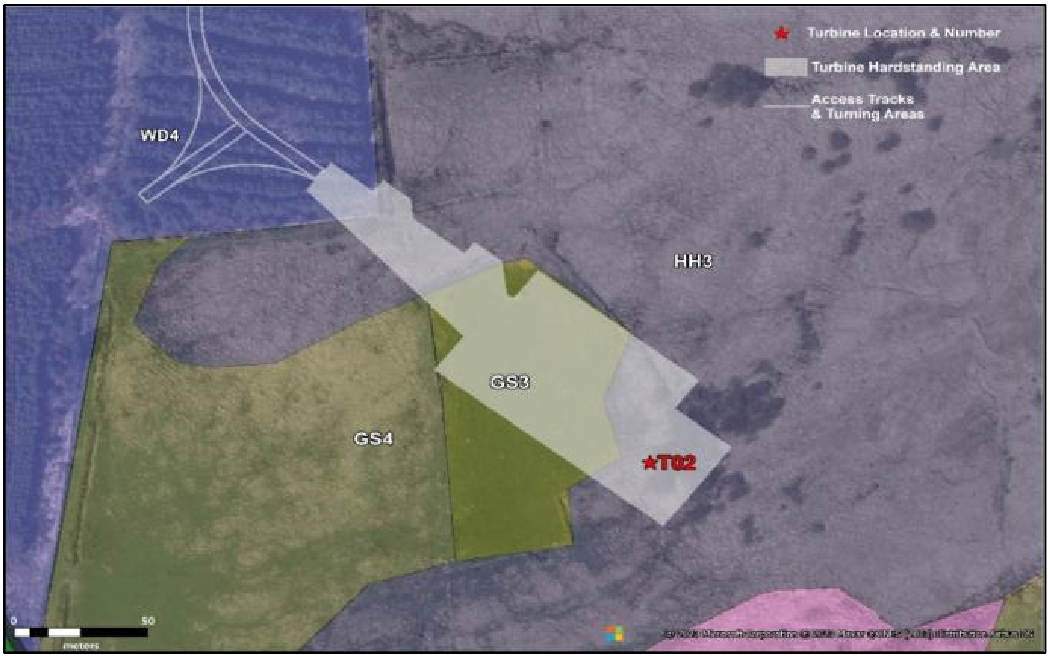
While Turbine T02 was known to be within an area of degraded wet heath (HH3 code), its associated hardstanding area overlapped an area of peaty acidic grassland (GS3) and slightly encroached/adjoined a peaty wet grassland (GS4) area (see Plate 1). The area for Turbine T17 was located within an extent of degraded wet heath (HH3) area that could have potentially supported pockets of higher quality peat habitat (see Plate 1). However, the peat habitats at both turbine areas were found to be of degraded/poor status in general such that no dedicated quadrat surveys were deemed necessary, and it was considered that the habitat surveys undertaken up to that point provided enough information to describe these areas and conclude that the proposed development would have minimal impact on key upland habitats identified overall (including peat).

On the other hand, both of the Turbine T03 & T13 areas comprised of relatively complex and often intrinsic mosaic peat habitat (see Plate 2) where the possibility of higher conservation value habitat occurring was potentially more likely and could not be ruled out in the absence of further high-resolution quadrat habitat surveys. The quadrat surveys found that the Turbine T03 area occurs within a heavily altered degraded wet heath (HH3) habitat that does not correspond to Annex I (where pockets of higher quality wet heath (HH3) occur in the wider wet heath habitat feature that are likely to correspond to Annex I 4010 but are avoided by the wind farm development here). The quadrat surveys confirmed that the Turbine T13 area occurs within a degraded heathland mosaic of wet heath (HH3) and cutover bog (PB4) that does not correspond to Annex I.

