MERCURY RENEWABLES (CARROWLEAGH) LIMITED

FIRLOUGH WIND FARM, CO. MAYO AND HYDROGEN PLANT, CO. SLIGO

RESPONSE TO THIRD PARTY SUBMISSIONS AND OBSERVATIONS

PLANNING APPLICATION REFERENCE ABP-317560-23

November 2023

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DOCUMENT APPROVAL

PROJECT	Firlough Wind Farm and Hydrogen Plant	
CLIENT / JOB NO	Mercury Renewables (Carrowleagh) Limited	6129
DOCUMENT TITLE	Response to Submissions Received	

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Date November 2023	Signature	Signature

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Date November 2023	Signature	Signature

6129/403/1/SJ

FIRLOUGH WIND FARM AND HYDROGEN PLANT
RESPONSE TO SUBMISSIONS RECEIVED

CONTENTS

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1 INTRODUCTION AND BACKGROUND TO REPORT

1.1 INTRODUCTION

This document provides a response to the Third Party Submissions made by various parties to the Strategic Infrastructure Development Application Reference ABP-317560-23 made to An Bord Pleanála by Mercury Renewables (Carrowleagh) Limited, for the construction of a wind farm and hydrogen plant and related works.

Section 1 sets out details of the Proposed Development. It includes details of the project team and contributors to the planning application and EIAR.
Section 2 sets out the planning policy context and details of the land zoning of the site.
Section 3 and 4 seek to address the observations raised. Contribution from Jennings O'Donovan, Biosphere Environmental Services, EirEco Environmental Consultants, RSK (Minerex Environmental Limited), Brendan O'Reilly, Noise & Vibration Consultants Limited, Macro Works, John Cronin & Associates, Black and Veach and Risktec Solutions Limited.
Section 5 concludes why the Proposed Development should be granted.

1.2 THE PROPOSAL

The Proposed Development will comprise the construction of 13 No. wind turbines (to be known as Firlough Wind Farm), an on-site 110 kV loop-in substation and all ancillary works and the construction of an underground Grid Connection via a looped connection between the Wind Farm Substation and the existing 110 kV overhead powerline north of Bunnyconnellan village, Co. Mayo. The Proposed Development will also include a Hydrogen Plant comprising 80 MW of modular alkaline electrolyser and all associated infrastructure including; compressors, cooling equipment, refuelling points, water abstraction, storage and processing, and the Hydrogen Plant Substation which will be connected to the Wind Farm via an underground electrical Interconnector.

The full description of the Project can be found in the EIAR Chapter 2: Project Description.

The planning application was accompanied by the following reports and drawings:

1) Planning Cover Letter to An Bord Pleanála;
2) Completed Planning Application Form;
3) Details of legal owners and relevant legal interest;
4) Newspaper Notices;
5) Site Notices;
6) Copies of Notification Letters sent to the bodies prescribed by An Bord Pleanála;

7) Environmental Impact Assessment Report (EIAR) in Four Volumes:
   - Non-Technical Summary (Volume I);
   - Environmental Impact Assessment Report (Volume II);
   - EIAR Figures (Volume III);
   - EIAR Appendices (Volume IV);
   - Landscape and Visual Impact Amenity Viewpoint Photomontage Booklets;
8) Natura Impact Statement (in accordance with Article 6 of EU Habitats Directive 92/43/EEC);
9) Planning Statement;
10) Copy of the confirmation notice, issued by the Department of Housing, Planning and Local Government, confirming notification to the EIA Portal;
11) Drawing schedule and planning application drawings consistent in size and scale with typical large-scale developments such as a wind farm. The scales of the drawings have been issued to and agreed with An Bord Pleanála;
12) Letter from the Applicant confirming that they will be a Statutory Undertaker for the purpose of the proposed grid connection works; and
13) CD with AutoCAD version of the Site Boundaries.

1.3 CONTRIBUTORS

The planning application and this response to submissions was supported by inputs from competent experts in their field as set out in **Table 1.1.**

Table 1.1: List of Contributors

Topic	Contributor/Organisation	Lead Author's Qualification	Years of Experience
Project Manager	Jennings O'Donovan & Partners Limited (JOD); Sean Molloy	B.Eng., M.Sc., C.Eng., MIEI, Dip.PM.	14
Environmental Scientist	JOD; Sarah Jones	B.Sc. (Hons). MSc.	2
	JOD; Shirley Bradley	B.Sc.	2
	JOD; Aileen Byrne	B.Sc.	2
Civil and Roads Design	JOD; Anthony McCoubrey	National Certificate in Civil Engineering	35
	JOD; John Doogan (JD)	National Diploma in Civil Engineering	32
	JOD; Cavelle Hendry (CH)	B.Sc.	2
	JOD; Kenneth Dunne (KD)	B.Sc.	2

Topic	Contributor/Organisation	Lead Author's Qualification	Years of Experience
Review and consultation	JOD; David Kiely	B.E., M.Sc., Eur.Ing., C.Eng., FIEI, MICE, F.RConsEI	40
Planning Consultant	JOD; Breena Coyle	BA., MSc., MRTPI., IPI.	13
Biodiversity & Natura Impact State	Biosphere Environmental Services; Brian Madden John Conaghan John Curtin David McGillycuddy EirEco Environmental Consultants; Paul Murphy	 BA (Mod.), PhD, MCIEEM. BSc., PhD, MCIEEM. BSc. BSc. MSc., Dip Aq Biol., CEnv., MCIEEM., MIFM.	 39 29 13 2 25
Hydrology and Hydrogeology **Soils and Geology**	RSK (Minerex Environmental Limited); Cecil Shine Sven Klinkenbergh Chris Fennell Lissa Colleen McClung	 BSc., MSc., PGeo., EurGeol. BSc., PG Dip., M.CIWEM., BA (mod), PG Cert., BSc., MSc., Ph.D.	 20 10 5 2
Noise Assessment	Brendan O'Reilly, Noise & Vibration Consultants Limited; Brendan O'Reilly Irwin Carr Consulting; Shane Carr	 MPhil., ISEE., SFA., EAA. BSc (Hons)., MIA., CIEH.	 35 22
Landscape and Visual Impact Assessment	Macro Works; Richard Barker		 16

Topic	Contributor/Organisation	Lead Author's Qualification	Years of Experience
		MLA., BA Env., PG Dip for., MILI.	
Archaeology	John Cronin & Associates; Tony Cummins David Murphy	 BA., MA. BA.	 27 11
Hydrogen Consultants	Black and Veach; Ben Stevenson Natalie Karmanov	 B.Sc., MSc., Construction Skills Certificate Scheme (CSCS). Fundamental Hydrogen Safety Credential, Center for Hydrogen Safety (American Institute of Chemical Engineers), B.Sc.	 4 15
Health and Safety Consultants	Risktec Solutions Limited; Nick Taylor Jonathan Wiseman David Reis	 MPhys (Hons)., Chartered Physicist., BSc (Hons).	 21 14 15
Telecommunications consultants	Al Bridges David McGrath Patrick Tinney	 B.Sc., B.Eng. B.Eng.	 5 3
Traffic and Transport Consultants	Collett & Son; Steven Mangham	 BTech in Civil Engineering.	 12

2 LEGISLATIVE AND PLANNING POLICY CONTEXT

The Planning Statement submitted with the application sets out the planning policy context relevant to the Proposed Development by providing an overview of the international, national and regional legislation and policy of relevance, as well as a detailed review of the planning policy framework within which the application will be assessed. Throughout the Planning Statement, renewable energy is identified as being required to play a vital role in mitigating climate change by transitioning to a low carbon economy and society. By investing in

renewable energy, Ireland can promote sustainable economic development using its own, secure and clean energy.

All planning applications have to be determined on their individual merits with due consideration given to the overall planning balance of a scheme. While many development proposals will encompass both positive and negative aspects that require consideration, planning weight should air on the side of a 'presumption in favour of development unless material considerations indicate otherwise' as per the paragraph 11 of National Planning Framework. The pressing need to address climate change, the challenges to energy security giving rise to the adoption of Regulation (EU) 2022/2577, and the presumption of overriding public interest being given to renewable energy projects, makes giving additional renewable energy projects, such as the Proposed Development this 'presumption in favour of development unless material considerations indicate otherwise' more important.

The Proposed Development contributes to supplying the national demand for renewable energy, which in the context of the ongoing climate emergency is an urgent Irish national priority. While renewable energy in Ireland has come a long way, there is still a shortfall in where the nation needs to be to achieve increasing targets. There is a clear national mandate to accommodate significant onshore wind within the next decade with The Climate Action Plan 2023 setting a 9 GW target for installed wind energy capacity by 2030. In May 2022 this was 4.3 GW, leaving a shortfall of 4.7 GW to be achieved in the next 8 years. The Proposed Development includes 65 – 78 MW of installed capacity wind energy that can be converted into green hydrogen, to provide a clean and low-cost fuel that can be used to decarbonise sectors that have been difficult to electrify, making it a vital contribution to the transition to a low carbon economy.

The Regional Spatial and Economic Strategy (RSES) for the Northern and Western Region supports the increased use of renewable energy sources to transition the region to a low carbon, and environmentally sustainable economy. The Mayo and Sligo County Development plans reinforce the national and regional energy policies. The Wind Farm Site falls in a 'Preferred' area for wind farms In the Renewable Energy Strategy for Co. Mayo 2011-2020.