Conclusion

As outlined above and in Section 8A.3.2 of Chapter 8A of the EIAR, the constraints led design approach ensured that confirmed/potential Annex I habitat features (including peat habitats) were located outside of the proposed development works footprint. The constraints led design approach also ensured that pockets of higher quality habitat potentially present within highly degraded or disturbed heath and/or bog habitats (*i.e.* peat habitats, *e.g.* Annex I 4010 wet heath HH3) were also avoided such that the proposed development works footprint is confined to very degraded peatland habitats of lower local importance (see Section 8A.3.2 of Chapter 8A of the EIAR).

It is therefore considered that the design approach here took heed of explicit pre-planning advice received from the CCC Ecology Office that "*In particular, the site should be designed to avoid direct intervention within intact peat habitats and on other habitats of high natural value*."



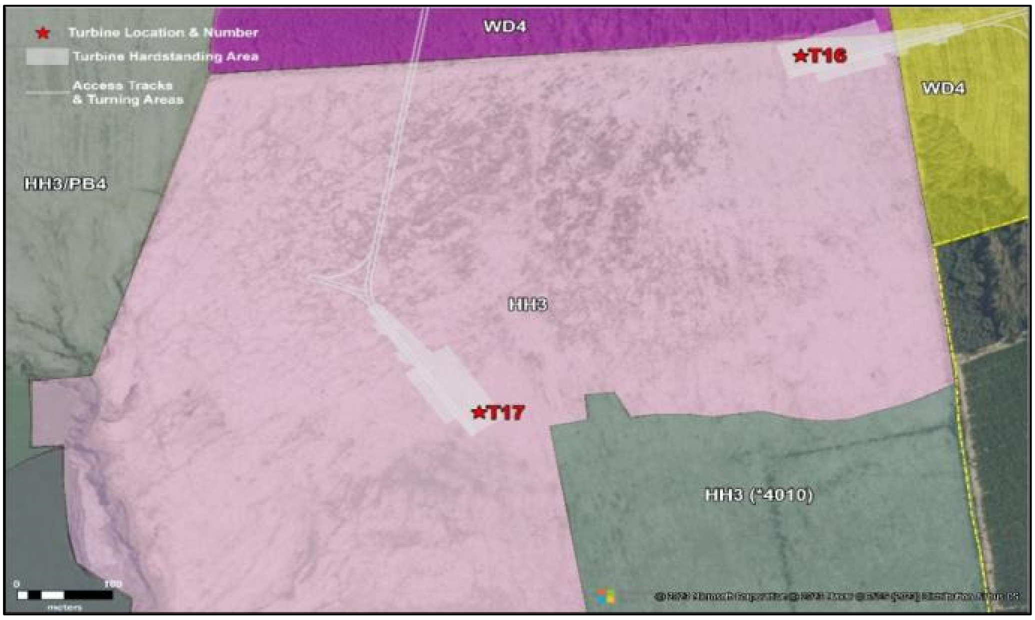


Plate 1: Turbines T02 (top) & T17 (bottom) areas and habitats.

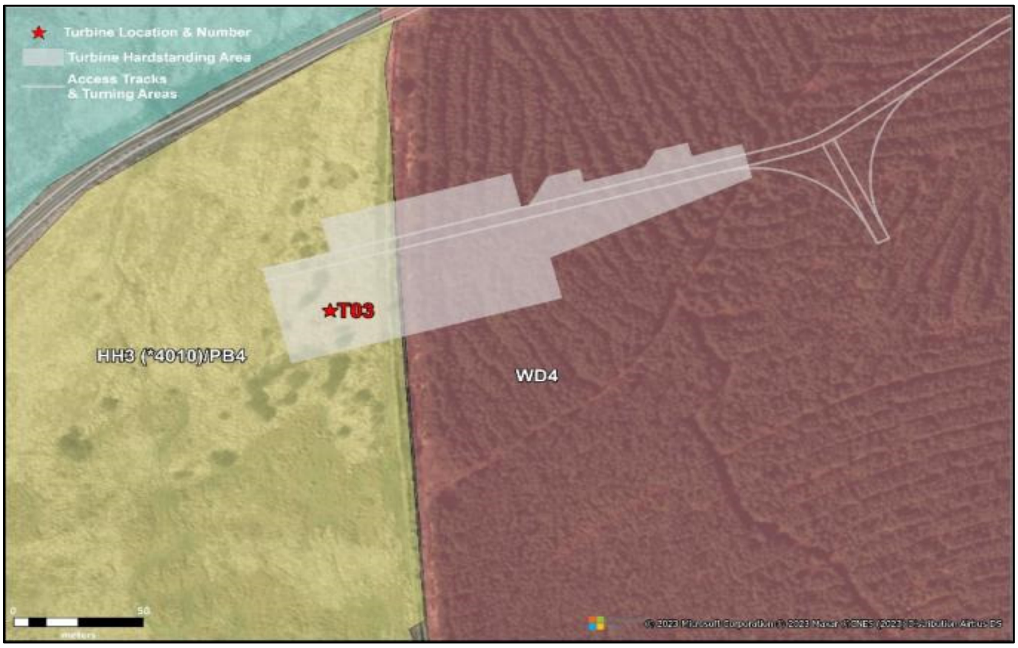


Plate 2: Turbines T03 (top) & T13 (bottom) areas and habitats.

4. Additional Points of Note in Appendix C **[Internal Report of the CCC Ecology Office]**

Historical Hen Harrier nest site at the study site

In Appendix C to the CCC submission an historic nest record is alluded to: "*Furthermore, based on the information available to Cork County Council Ecology Office, it would appear that both wind turbines T02 & T03 are located within an area proximal to a known historical nesting site for Hen Harrier*".

This information was not provided by CCC as part of pre-planning consultations and neither was the presence of any historic nest site in this area raised by the National Parks & Wildlife Service during consultations. Without knowing the age and provenance of such a record it is difficult to evaluate the significance of this observation. Over the course of four breeding season VP surveys there was no nesting Hen Harrier pair recorded within 2km of the large study area boundary. It is of course possible that there is an aged record of a Hen Harrier nesting attempt from the area, but the CCC submission does not provide the source, or age of this record. We understand the need to treat such records sensitively, but the lack of detail makes it impossible to evaluate the associated statement of the CCC Ecology Office that it is considered that there is still the potential of this area to be utilised once more by a breeding pair.

The methodologies used in some previous surveys, including national Hen Harrier surveys, can also indicate 'possible' or 'probable' nesting activity based on few observations and little more than sightings of birds in areas of 'suitable habitat'. The detailed surveys carried out to inform the EIAR would be far more intensive than those carried out as part of broad scale surveys intending to track wider population demographics. Using the recommended survey methodology and over an extended survey period, we found no evidence of nesting Hen Harrier in the study area. We have based our assessment on the best available contemporary information and with an understanding of the ecology of the species and the location of nesting pairs in the wider hinterland area.

We would reject the assertion in Appendix C of the CCC submission that the importance of the site and surrounding landscape for Hen Harrier has been underestimated. As already outlined, very detailed intensive field surveys have been carried out to inform the assessment and these have demonstrated that usage of the study area by Hen Harrier was consistently low. Hen Harriers were recorded for a smaller proportion of the observation period in the latter part of the survey period, despite a marked increase in the number of breeding pairs present in the wider area. The clarification and information provided in the EIAR, NIS and herein should provide the necessary information to inform the Board and facilitate the Appropriate Assessment in relation to Hen Harriers and the potential impacts on the SPA.

Golden Plover related citation from Sansom *et al.* (2016)

Appendix C of the CCC submission includes commentary and criticism in relation to the impact assessment on Golden Plover. A paper by Sansom *et al.* (2016) is cited, describing impacts on Golden Plover abundance and displacement from active turbines. This research was related to breeding and not wintering Golden Plover. Golden Plover do not breed at this site and any concerns regarding potential displacement of breeding Golden Plover are therefore misplaced. The information provided in this response should also be helpful in allaying some of the concerns stated in the internal report of the Ecology Office of CCC included as Appendix C to the submission. Issues raised as potential concerns in relation to displacement, the barrier effect etc. and wintering Golden Plover have all been considered and we are satisfied that the potential for direct, indirect and cumulative effects are all adequately assessed.