Green hydrogen is featured in the Climate Action Plan 2023, National Energy and Climate Plan, National Energy Security Framework, Renewable Fuels for Transport Policy Statement, the Consultation on Developing a Hydrogen Strategy for Ireland, Mayo County Development Plan 2022-2028 and multiple European level policies, including the EU Hydrogen Strategy, European Green Deal and REPowerEU.

2.1 HYDROGEN STRATEGY IRELAND

Since the Application for the Proposed Development was submitted, Ireland's National Hydrogen Strategy was published on 12th July 2023. According to the strategy, the three primary strategic reasons for developing an indigenous hydrogen sector in Ireland are decarbonisation, energy security and developing industrial opportunities.

Decarbonising our economy

Ireland is on a pathway to net-zero emissions by no later than 2050. Delivering on this legally binding target will require no less than a transformational change of our entire energy and economic ecosystem. Indigenously produced renewable hydrogen can play a significant role in enabling this transition as it does not emit carbon dioxide (CO_2) when used. Renewable hydrogen (often referred to as "green hydrogen") has the potential to become a zero-carbon substitute for fossil fuels in many sectors of our economy considered hard to decarbonise, where other solutions such as direct electrification are not feasible or cost effective. This is the primary reason for delivering the National Hydrogen Strategy.

Enhancing our energy security

Hydrogen can also play an important role in ensuring the security of Ireland's energy supplies into the future. Ireland imported 77% of its energy supply in 2021, up from 72% in 2020. Harnessing Ireland's wind energy into the production of renewable hydrogen provides a significant opportunity for Ireland to reduce our reliance on imported fossil fuels and potentially even achieve energy independence. Given its high energy density as a gaseous fuel, hydrogen is also well suited to support the development of large-scale seasonal storage applications, helping to manage the variability of renewable energy sources such as wind or solar, or the seasonality of demand patterns across the year. Fossil fuels are used as a backup to renewables today, but renewable hydrogen can offer a zero-carbon alternative in the future. This was recognised in the National Energy Security Framework, which called for the development of a National Hydrogen Strategy to support Ireland's energy security into the future.

Creating industrial and export market opportunities

Whilst supporting decarbonisation and energy security are the foremost goals of delivering the National Hydrogen Strategy, there are also potential industrial and export market opportunities that may arise from its development. Given our vast renewable resources, Ireland has the potential to produce renewable hydrogen in excess of our own needs in the long-term. With many countries across Europe having identified a long-term need for

renewable and low carbon hydrogen imports to meet their own decarbonisation needs, Ireland could be well placed to supply these markets. Developing an export market for renewable hydrogen could deliver many benefits for the development of hydrogen domestically. An export market could help to deliver the necessary economies of scale needed to reduce production costs, allowing hydrogen to become competitive and strengthening the business case for large scale infrastructure such as a national hydrogen network to be developed. An export market could also deliver economic growth and the creation of many high skilled jobs in the renewable energy sector across Ireland. In recognition of this fact, the National Hydrogen Strategy also sets out actions to explore these opportunities further.

The strategy states:

"*The Climate Action and Low Carbon Development (Amendment) Act 20214 has put Ireland on a legally binding path to net-zero emissions by no later than 2050, and to a 51% reduction in emissions by 2030. To achieve this, the transition must be made to a climate resilient, biodiversity rich, environmentally sustainable, and climate-neutral economy. Realising these ambitions will require a* ***coordinated effort across Ireland and every economic sector will be involved****. It requires no less than a* ***national transformation*** *over the coming years in how we work, travel, heat our homes, source our energy, and use our land."*

And

"Indigenously produced renewable hydrogen offers an incredible opportunity for Ireland and could play a significant role in enabling this transition to a net zero economy. As it does not emit carbon dioxide (CO_2) when used, renewable hydrogen (often referred to as "green hydrogen") has the potential to become a zero-carbon substitute for fossil fuels in many hard to decarbonise sectors."

In order to kick start production, Ireland will prioritise the scale up and production of renewable hydrogen. The strategy notes that initial hydrogen applications are likely to utilise compressed tankering solutions for transport. The Proposed Development will use this technology.

Key Messages in the Strategy include:

- Decarbonised gases like hydrogen should be a critical component of Ireland's net zero integrated energy system.
- Its use should be targeted towards "hard to decarbonise" sectors.
- Ireland has a strategic opportunity to produce renewable hydrogen at scale, with potential to produce more than our own indigenous needs.

- The starting point is different in Ireland as limited industrial demand for immediate use exists today, compared to other jurisdictions.
- The establishment of a renewable hydrogen industry in Ireland can play an important role in Ireland's future energy security, supporting continued economic growth, opening potential new markets, including exports, and domestic industrial opportunities.

3 RESPONSE TO STATUTORY BODY SUBMISSIONS AND OBSERVATIONS

3.1 SLIGO COUNTY COUNCIL

Renewable Energy

The Applicant would first like to acknowledge the positive observations in relation to renewable energy and national policy, including hydrogen in the Sligo County Council submission:

"The provision of renewable energy to meet national energy needs, replace fossil fuel use and to contribute towards climate change mitigation is fully recognised and supported at all levels of national, regional, and local planning policy including within the National Planning Framework (NPF), the Northern & Western Regional Spatial & Economic Strategy 2020-2032 (RSES) and the objectives of the County Development Plan 2017-2023 (as varied and extended). In addition, the National Hydrogen Strategy (2023) prioritises the scale up and production of renewable hydrogen, noting that, prior to 2030, hydrogen will be predominantly produced from grid connection electrolysis from surplus renewables. The Strategy goes on to include for various options for hydrogen to replace fossil fuels including within commercial and residential heating, road and rail transport, and maritime uses. As such, given the nature of the proposal, and the objectives and strategy outlined at national, regional, and local level, ***the principle of the development as proposed within the county, and which is of a strategic scale, should be fully supported."***

Sufficiency of proposed mitigation measures

The Applicant would also like to acknowledge the comments around the sufficient nature of the mitigation measures:

"It is noted however that there will be a range of local level effects on the environment that may be impactful. At a general point it is considered that the proposal includes sufficient mitigation measures, as detailed within the EIAR to minimise these impacts to an acceptable level."

Economic benefits of the proposed project

The submission also notes the importance of the positive economic benefits of the Project:

"It should also be noted that there would be associated benefits of the development including of an economic nature (e.g. job creation and economic spend in the area). These are also detailed within the EIAR (within the section on material assets and other issues) and weight should be given to these matters when forming a view on the application."

Landscape and Visual

In general the Sligo County Council submission is supportive of the Proposed Development and because it is the element contained within their jurisdiction, the focus is on the Hydrogen Plant element of the Proposed Development. It indicates an acceptance of the localised nature of the landscape and visual impacts of the Hydrogen Plant. But queries if more could have been done to further reduce such effects:

"*It is considered that while the proposed hydrogen plant would have a visual impact on the rural landscape given its scale and nature (as an untypical addition to a rural setting) due to the topography of the site and surrounding area any impact would likely be of a* ***localised nature only****. However, it is noted that within the submission there is limited information contained on the design detail and visual appearance of the hydrogen plant / electrolyser building to demonstrate the design quality and appropriateness of the appearance of the building, given its scale, to this rural setting (e.g. CGI images, design statement, site sections, evidence of consideration of detailed siting, materiality). The submitted information is limited to basic elevation and plan detail only. While it is understood that the development would likely be of a utilitarian appearance a more detailed examination of the site context and further understanding of the requirements of the building may have led to a more informed design or siting and possible reduction in the scale of the building and therefore visual impact of the development. The careful consideration of this matter by ABP is recommended."*

By way of response, it is considered important to highlight those measures that were undertaken to examine and optimise the siting of the Hydrogen Plant and inform its design. These are set out below.

The Hydrogen Plant Site was examined at an early stage in the design process to determine likely visibility of a 'block model' that represented the likely scale and massing of the Hydrogen Plant electrolyser building. Four representative viewpoints were selected and wireframe montages prepared from the baseline photography captured at those viewpoint locations. The site had been selected partly on the basis of its discrete low-lying location within the rolling topography and vegetative screening context and the resulting wireframe montages confirmed that approach as the electrolyser building was shown to be highly screened. Because of this result from the early stage siting assessment, it was considered that the selected site was an appropriate one.

Notwithstanding the high degree of screening indicated by the early stage siting analysis, consideration was also required in relation to the micro-siting particularly of the proposed

electrolyser building within the broader Hydrogen Plant Site. A degree of site levelling / terracing was a design requirement to provide a flat platform for the Hydrogen Plant. Due to the balance of cut and fill across the site, this allowed the electrolyser building to be nestled into the slopes of the site at a lower level that it would in an unmodified site. The resulting toe slope of the southern 'fill section' of the site could then be used for proposed mitigation planting. While this native woodland planting did not appear in any of the photomontages (due to inherent site screening), and therefore, had limited visual impact mitigation benefit, it was considered beneficial in general landscape terms to help assimilate the Hydrogen Plant into its surrounding landscape context and for biodiversity purposes. The more elevated western boundary of the site was also proposed for planting with a native woodland mix and this did have a minor screening benefit for views from the N59.