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FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 7

EIAR Consultation Correspondence with Cork County Council Ecologist

From:	Thomas Watt
To:	Eamon Hutton
Cc:	Greg Simpson
Subject:	FW: Ballinagree Wind Farm
Date:	Monday 23 March 2020 11:59:47
Attachments:	image001.jpg image002.jpg

Eamon
See comments of my colleague Sharon regarding EIA/ AA

Thanks
Tom

From: Sharon Casey
Sent: Monday 23 March 2020 08:42
To: Thomas Watt
Subject: RE: Ballinagree Wind Farm

Tom,

I have reviewed the proposal and have the following comments. These comments are made without prejudice and are based on a review of publicly available information. I do not have access to any site specific ecological data.

Key ecological sensitivities identified in respect of this proposal include

- sites designated for nature conservation and their associated habitats and species;
- protected species; and
- habitats of high nature conservation value.

Based on the mapping presented, it is clear that the site boundary overlaps with the boundary of the Boggeragh Mountains Natural Heritage Area and lies immediately adjacent to the Boggeraghs to Musheramore Mountains Special Protection Area. Indeed, it is noted that the boundary of the proposed windfarm extends into the 500m buffer to the SPA, which is indicated on the CDP Wind Energy Strategy to be an area not suitable for wind energy development. The development is also located within two sensitive catchments, being the catchment of the Blackwater River Special Area of Conservation and the catchment of the Sullane River.

Aerial imagery indicates that the site supports natural and semi-natural habitats.

My first recommendation is **to amend the proposed boundaries of the development site to not encroach into the Boggeragh Mountains Natural Heritage Area or into the area which is indicated in the CDP Wind Energy Strategy to be not suitable for wind energy development**

Ecological Survey and Assessment

Without completing detailed AA screening, it is clear that this proposal is likely to trigger a requirement for AA, and it is therefore advised that the applicants would commence the necessary survey and assessment work to compile a Natura Impact Statement in respect of this project. It will also be necessary to prepare an EIAR in respect of a wind energy development of this scale. The AA report and biodiversity chapter of the EIAR should be prepared by competent experienced ecologists. Given the nature of the landscape it is likely that ornithological, freshwater and upland habitats expertise will be required to complete necessary surveys and compile the required reports.

Without direct knowledge of the site, key issues likely to be required to focus on will be

- potential for the project to give rise to impacts on the population of Hen Harrier which is associated with the adjoining SPA, and possibly other avian species including Merlin, Golden Plover, Red Grouse, Snipe and possibly Curlew – and there may be others. It is advised that the ecologists working to prepare the planning application documents would contact expert organisations including the NPWS, the Irish Raptor Study Group and BirdWatch Ireland and to review all available literature to identify the target species which will need to be surveyed. Surveying protocols will need to be established, and these should be designed to accord with latest guidance from the NPWS and Scottish Natural Heritage. Applicants should note that a minimum of two full years of survey for key sensitive species will be required in such a sensitive location. The information gathered during the survey stage should be used to inform design to ensure that areas around known breeding sites and key foraging areas for sensitive bird species are avoided.
- Potential for the project to give rise to negative effects on freshwater habitats. To this end, there should be a focus at design stage on providing for an appropriately designed surface water management system which minimises risk of release of contaminants to surface waters and ensures that there is no increase in surface water run-off from the site. Avoidance of disturbance of peat based habitats will greatly assist with this.
- It is generally recommended that development on peat habitats is avoided. In particular, the site should be designed to avoid direct intervention within intact peat habitats and on other habitats of high natural value.
- The applicants ecologists should be in a position based on desk top studies and preliminary investigations to identify any other ecological issues which would require to be addressed.