Due to its rural setting, it was considered from an early stage that the optimal tone / material for the electrolyser building would be a dark olive green, similar to that applied to agricultural farm sheds throughout the country. Although the electrolyser building was to be of a much larger scale than a typical farm shed, only its roof profile was likely to be even partially revealed to surrounding viewers and thus, it is likely to be read as an agricultural structure in such circumstances and given little attention.

For the reason outlined above, the siting and design of the proposed Hydrogen Plant and particularly the electrolyser building, were given careful consideration from an early stage of the design process. Because the embedded mitigation, represented by the siting, site levelling, colour scheme and perimeter planting were revealed in the visual impact assessment to be very successful, it was not considered necessary to provide aerial CGI views of the proposed hydrogen plant. To do so can have the effect of overemphasising the effects that were duly assessed from surrounding visual receptors, at ground level within the public realm. However, it is accepted that CGI images can be used to illustrate the overall design of a development in a clearer manner than architectural plans / elevations and substantially screened photomontages.

<u>Observations on traffic impact</u>

In terms of Traffic, the Sligo County Council submission states that:

"It is noted that the assessment includes a Road Safety Audit however it is considered this does not appear to fully address the implications of the safety of the new junction to the N59 and instead focuses on the design of the roundabout access."

This has been fully assessed in the EIAR. The proposed junction has been subject to a Stage 1 road safety audit carried out by an independent audit team approved by the TII. The road safety audit report is included in Appendix 15.3 of the EIAR and outlined in Section 15.5.16 of Chapter 15: Traffic and Transport. To avoid repetition, the safety of this junction is addressed in Section 4.7.2 of this response.

The submission also states:
"Any decision on the intensification of the use of the access onto the N59 should be consistent with previous advice and responses of Tll relating to other development (including one-off dwellings) seeking permission for a new access or intensification of the use of an existing access onto the N59*. Concern that the proposed access onto the N59 would be prejudicial to highway safety given the number and nature of proposed vehicular movements serving the hydrogen plant."*

The proposed realigned junction between the N59 national secondary road and the L6612 local road at Carraun, Co. Sligo has been designed as a simple priority junction with priority for N59 through traffic on the N59 National Road. The junction is located in a 100 km/h speed limit zone. The junction has been designed in accordance with TII Specifications, primarily DN-GEO-03036 Geometric design of junctions. The design team have met with representatives of Sligo County Council Roads Department to discuss the location and layout of the proposed junction. The layout of the proposed junction is shown on Drawing No. 6129-PL-121 included in the planning application drawings. The proposed junction has been subject to a Stage 1 road safety audit carried out by an independent audit team approved by the TII. The road safety audit report is included in Appendix 15.3 of the application. The recommendations of the auditors have been accepted by the design team as shown in the audit feedback form appended to the audit report and the recommendations of the audit have been incorporated into the final junction design. Junction design to TII specification, autotrack analysis to replicate the turning movements of vehicles, land acquisition for junction realignment / visibility splays and the road safety audit process have resulted in a safe and serviceable junction. The junction will provide access to the proposed Hydrogen plant and to the existing L6612 local road at the roundabout junction. The layout of the N59 junction has been designed to facilitate future widening of the N59 National Secondary Road.

<u>Applicants control of land adjoining the road junction</u>
To address this point made by Sligo County Council:
"Furthermore, it is unclear if the applicant has adequate control from adjoining landowners to maintain the sightlines at this new junction."

The Applicant would like to clarify that all consents are in place to ensure adequate sight lines from this junction. The junction is not new, it is an existing junction Section 15.3.5.6 of the Traffic Chapter of the EIAR includes a traffic count at this existing junction.

Set back from sensitive receptors

The Sligo County Council response highlights the set back of the Hydrogen Plant from sensitive receptors, stating that:

"In relation to the hydrogen plant site, it is well removed from any sensitive premises (e.g. residential development) within Co Sligo. This would negate against many impacts that typically arise from development such of loss of light or overshadowing. Otherwise, there would be the potential for visual impacts (discussed above) for near neighbours and traffic impacts which would impact on local populace, road users etc."

Focus on impacts of wind farm

"As a general point, it is noted that the submitted application and assessment tends to focus of the impact on the wind energy development and with less emphasis on the hydrogen plant. While this is partly understandable, it should be noted that, on an individual basis, the hydrogen plant site is a significant scale of development. As such, the Board, in making its decision, should ensure that appropriate weight and consideration should be given to this aspect of the development and the potential impacts on the environment and the proper planning and sustainable development of Co. Sligo."

The Applicant has gone to considerable lengths to ensure that the Project as a whole, including the Wind Farm, Hydrogen Plant and indeed functionally interdependent development not part of the planning application has been assessed in the EIAR. As part of the scoping exercise, it was identified that some potential significant impacts were more relevant to either the Wind Farm or Hydrogen Plant and the focus of the technical assessments reflects this. For example, Landscape and Visual Impact was considered to be on a more significant scale for the Wind Farm than the Hydrogen Plant and the focus of this assessment reflects this. As input water and wastewater treatment and discharge are required for the processes of electrolysis at the Hydrogen Plant, the hydrological assessments are more focused on the Hydrogen Plant Site. The Applicant firmly believes that it has presented a comprehensive EIAR which has addressed all the likely significant impacts of the Project as a whole on the environment. To the extent the Board believe that additional analysis or information is required the Applicant will gladly respond to any request for additional information the Board may make.

Adequacy of community consultation questioned

Thereafter the submission includes transmission of council meeting notes in relation to the Project, this includes:

"A resolution of the Member's was passed to request an Oral hearing. Inadequate consultation has taken place with local residents prior to lodging the SID application particularly given the nature, scale and significance of the proposed development. Regard should be given to local resident's concerns raised directly to ABP through the consultation process."

The Applicant acknowledges Sligo County Council's request for an oral hearing and fully accept a decision whether to hold an oral hearing or not is entirely at the discretion of the Board. That said the Applicant believes that an oral hearing is not necessary in the present circumstances as all relevant issues have been adequately addressed in the application and in the third-party submissions and observations and giving the pressing need to accelerate the deployment of renewable energy an oral hearing would be contrary to this wider public interest.

The Applicant has provided meaningful public engagement which has enabled the public to influence the design of the Project. As per EIA regulations, a Pre-Application Community Consultation (PACC) report was included with the EIAR in Appendix 1.3. This outlined the active steps taken by the Applicant to engage with and take into account the views of local communities in the design of the Proposed Development.

The potential effects of the Proposed Development were shared with the public along with the mitigation measures implemented to avoid, reduce or remediate these. At the Public Information Days (PIDS) community members raised concerns regarding topics such as water abstraction, water discharge, landscape and visual and hydrogen safety. These were discussed in depth at the PIDs and in subsequent communication with the public. A high number of specialist consultants were on hand at the PIDs, including hydrogen specialists to discuss the Project and answer questions (see section 3.6 of the PACC). Visuals of the Project were shared and concerns around specific views were discussed. Approximately 150 people attended the two days and discussions were held with many of the community members who have now raised submissions. The PACC also documents the practical effects of the engagement, i.e. the changes made to the Project as a direct result of community engagement. This included relocating the Hydrogen Plant, changes to the layout of the Hydrogen Plant and changes to the design of the wastewater treatment and monitoring. Extensive hydrological impact assessment has been undertaken during the EIA including assessment of the worst case scenarios. Mitigation has been designed to prevent significant adverse environmental impacts.

Section 4.1 of this report provides further detail on consultations and engagement with local communities.

The conclusion of the submission states that:

"A *review of the submission and accompanying assessments has tended to identify that the local impacts associated with the development can be mitigated to an acceptable level."*

The Applicant welcomes this assessment.

Other topics in the meeting notes include the below list. To avoid repetition in this submission these are addressed in the following sections of this response.

- Highways & Access: Section 4.6
- Hydrology: Section 4.5
- Hydrogen policy and premature development: Sections 4.2.1 and 4.2.4
- Turbary rights/Peat cutting: Section 4.13.1 and response to the Minister of Housing in Section 3.5)

3.2 HEALTH AND SAFETY AUTHORITY

The Health and Safety Authority (HSA) were consulted throughout the design and planning stage, this is outlined in Section 1.10.2 Scoping of Chapter 1: Introduction. Briefly this included:

A consultation meeting with the HSA was conducted on 1st July 2022. Key topics discussed with the HSA are outlined in the EIAR Chapter 1: Introduction, Section 1.10.2. In February 2023 a draft Quantitative Risk Assessment (QRA) was submitted to the HSA for review. A second scoping meeting was conducted on 21st March 2023. The focus of the discussion centred on the HSA comments on the QRA submitted for review. The HSA confirmed that the revised Technical Land Use Plan, which includes guidance on hydrogen production, had been published and should be referenced in the updated QRA.

The submission provided by the HSA includes 8 points in relation to the Quantitative Risk Analysis (QRA). The Applicant is satisfied that these points can be comprehensively addressed but to do so would require an updated/revised QRA to be submitted. The Applicant notes the Board's invitation to make a submission on the submissions and observations received by the Board from statutory consultees and third parties, specifically precludes the submission of additional or supplementary reports. The Applicant would welcome the opportunity to submit an updated/revised QRA and respectfully requests the Board to afford it the opportunity to do so by making a request pursuant to section 37F(1)(a) of the Planning

and Development Acts 2000 to 2022 requesting the Applicant to submit an updated QRA addressing the points raised by the HSA. Notwithstanding the Applicants request to submit a revised QRA we set out below our response to each of the points raised by the HSA. The QRA model has been rerun with the suggested amendments, these do not change the overall conclusions and the updated model can be set out in the new QRA should it be requested.