The Biodiversity chapter of the EIAR should be prepared to accord with CIEEM Guidelines and the NIS should be prepared taking account of National and EU Guidelines as well as recent case law. The applicants are free to contact me to discuss any of this,

Regards

Sharon

From: Thomas Watt
Sent: 20 March 2020 10:26
To: Sharon Casey; Mary Sleeman
Cc: Greg Simpson
Subject: FW: Ballinagree Wind Farm

Sharon / Mary
This scheme is significant and will be going to ABP. Applicant looking for meeting / conference call in 4 wks. Not sure this is possible or advisable.
Appreciate it if you would examine and write brief advisory note in order that I can relay same and avoid our congregation over a conference call.
I will contact applicant in the interim and ascertain whether phone / email conversations with yourselves would be more appropriate and convenient.
I will update you accordingly
Thanks
Tom

From: Eamon Hutton [mailto:eamon.hutton@ftco.ie]
Sent: Thursday 19 March 2020 10:30
To: Greg Simpson
Cc: Carol Stack; Thomas Watt
Subject: RE: Ballinagree Wind Farm

Greg,

Thanks for your email. I sent through a compressed copy of the pre-planning request report to planninginfo this morning. Attached is the same copy. We understand that there will be constraints with regard meetings in the coming weeks. However, we hope that we'll be able to accommodate something, whether it's a conference call or a postponement.

Kind regards,
Eamon Hutton

My previous email read:

Please find attached a pre-planning meeting request for the proposed Ballinagree Wind Farm, County Cork. Included is a cover letter and a report outlining the proposed development. The applicants for the proposed development are Coillte and Brookfield Renewables Ireland. The project is likely to be considered SID, however, we respectfully request a pre-planning meeting with representatives of Cork County Council Planning Department in order to discuss the application in relation to the proper planning and sustainable development of the area.

If you require any further information, please do not hesitate to contact the undersigned.

Kind regards,
Eamon Hutton

From: Greg Simpson <Greg.Simpson@CorkCoCo.ie>
Sent: Thursday 19 March 2020 10:01
To: Eamon Hutton <eamon.hutton@ftco.ie>
Cc: Thomas Watt <Thomas.Watt@CorkCoCo.ie>
Subject: Ballinagree Wind Farm

Hi,

I received a note from our IT section to say that your recent email could not be delivered due to the size of the attachments.
Could you try to reduce the size (.pdf) seems to work ok or send a few smaller emails?
Alternatively you could give me call on 087 213 1095
If you can't get through to me you could also try the Senior Planner, Thomas Watt on 087 418 1321.
We might not be able to arrange a face to face meeting but will be able to discuss the key issues.

Regards

Greg

www.corkcoco.ie

www.corkcoco.ie

Marie Geary

From: Sharon Casey <Sharon.Casey@CorkCoCo.ie>
Sent: Friday 3 July 2020 15:50
To: Ballinagree Wind Farm
Cc: Thomas Watt; Greg Simpson; David Ryan
Subject: Ballinagree Proposed Windfarm Scoping

Thank you for your email. I have fed back on this previously. Please see attached.

Regards

Sharon

My comments per previous emails were as follows:

I have reviewed the proposal and have the following comments. These comments are made without prejudice and are based on a review of publicly available information. I do not have access to any site specific ecological data.

Key ecological sensitivities identified in respect of this proposal include

- *sites designated for nature conservation and their associated habitats and species;*
- *protected species; and*
- *habitats of high nature conservation value.*

Based on the mapping presented, it is clear that the site boundary overlaps with the boundary of the Boggeragh Mountains Natural Heritage Area and lies immediately adjacent to the Boggeraghs to Musheramore Mountains Special Protection Area. Indeed, it is noted that the boundary of the proposed windfarm extends into the 500m buffer to the SPA, which is indicated on the CDP Wind Energy Strategy to be an area not suitable for wind energy development. The development is also located within two sensitive catchments, being the catchment of the Blackwater River Special Area of Conservation and the catchment of the Sullane River.