HSA points and responses:

"1. Confirmation that the individual risk contours presented in Section 4 take into account a residential population being both indoors and outdoors, as set out in Section 2.5.3 of the Authority's Guidance on technical land use planning (TLUP)."

The individual risk contours have been derived based on adjusted vulnerabilities which take into account 90% indoor occupancy (in a CIA-3 type building) and 10% outdoor occupancy.

"2. The following queries on assumption sheet A03:

a. The temperature for F2 weather conditions is not stated. TLUP Methodology states that the temperature for TLUP purposes should be 10°C for F2 weather conditions?"

"b. The split of D5 and F2 weather conditions is shown as 92.88% and 6.93%, respectively. This differs from the TLUP Methodology where 80% D5 and 20% F2 are set out in 2.5.4, to be amended."

2a. The QRA model has been updated to assess 15°C for D5 and 10°C for F2 and the assumptions have also been updated. The updates have a minor impact on contours and do not change the conclusions of the QRA.

2b. The wind speed and directional probability have been obtained from The Irish Meteorological Service, using the nearest weather station to site (Knock Airport: https://www.met.ie/climate/available-data/historical-data). The analysis therefore takes into account the region-specific wind direction probability. If a generic approach is required, then the windrose data can be normalised such that there is an 80% D5 and 20% F2 split. Please refer to the table below showing the (alternative) normalised windrose data.

	Wind "from" Direction (degrees, North = 0)												
	0	30	60	90	120	150	180	210	240	270	300	330	Total
F2	1.90%	1.09%	0.99%	0.90%	1.75%	2.96%	2.36%	2.22%	1.47%	1.42%	1.37%	1.56%	20.00%
D5	4.35%	2.71%	1.64%	3.36%	6.39%	8.43%	9.08%	12.07%	9.42%	9.86%	7.35%	5.33%	80.00%

"3. The following queries on assumption sheet A05:

a. Outdoor fixed installations

i. The frequency of jet fire for 10 mm pipe leak is one order of magnitude lower than that stated against Event# 073 in Table 36 of the TLUP Methodology, to be corrected."

The frequency of jet fire for 10 mm leak has been corrected in the assumptions register. Note however that this does not impact the QRA since no "outdoor fixed installations" have been assessed. The outdoor equipment is limited to H_2 storage (modelled as hydrogen storage cylinder array as per HSA guidance Table 38), road transport loading arms, road transport units or onsite pipeline.

"ii. The frequency of flash fire for 10 mm pipe leak is one order of magnitude higher than stated against Event# 075 in Table 36 of the TLUP Methodology, to be corrected."

Please refer to response to 3ai above, "outdoor fixed installations" have not been modelled. The value in the assumptions register has been updated accordingly.

"b. Indoor fixed installations

i. The frequency of jet fire for 10 mm pipe leak is two orders of magnitude lower than that stated against Event# 079 in Table 37 of the TLUP Methodology, to be corrected."

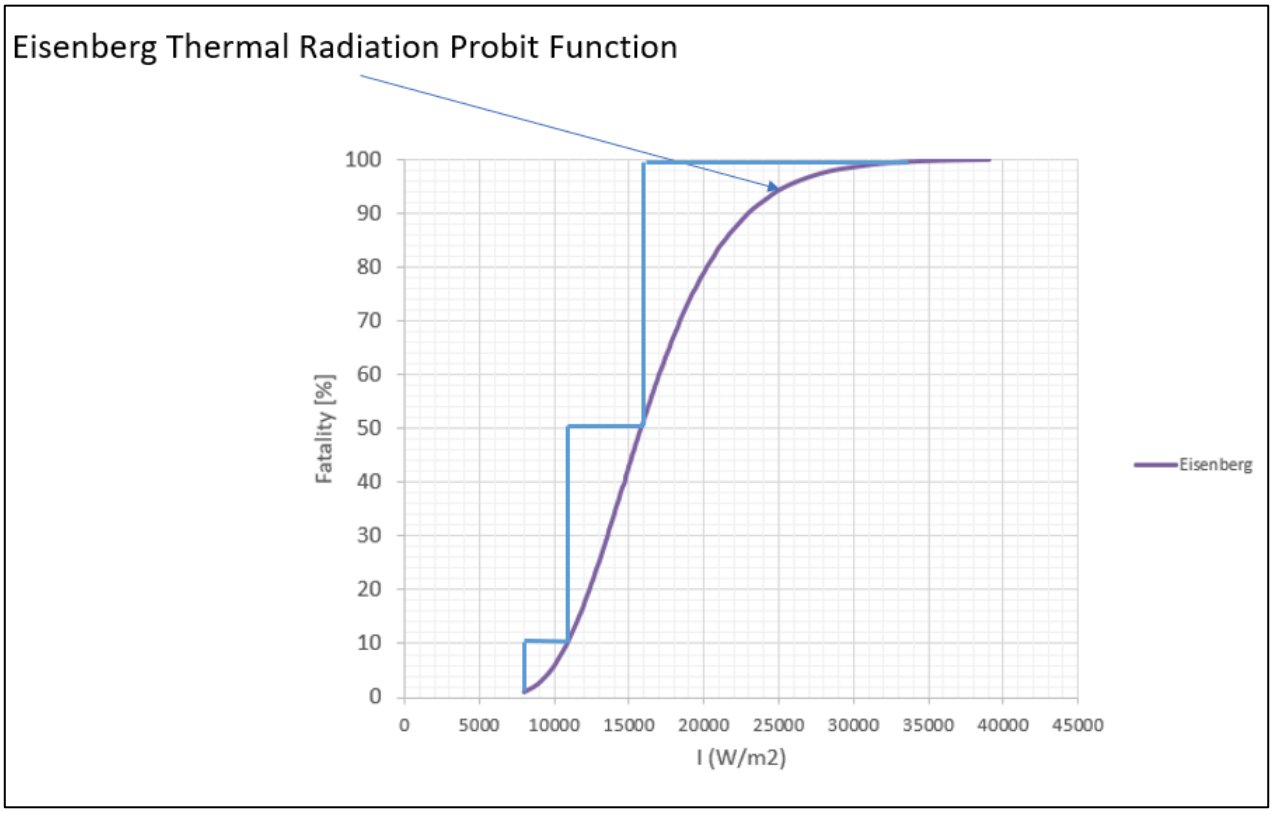
3b i. This is a typographical error in the assumptions register. Please refer to Appendix C of the QRA report, which shows all scenarios modelled and the associated frequencies. Here it can be seen that the jet fire frequency for 10 mm leak is as per the HSA guidance document. The tables in the assumptions registers will be updated to reflect HSA guidance (and those applied in the QRA model).

"4. The following queries on assumption sheet A06:

a. In relation to indoor and outdoor vulnerability values, clarity is required on the thermal radiation values used. The TLUP Methodology states that a thermal radiation value of 8.02 kW/m^2 leads to 1% fatality and a thermal radiation value of 10.9 kW/m^2 leads to a 10% fatality. However, the QRA states that a thermal radiation value of >8.02 kW/m^2 would lead to 1% lethality and >10.9 kW/m^2, this appears to be correct — the level of fatality is not a step function, rather it should be a continuous probit relationship. The lethality varies from 1% to 10% between 8.02 kW/m2 and 10.9 kW/m2. Further clarity required here."

Currently a threshold approach (i.e. step function) for thermal radiation modelling has been performed for both indoor and outdoor vulnerabilities (as per Table 9 of the HSA TLUP guidance).

The model has been updated to incorporate a step function that lies above the probit function for outdoor explosion and thermal radiation (as shown in the graph below).



This means that the vulnerability predicted for outdoor explosion and thermal radiation is more conservative than the probit function. To account for the 90% occupancy indoors and 10% occupancy outdoors, the vulnerabilities for the step functions (indoors and outdoors) have been weighted by the occupancy factor to derive a single set of vulnerability levels. This enables presentation into an individual risk contour in Safeti.

The updates have a minor impact on contours when compared to the QRA submitted with the EIAR. See **Figures 3.1** and **3.2** below.