Aerial imagery indicates that the site supports natural and semi-natural habitats.

My first recommendation is ***to amend the proposed boundaries of the development site to not encroach into the Boggeragh Mountains Natural Heritage Area or into the area which is indicated in the CDP Wind Energy Strategy to be not suitable for wind energy development***

Ecological Survey and Assessment

Without completing detailed AA screening, it is clear that this proposal is likely to trigger a requirement for AA, and it is therefore advised that the applicants would commence the necessary survey and assessment work to compile a Natura Impact Statement in respect of this project. It will also be necessary to prepare an EIAR in respect of a wind energy development of this scale. The AA report and biodiversity chapter of the EIAR should be prepared by competent experienced ecologists. Given the nature of the landscape it is likely that ornithological, freshwater and upland habitats expertise will be required to complete necessary surveys and compile the required reports.

Without direct knowledge of the site, key issues likely to be required to focus on will be

- *potential for the project to give rise to impacts on the population of Hen Harrier which is associated with the adjoining SPA, and possibly other avian species including Merlin, Golden Plover, Red Grouse, Snipe and possibly Curlew – and there may be others. It is advised that the ecologists working to prepare the planning application documents would contact expert organisations including the NPWS, the Irish Raptor Study Group and BirdWatch Ireland and to review all available literature to identify the target species which will need to be surveyed. Surveying protocols will need to be established, and these should be designed to accord with latest guidance from the NPWS and Scottish Natural Heritage. Applicants should note that a minimum of two full years of survey for key sensitive species will be required in such a sensitive location. The information gathered during the survey stage should be used to inform design to ensure that areas around known breeding sites and key foraging areas for sensitive bird species are avoided.*
- *Potential for the project to give rise to negative effects on freshwater habitats. To this end, there should be a focus at design stage on providing for an appropriately designed surface water management system which minimises risk of release of contaminants to surface waters and ensures that there is no increase in surface water run-off from the site. Avoidance of disturbance of peat based habitats will greatly assist with this.*
- *It is generally recommended that development on peat habitats is avoided. In particular, the site should be designed to avoid direct intervention within intact peat habitats and on other habitats of high natural value.*
- *The applicants ecologists should be in a position based on desk top studies and preliminary investigations to identify any other ecological issues which would require to be addressed.*

The Biodiversity chapter of the EIAR should be prepared to accord with CIEEM Guidelines and the NIS should be prepared taking account of National and EU Guidelines as well as recent case law. The applicants are free to contact me to discuss any of this,

Regards

Sharon

From: Ballinagree Wind Farm [mailto:ballinagreewindfarm@ftco.ie]
Sent: 02 July 2020 14:47
To: Sharon Casey
Subject: Scoping Report

CAUTION FROM CORK COUNTY COUNCIL IT SECURITY: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Dear Sharon

Coillte Renewable Energy in partnership with Brookfield Renewables Ireland intend to apply for planning permission for a renewable energy development referred to as the Ballinagree Wind Farm, located in North West County Cork, near the town of Ballinagree.

Please find attached cover letter and Scoping Report which is being issued to you as part of the consultation process for the Environmental Impact Assessment report. As part of the consultation process, we would be interested in receiving any comments you may have on the proposed development relevant to your area of expertise, before 3rd of August 2020.

If you have no comment to make, I would be grateful if you could acknowledge receipt of this email. If you have any queries regarding the project, please contact us at the above email address.