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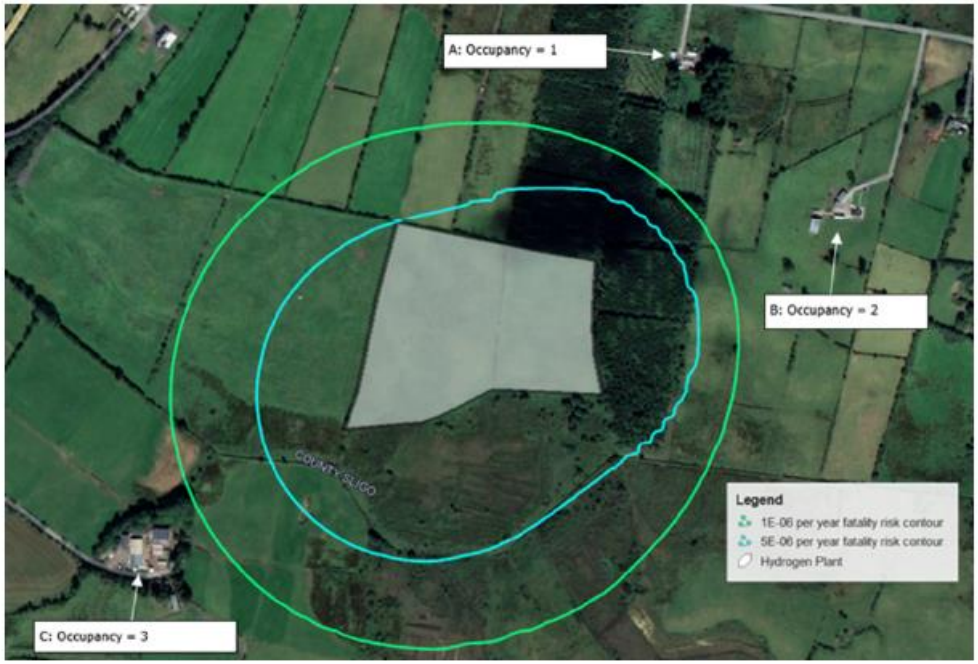


HSA comments update

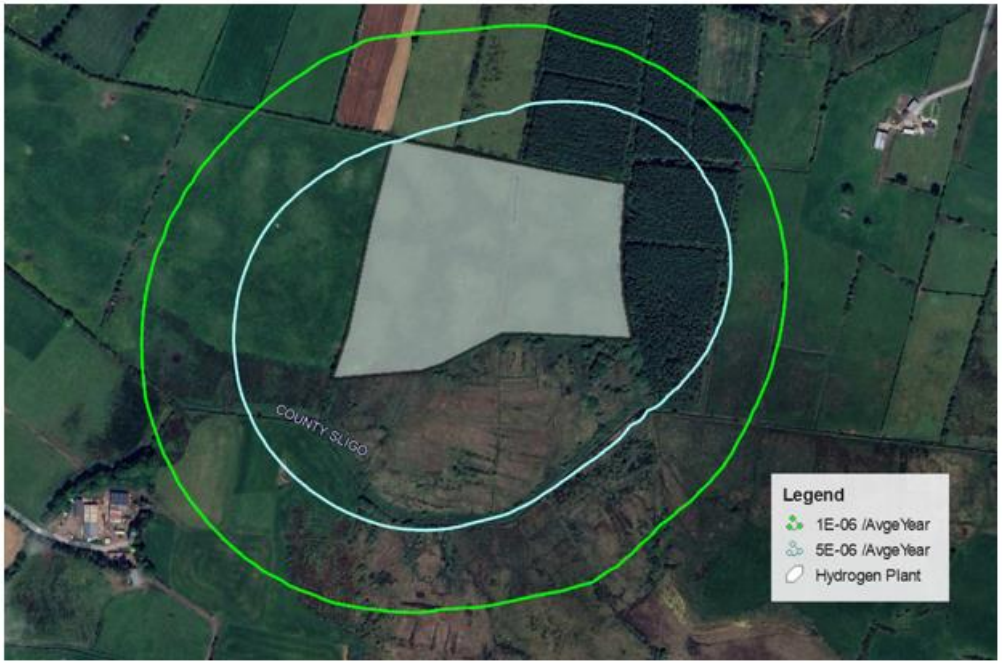
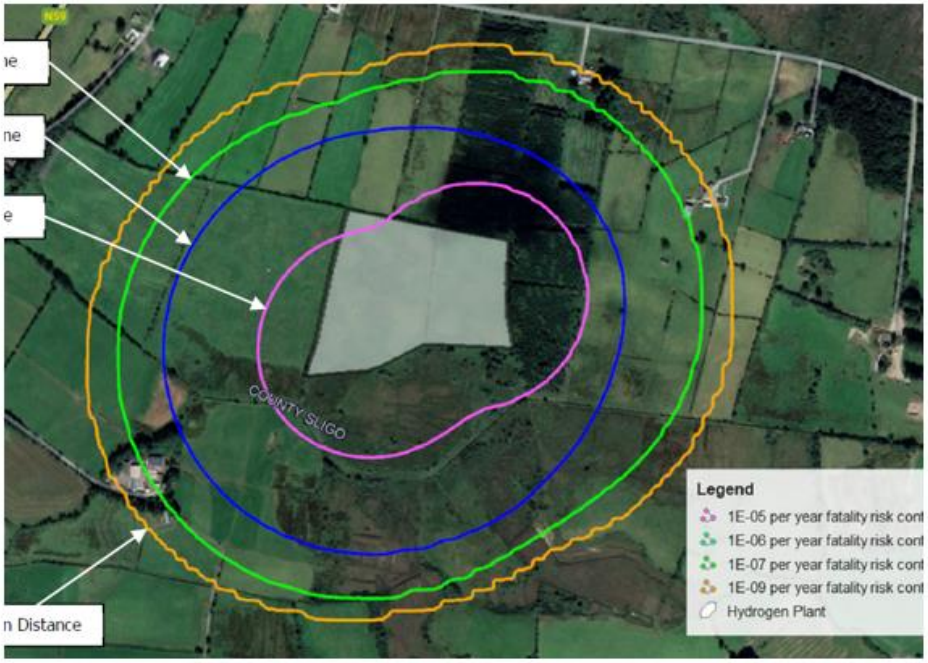


Figure 3.1: Consultation Distance and Inner Risk Zones

Report Issue 3.0



HSA comments update

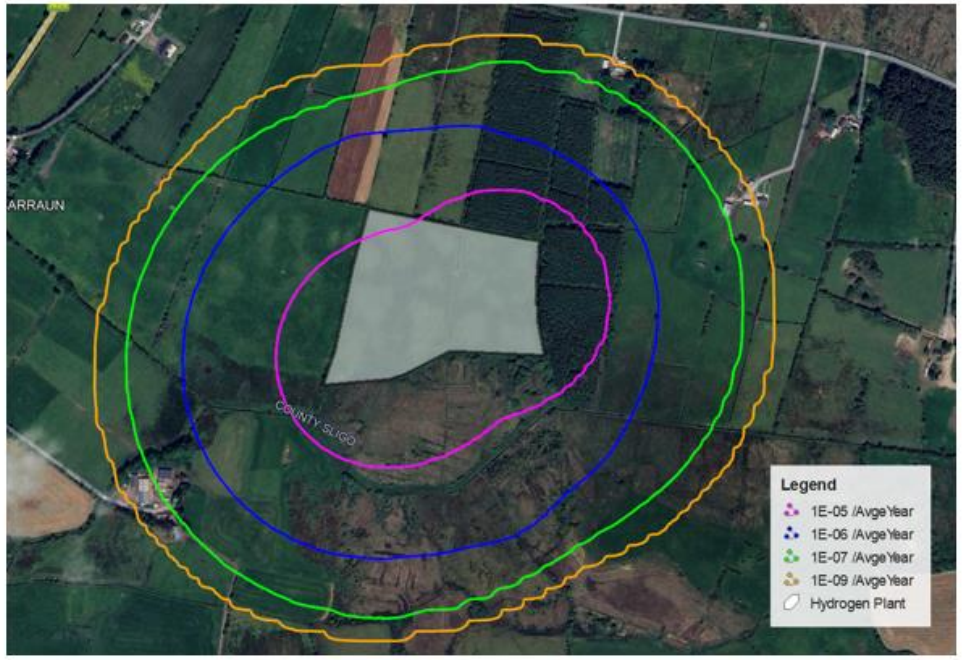


Figure 3.2: Individual Risk Contours from the Hydrogen Plant (relevant to new establishments)

"5 Appendix B: IS-11 states that it is assumed that 5 loading bays are in operation (with 1 in standby), whereas Appendix C mentions 7 loading arms for IS-11. Inconsistency to be resolved / justified."

Appendix C reflects the QRA modelling approach (i.e. 7 loading arms have been modelled). Appendix B has been updated.

"6 Appendix C: Unclear how the LOC frequencies are calculated. There is no explanation, and it does not match the scenarios and frequencies described in Assumption Sheet ID A05. Further explanation required."

If deemed necessary by the Board, further descriptive explanation can be added to Appendix C of the QRA.

Note that the LOC frequencies have been adjusted to take the following factors into account:

- Number of equipment sources per release point in Safeti (this is typically 1 equipment item per release point, with the exception of the Dryers (2), Compressors A/B (2) and loading arms (7)).
- Operating factor (all 100% within the exception of the Dryers and Compressors A/B where there is 100% standby i.e. one operating, one standby, hence a 50% operating factor has been applied to each of these).
- Number of cylinders ""N"" per cylinder storage array as per HSA TLUP guidance Table 38 (Appendix C will be updated to include the assumed value).
- Conversion of loading arm leak frequencies from per hour to per year.

The model has been rerun applying the adjusted frequencies, this does not change the overall conclusions and, if requested by the Board, the updated modelling can be set out in an updated QRA.

"7. Appendix D: The overpressure values presented are not consistent with those set out in section 2.4 of the TLUP, review and amend or provide justification for differing over pressure values."

The overpressure values in Appendix D of the QRA have been updated to those values provided in the TLUP guidance document. This does not change the overall conclusions of the QRA. The updates have an insignificant impact on contours, **see Figures 3.1** and **3.2** above.

"8. The report would benefit from more clarity in terms of the events which are most significant in terms of off-site risk."

A summary of the events identified in the submitted QRA which are most significant in terms of off-site risk are set out below.

Inner Zone South West

Refer to the point in **Figure 3.3** below for where contribution has been assessed. Risks at this location are dominated by:

- Instantaneous failure of road transport units (located in the storage area), resulting in a vapour cloud explosion
- Instantaneous failure of the H_2/Lye Separator resulting in vapour cloud explosion
- Instantaneous failure of the Scrubber resulting in vapour cloud explosion
- Instantaneous failure of the road transport units (located onsite in the loading bays) resulting in vapour cloud explosion
- Loss of entire contents through largest connection of the H_2 Storage resulting in vapour cloud explosion

Figure 3.3: Inner Zone South West

Consultant Distance, Outer Zone and Middle Zone South West

Refer to the points in **Figure 3.4** for where contribution has been assessed. Risks in these locations are dominated by:

- Instantaneous failure of road transport units (located in the storage area), resulting in a vapour cloud explosion

Figure 3.4: Consultant Distance, Outer Zone and Middle Zone South West

Consultant Distance North East

Refer to the points in **Figure 3.5** below for where contribution has been assessed. Risks in this location are dominated by:

- Instantaneous failure of road transport units (located onsite in the loading bays), resulting in a vapour cloud explosion of the flammable gas cloud

Figure 3.5: Consultant Distance North East

Outer Zone North East

Refer to the points in **Figure 3.6** to the right for where contribution has been assessed. Risks in this location are dominated by:

- Instantaneous failure of road transport units (located onsite in the loading bays), resulting in a vapour cloud explosion
- Loss of entire contents through largest connection of the H_2 Storage resulting in vapour cloud explosion.

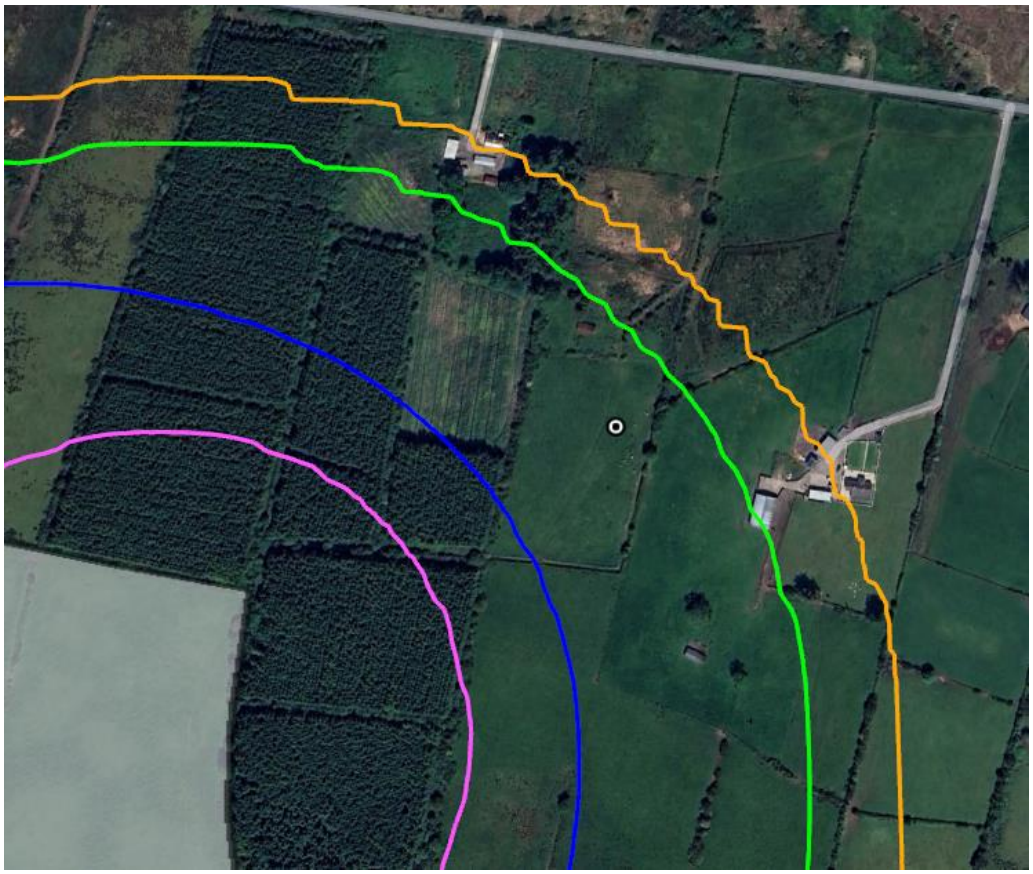


Figure 3.6: Outer Zone North East

Middle Zone and Inner Zone North East

Refer to the points in **Figure 3.7** below for where contribution has been assessed. Risks in this location are dominated by:

- Instantaneous failure of road transport units (located onsite in the loading bays), resulting in a vapour cloud explosion
- Instantaneous failure of road transport units (located in the storage area), resulting in a vapour cloud explosion of the flammable gas cloud
- Loss of entire contents through largest connection of the H2 Storage resulting in vapour cloud explosion
- Instantaneous failure of the H_2 Storage, resulting in a vapour cloud explosion of the flammable gas cloud

Figure 3.7: Middle Zone and Inner Zone North East

3.3 IRISH AVIATION AUTHORITY

The IAA states that:

"It is the observation of the Irish Aviation Authority that the applicant should be required to engage with Ireland West Airport to conduct a preliminary screening assessment in relation to the potential impact on instrument flight procedures and communication, navigation and surveillance equipment at Ireland West Airport."

A scoping document was sent to Ireland West Knock Airport in March 2022, no response was received. A further scoping request has been sent on Thursday 5th October 2023. To date, no response has been received.

Chapter 13: Material Assets includes Section 13.7.1; Aviation. It notes that Ireland West Knock Airport is 27.3 km to the south-east of the Wind Farm Site. The chapter states:

The Proposed Development is outside the 'Outer Horizontal Surface' (over 15 km away). The Ox Mountains at 413 m OD and 3 km west of the Wind Farm Site are a considerable and well known obstacle to aviation. The proposed wind turbines will have an elevation of approximately 340 m OD at the highest point. This elevation is lower than the mountains, thus reducing any potential interference to flights paths or radar. The Hydrogen Plant due to its height does not pose a risk to aviation. Therefore, no potential effects to air navigation were identified.

Should any further response to scoping be received, the results will be shared with the Board.

The IAA submission also states:
"In the event of planning consent being granted, the applicant should be conditioned to contact the Irish Aviation Authority to:
(I) agree an aeronautical obstacle warning light scheme for the wind farm development,
(2) provide as-constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location and
(3) notify the Authority of intention to commence crane operations with at least 30 days prior notification of their erection."

These requests can all be complied with.

3.4 INLAND FISHERIES IRELAND (IFI)

The IFI submission includes a number of points, these alongside the responses are set out below:

"IFI recommend an Environmental Monitoring Committee (EMC) including representatives of IFI, Sligo County Council, Mayo County Council and other relevant organisations or groups be put in place for the construction phase of this development."
Noted.

"IFI is concerned that the Assimilative Capacity calculations for the discharge from the Hydrogen Plant into the Dooyeaghny / Newtown River is based on only two grab samples of the receiving waters. This provides low accuracy analysis at one point in time and do not provide sufficient data to assess the long-term year-round potential impacts of the discharge over different environmental conditions. A long-term monitoring program must be put in place to ensure accurate river flow and water quality data is used to assess the assimilative capacity of the receiving water. This data must be provided to adequately assess the potential impact on the Dooyeaghny /Newtown River and the important salmonid habitat present prior to a decision on the development being made."

"No direct long term flow monitoring for the Dooyeaghny / Newtown River was provided for the Assimilative Capacity calculations with "estimated velocity" being used. A long-term monitoring program must be put in place to ensure accurate river flow is used to assess the assimilative capacity of the receiving water."

"Recommendations in section 5.1 the Preliminary Discharge & Assimilative Capacity Assessment must be implemented including "Surface water quality will be monitored on c routine / continuous basis with a view to establishing site specific Q95 and baseline water quality ranges, and managing source water and process water chemistry."

While we agree with IFI that a long-term monitoring program must be put in place to ensure accurate river flow and water quality data is used to assess the assimilative capacity of the Dooyeaghny/Newtown river, we do not agree with its suggestion that such monitoring is necessary prior to making a decision with respect to the planning application. The EIA Directive requires the assessment of the likely significant effects, and having identified these, to propose mitigation measures to avoid or reduce the likely impacts. The approach which we have adopted in the EIAR accompanying the application is to identify and assess the worst-case scenario and having identified this, present a suite of mitigation measures to ensure that any residual impacts can be adequately managed within stated parameters. In fact, the continuous monitoring of flow rates and relevant water quality parameters suggested by IFI is included as part of the mitigation and monitoring measures proposed by the Applicant in the EIAR. We are satisfied that this approach ensures the likely significant effects have been adequately identified and presented in the EIAR to allow the Board to conduct the EIA and the mitigation and monitoring measures proposed are designed to and will ensure that any residual impacts will, at all times, be managed in accordance with the parameters identified in the EIAR.