Kind Regards

Ciara Finn
For and on behalf of

Eamon Hutton
Project Planner

Fehily Timoney and Company
Core House, Pouladuff Road, Cork, T12 D773
t: +353 21 496 4133
www.fehilytimoney.ie

www.corkcoco.ie

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 8

BEMP Supporting Letters

Strategic Infrastructure Development (SID)
An Bord Pleanála
64 Marlborough Street
Dublin 1

Our Ref: CLS_ABP_LTR_593

28 November 2023

Re: Board Reference Number: ABP-312606-22

Dear Sirs,

The letter refers to all the "estate right and title" of Coillte Cuideachta Ghniomhaiochta Ainmnithe ("Coillte CGA") in the properties known as Knocknagappul, Blackrock and Annagannihy which are outlined in blue in the indicative map ("Map 1") attached hereto (hereinafter called "**the Property**").

We refer to the proposal by Ballinagree Wind DAC to locate 3 Biodiversity Enhancement Management Plan areas the ("**BEMP Lands**")on the Property. The proposed locations of the BEMP Lands as they concern the Property are outlined in yellow on the Map 1 attached hereto.

Ballinagree Wind DAC (**the "Applicant")** is a company which has been established for the purposes of the development of Ballinagree Windfarm (the "Proposed Development"), a joint venture between FuturEnergy Ireland Development DAC ("FuturEnergy Ireland") and Ørsted. FuturEnergy Ireland is a 50:50 joint venture company between Coillte and ESB.

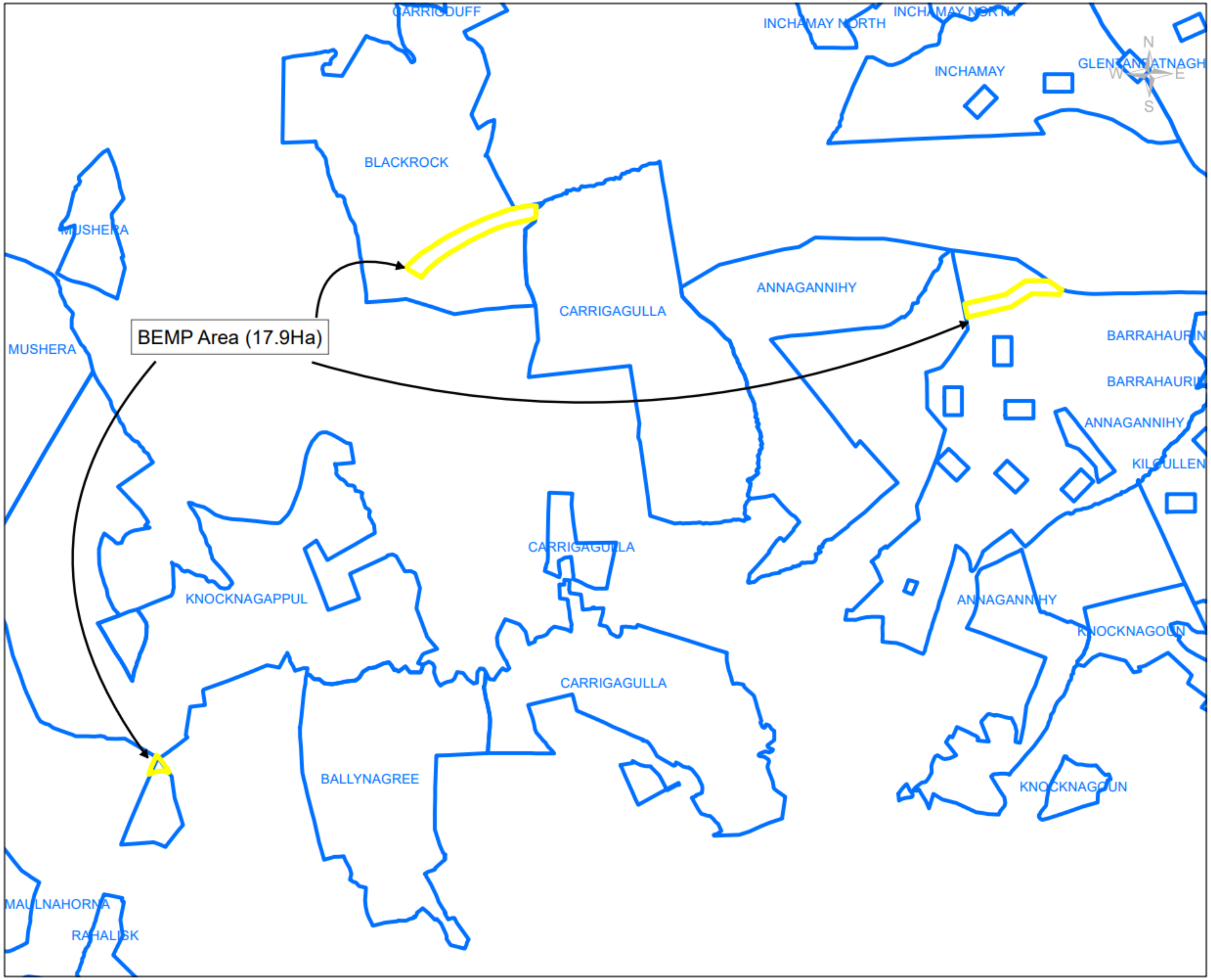
Coillte CGA as owners of the BEMP Lands and the owner of 50% of FuturEnergy Ireland has agreed, in principle, to the implementation of the BEMP and the ongoing land management measures therein on the BEMP Lands in the event planning permission is granted for the Proposed Development.