The key water quality parameters for the worst case scenario associated with wastewater discharges from the facility identified in the EIAR submitted with the application was dry

weather conditions and peak average wastewater. The peak average wastewater will occur when the Hydrogen Plant is built to maximum capacity and during predicted high wind production seasons. The worst case scenario would be one in which this occurs at the same time as a prolonged period of dry weather.

The potential significant impacts associated with this worst case scenario have been fully documented in the EIAR and may be assessed as part of the EIA.

The wastewater generated from the water treatment process will be variable month to month depending on wind energy production, i.e. the Hydrogen Plant will have largest volumes of wastewater generated when there is the most wind. This is expected to be in February, with lowest volume of discharge in summer months. This is also generally in line with rainfall trends throughout year, i.e. it is generally wettest in the windier months. Therefore, the peak average wastewater is likely to coincide with wetter weather and more favourable assimilative capacity and the worst case scenario is unlikely to occur.

The EIAR also identified mitigation measures. The mitigation measures included in the EIAR were as follows, starting from absolute worst case scenario whereby extended drought conditions lead to low river discharge rates and unfavourable assimilative capacity for an extended period of time:

1. With several weeks worth of wastewater storage available (buffer capacity), the facility can be managed whereby discharge can be regulated and restricted i.e. gated down, to achieve a discharge loading which the observed assimilative capacity can accommodate without significant adverse effects on downstream water quality. During this period waste water can be tankered off site to maintain space in waste water tank storage. The Preliminary Discharge and Assimilative Capacity Assessment (pDACA), included in Appendix 9.3 of the EIAR, demonstrates that under these conditions during worst case scenario where the assimilative capacity is inadequate to receive the anticipated peak average wastewater with quality in line with typical licence limits (BOD), restricting the discharge rate by 50% will be sufficient to ensure discharging to surface waters will not have an adverse significant effect on downstream surface water quality.
2. When continuous monitoring of the river depth / river discharge rate and discharge quality indicates that there is inadequate assimilative capacity to discharge, and there is no buffer capacity on site for wastewater storage (wastewater storage is nearing full capacity), the Hydrogen Plant can cease operations including the treatment of raw source water i.e. the principal source of wastewater arising on site.

There is a waste water storage tank sized 1,500 m^3 which provides 1,500,000 litres of storage space, enough for 1 month at forecasted high wind production or 4 months of low wind production. In this scenario wastewater in storage will be tankered off site to an appropriate facility to be disposed of, and operations will resume only when two weeks worth of wastewater storage volume is available once again. The Hydrogen Plant can continue operating under this regime (without discharging) during worst case conditions where river discharge rates / assimilative capacity are unfavourable.

These scenarios are unlikely and are only expected to occur very rarely, as predicted high wind production seasons is in line with forecasted higher periods of rainfall, i.e. at windy times of the year (October to February) it is also generally rainy.

This can be seen if the existing climate baseline rainfall in Table 10.4 of Chapter 10: Air and Climate is compared to the predicted waste water discharge in Table 2.8 of Chapter 2: Project Description. Table 4.1 in the Hydrology section of this response shows this comparison.

The pDACA demonstrates under typical operating conditions the wastewater treatment system will manage discharge rates such that there will be no likelihood of significant impacts on the receiving environment. The waste water storage tank can provide a minimum of 1 months wastewater storage (once the Hydrogen Plant is at fully installed capacity and during predicted high wind production seasons eg February, and up to four months during periods of lower hydrogen production eg July, this will be significantly longer during the phase up period where a smaller electrolyer is installed). Should wastewater discharge to the receiving water course be required to stop, removal of this stored wastewater by tanker to a licensed facility can commence. This makes space for further wastewater storage, and so it is unlikely to reach a scenario where production is required to cease due to the wastewater storage being full.

The necessary monitoring system will be implemented to ensure that the emissions from the Hydrogen Plant are at all times within the water quality parameters set out in the EIAR. Section 5.3 of the pDACA (Appendix 9.3 in the EIAR) outlines the Detailed Monitoring Plan for the Hydrogen Plant which will establish critical thresholds (e.g. critical river discharge rate or assimilative capacity) for discharges of the specific characteristics of the Hydrogen Plant. Section 4.5.3 and 4.5.4 of this response sets out the progress of the development of the monitoring plan and brings together the monitoring outlined in the EIAR and pDACA. Therefore the wastewater treatment system includes a comprehensive monitoring system and controls to ensure the discharges are maintained within the qualitative and quantitative thresholds specified the EIAR.

The Hydrogen Plant and wastewater treatment systems have been designed and will be managed in a way that discharging of trade effluent of unacceptable quality and/or discharging of trade effluent to surface water with inadequate assimilative capacity will not be permitted to occur. This will be achieved through continuous monitoring of treatment systems, effluent quantity and quality, and surface water discharge and quality and receiving watercourse flow and water quality to inform management and decision making. These systems and fail safes can also be automated as part of the monitoring systems where emergency response is activated when certain thresholds are exceeded. The Hydrogen Plant will require an EPA licence due to the type of activity occurring, this will have specific stipulations in terms of discharge, ongoing monitoring and reporting.

"Recommendations in section 5.1 the Preliminary Discharge & Assimilative Capacity Assessment must be implemented including "Surface water quality will be monitored on a routine / continuous basis with a view to establishing site specific Q95 and baseline water quality ranges, and managing source water and process water chemistry."

"IFI request continuous monitoring of discharge out flow volume and receiving water flow to ensure adequate assimilative capacity is available. Water quality monitoring must be carried out by composite sampler on a daily basis."

It is agreed that continuous monitoring will be carried out. Such monitoring and control is identified in the pDACA and EIAR, i.e., continuous monitoring will facilitate management of discharge and where discharge quality and/or assimilative capacity are unfavourable, discharge will not occur.

"Information on the potential for expansion of wind farm site or the capacity of the Hydrogen production site should be provided. The Preliminary Discharge & Assimilative Capacity Assessment shows discharge flows will have to be managed during low flow conditions to protect water quality in the Dooyeaghny/ Newtown River, any potential long-term expansion of this facility may result in increased pressure on this catchment."

Section 2.6.6.1 of Chapter 2: Project Description states:
The Wind Farm configuration consists of 13 wind turbines with no capacity for future expansion and, with an overall installed capacity of 65-78 MW. The electrolyser has been designed to consume the full output of the Wind Farm once built to full capacity.

To clarify, once built to full capacity, the Hydrogen Plant cannot expand as it has been designed to consume the entire output of the Wind Farm. The EIAR assessed the worst case scenario of the Hydrogen Plant built to maximum capacity. Therefore, in the worst case the installed capacity of the Hydrogen Plant will not increase.

"Atlantic salmon, sea trout and brown trout are cool water species and may become distressed in waters of 20^{o}C or above. The Freshwater Fish Directive requires that temperature measured downstream of a point of thermal discharge must not exceed the unaffected temperature by more than 1.5^{o}C. The proposed discharge must comply fully with the Freshwater Fish Directive."

Noted. The water treatment process does not raise the temperature of wastewater and discharge will be at the ambient temperature of the constructed wetlands process where the wastewater will reside for between 6 and 12 days. Waste water discharge will comply fully with the Freshwater Fish Directive requirements.

"The proposed discharge into the Dooyeaghny/ Newtown River must be licenced by the Environmental Protection Agency or the Local Authority. IFI requests a copy of the discharge licence application."

Noted. Scoping with the EPA is outlined in Section 1.10.2 of Chapter 1: Introduction. The Proposed Development includes activities which are subject to an Industrial Emissions Licence from the Environmental Protection Agency, these will be applied for post consent as per EPA regulations.

"The constructed wetlands must be engineered to provide adequate treatment and capacity for all wastewater produced on site. All recommendations contained within the Preliminary Discharge & Assimilative Capacity Assessment must be complied with. The capacity of the constructed wetland must provide adequate capacity for extreme rainfall events. An impermeable lining must be used in construction and a discharge sample chamber provided which is accessible to persons authorised under the Water Pollution Act 1977. A maintenance and repair/replacement program for the wastewater treatment plant and constructed wetlands system must be drawn up and a long-term contract put in place for the provision of this service. The installation of septic tank and constructed wetlands must monitored by an engineer and photos of the installation retained."

Noted. Rainwater at the site will be attenuated and predominantly used as raw water source, however the detailed design of the treatment systems including Constructed Wetlands (CWs) will include consideration for rain and storm events. All requirements set out by relevant stakeholders and in line with relevant guidance will be adhered to and included in detailed design.

"IFI request that safe 24h/day access be provided to the discharge location on the Dooyeaghny / Newtown."

Agreed.

"IFI request green infrastructure, such as permeable paving in areas where there is no risk of fuel or chemical spill, be incorporated into the site surface water management. Native tree and native pollinator friendly planting must be incorporated into the site landscaping design."

Noted. The Proposed Development includes large scale rainwater harvesting storage, and rain water will be used as a raw water source for the Hydrogen Plant. This includes surface water runoff / storm runoff. Appendix 12.2 of the EIAR included a landscape plan which incorporates native and pollinator friendly planting.

"IFI request rainwater harvesting, and storage must be maximised on site from all roofed areas in the Hydrogen production site for use in the production process, to support the proposed 80% process waters being provided by rainwater harvesting."