Yours faithfully,

Sent via email, bearing no signature
Brenda Molloy
On behalf of Coillte CGA

Coillte, Dublin Road, Newtownmountkennedy, Co. Wicklow, A63 DN25, Ireland.
T 0818 367 378 E info@coillte.ie W www.coillte.ie

Map 1: Map Illustrating Proposed Location of the BEMP Lands as they Concern Coillte Property (Lands Outlined in Blue)



Title Block:

Ballinagree WFS

BEMP Areas (Coillte Lands)

Legend:

Bemp Areas - 17.9Ha.

Coillte Property

Projection = IRENE95
Irish Transverse Mercator

Created: FEI GIS
Date: 07/09/2023

Produced on FEI GIS - Ordnance Survey Ireland Licence No EN 0013722 (Digital Contract) @ Ordnance Survey Ireland/Government of Ireland

Scale: 1: 15,000 @ A3

Kilometers
0 0.325 0.65 1.3

FuturEnergy Ireland

18 July 2023

Bord Pleanála Case Reference: 312606
Re: Wind Farm at Ballinagree, County Cork (the "Wind Farm")

Dear Colleague,

I confirm Orsted Onshore Ireland Midco Limited entered into Option Agreements for Co-operation Agreements for the purpose of Biodiversity Enhancement Management Plan (the "BEMP") with the appropriate landowners in respect of the Wind Farm.

I confirm the said Co-operation Agreements provide the necessary rights to carry out works in accordance with the BEMP, including the following works:

- Grassland management.
- Bog/heath/ rough grassland management.
- Rush management.
- Intact bog works.
- Scrub development.
- Hedgerow management.
- Removal of self-sown conifer saplings.
- Removal of non-invasive species.
- Livestock maintenance/restrictions.

I further confirm the said Co-operation Agreements include the necessary restrictions on the landowner to ensure that there is no interference with the BEMP.

Please note it is agreed with three landowners that Orsted Onshore Ireland Midco Limited can carry out the necessary works, in the unlikely event that the landowner does not comply with the Co-operation Agreement. The fourth and final landowner has agreed to carry out the works directly.

The Co-operation Agreements are for a term of 30 - 35 years with the option to extend the Agreement for a further period of 30 – 35 years. Three landowners have the option to terminate the Agreement after 15 years. One landowner is not entitled to terminate his Agreement, he can only review certain terms of the Agreement. It is not expected that any landowner will wish to terminate the Agreement.

I confirm Orsted Onshore Ireland Midco Limited are satisfied the Co-operation Agreements are adequate to ensure they can meet their obligations in respect of BEMP.

Yours faithfully,

Sinead O'Riordan
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