Rainwater harvesting is maximized for use as raw water source utilizing underground storage. The IFI submission requests that rainwater is used as the principal raw water source for the Hydrogen Plant. Wherever rainwater is available via underground storage it will be utilized as the principal water source and will reduce pressure on groundwater as a resource, and reduce concentrated groundwater chemistry loading in waste waters arising from the raw water treatment process. The pDACA and EIAR assumed 100% of the required water budget was provided using groundwater as the sole source in order to assess the worst case environmental impact. Groundwater has merit in terms of dependability/availability of the resource. Supplementing groundwater with rainwater will achieve some of the same beneficial effects including ensuring sustainable use of groundwater resource, and reducing pollutant load in wastewaters.

Calculations based on the area of the roof and long term annual rainfall data show that an average of 18,275 m^3 of water per year could be harvested from the electrolyser building roof. An additional 33,751 m^3 rainwater per year could be harvested from the remaining non-roofed area. This totals 50,026 m^3 per year from rainwater, accounting for 80% of the entire annual water demand.

The Proposed Development could not commit to using rainwater as the principal source at a specified rate e.g. 80% due to the potential for long dry periods with little rain accumulated in storage. This is not withstanding that the management of the Hydrogen Plant will ensure sustainable use of groundwater and ensuring discharging under favourable conditions.

"IFI request a letter from Uisce Éireann be provided confirming adequate provision of water to supply the process waters for the hydrogen production site, if required."

Noted. A pre-connection feasibility application was submitted to Irish Water, (ref CDS23001225) it was confirmed that the connection was feasible. This can be provided to IFI.

"The Wastewater Quality & Discharge Report states that the Dooyeaghny/ Newtown River may receive a relatively high volume of groundwater discharge: Mercury Renewables must demonstrate that there will be no impact on the base river flow within the Dooyeaghny/ Newtown River as a result of the proposed groundwater abstraction. A reduction in the base flow during drought conditions will exasperate the impacts of climate change on this river increasing the pressure of high water temperatures and low flow conditions on salmonids within the catchment."

The Hydrogen Plant is designed to continually monitor relevant flow rates, including in the Dooyeaghny/ Newtown River. The ongoing continuous monitoring will be used in real time during the operational phase to facilitate source water abstraction and treatment, wastewater treatment, and discharge management and failsafe controls. Rainwater harvesting will be used to supplement groundwater and an underground tank with a capacity for 5,287 m^3 is available for rainwater storage. The management and sustainable use of source water will be achieved through continuous monitoring and establishment of critical thresholds. See Section 4.5.1 of this report.

The Ground Water Assessment included in Appendix 9.8 of the EIAR modelled the Zone of Contribution (ZOC) for the groundwater abstraction. This map can be seen in Figure 4.1 of

this report. The Ground Water Assessment states that; The zone of contribution is likely predominantly to the north of the site consistent with local topography. Tributaries for the Newtown River are outside the ZOC including the worst case scenario where no rainwater harvesting is used. Under worst case scenarios, the Hydrogen Plant will use stored rainwater, mains water and/or cease production until conditions become favourable.

Note. The discharge will be at an ambient temperature.

"All chemicals including fuels, cleaning and anti-scaling products, potassium hydroxide sodium bisulphite must be contained within bunded containers of 110% capacity of the largest container."

Noted. This will be complied with. Section 2.6.6.5 of Chapter 2 Project Description states: Chemical storage containers, and chemical feed pumps will be located in concrete secondary containments built to 110% volume. Secondary containments will be provided with valved drains that are normally closed. The containments will be monitored for chemical spills using level indicators with alarms.

"IFI must be included as a notifiable body in the Emergency Response Plan in case of discharge to surface waters."

Noted. This will be complied with. The IFI is included in **Section 6.2**; Communication Plan, of the Emergency Response Plan submitted as part of the CEMP with the EIAR.

"IFI request an assessment of alternative wastewater treatment and discharge options including connection to the Ballina sewerage network."

The Hydrogen Plant will discharge treated trade effluent to surface waters. The discharge of trade effluent is a licensed activity, and considering the nature and scale of the Hydrogen Plant the proposed activities are likely to be listed on the First Schedule of the EPA Act. In the event that an IE licence is not required, at minimum the Hydrogen Plant will require a Section 4 Water Protection Act Discharge Licence from the local authority. Wastewater will be treated and managed through passive nature-based solutions, including constructed wetlands. All nature based water and wastewater treatment systems (constructed wetlands) will be designed and specified by competent, qualified and experienced environmental engineers. Constructed wetlands will be designed with particular characteristics and ecological attributes based on the expected contaminant loading, achievable retention time, and performance / discharge quality objectives.

Alternative wastewater discharge were assessed in Chapter 3: Alternatives Considered of the EIAR. The alternatives assessed were:

- Removal offsite for treatment and disposal by licensed contractor.
- Wastewater treatment on site by watering down with harvested rainwater to dilute mineral content and recharge to groundwater.
- Wastewater treatment on site by constructed wetland and discharge into local watercourse.

The wastewater treatment system in place is considered the best fit for the volume and type of wastewater produced. The wastewater generated by the Hydrogen Plant is of relatively low impact or significance and will be similar to concentrated groundwater. It is considered that treating this water to within acceptable levels and discharging in the vicinity of the abstraction is the preferred method of disposal, as opposed to removal off site and relying on an external water treatment facility. This allows the water to remain in the catchment it was abstracted from.

A connection to the Ballina sewerage connection was not considered as an alternative during the EIA process. The Hydrogen Plant is located in an un-serviced area and treatment at Ballina would require a pipeline and likely pumping system for waste water. The Ballina Waste Water Treatment plant is located approximately 5. 7 km from the Hydrogen Plant Site. It is a potentially feasible option to build a pumped pipeline, but this would be a significant project in itself, disproportionate to meet the project requirements and as such is not considered a reasonable alternative. Furthermore, the impacts of installing a pipeline, including impacts to soils and hydrology, the transport network and the waste water system itself etc. would need to be assessed but in the absence of mitigation are likely to be significant. The nature of the waste water produced at the Proposed Development would not need to be treated to the level provided in a municipal wastewater treatment plant. The capacity at the Ballina treatment plant would also need to be assessed.

Treatment off site or connection to the sewage network was not raised as an alternative during consultation with the EPA, Inland Fisheries Ireland, Sligo County Council, Mayo County Council or by any other consultee.

It does not make practical or economic sense to construct a pipeline to transport wastewater off site. This is especially relevant during the phase up stages where the volume of waste water will be low. The Hydrogen Plant will be operated in accordance with all industrial emissions and discharge licences applicable to the facility and the discharge of waste water

to the adjacent water course. The water discharge will be in compliance with the applicable licence and is not likely to have significant adverse impacts on the environment. If water is not compliant with licences it will not be discharged. It was considered that removal by tanker would be the most suitable alternative to discharge to surface waters, given the relatively low volume of wastewater.

"In case of fire at the hydrogen production plant, waters must not be discharged directly into the Dooyeaghny/Newtown River. A fire water collection system must be in place to prevent direct discharges of polluted waters into the Dooyeaghny/Newtown River."

Fire waters will be contained on the Hydrogen Plant site and will not be permitted to discharge direct to surface waters, or groundwaters. The infrastructure included in the designs submitted with the application i.e. waste water storage, rain water or storm water storage (see Section 2.6.6.4 and 2.6.6.6 of Chapter 2; Project Description in the EIAR) will accommodate fire water as necessary.

A wastewater storage tank, sized c.1,500 m^3 located to the south of the water treatment building, will be constructed to achieve the ability to stop discharging to constructed wetlands or surface water completely for a minimum duration of one month, without having to stop the production process. In line storage throughout the process will facilitate buffering flow and discharge rates. This includes wastewater storage with a view to buffering inflow and regulating discharge from wastewater treatment works on site. This provides additional water storage which will be tankered off site and taken to a licensed facility for treatment and disposal.

"IFI request land stability monitoring is carried out throughout the duration of construction across the windfarm site."

All construction phase works will be supervised by competent geologist / geotechnical engineer.

"Method Statement for all works which may impact on surface waters must be provided to IFI a minimum of two weeks prior to works commencing. All in-stream works, including culvert installations, directional drilling and grid connection cable water crossings, or any other works that may give rise to high suspended solids in close proximity to these watercourses or may impact on the Brusna River System or the Newtown River will be subject to the closed season (i.e. they cannot take place from 1st October to 30th June). It is important that appropriate scheduling of works is allowed for. Instream works must be during low flow and dry weather conditions."

Noted. This will be complied with.

"All pollution mitigation measures contained within the EAR must be implemented in full and included in the contract for construction."

Noted. It goes without saying all mitigation and monitoring measures set out in the EIAR will be implemented in full.

"There must be no spread of invasive species as a result of the proposed development. All biosecurity measures contained in the EIAR must be implemented in full and included in the contract for construction."

Noted. This will be complied with. Invasive Species are assessed in the EIAR in Chapter 5: Terrestrial Ecology and Chapter 6: Aquatic Ecology and mitigation measures are outlined in the CEMP.

"There must be no discharge of silted waters, cement products, hydrocarbons or otherwise polluted waters into any surface watercourse as a result of the proposed works. The IFI publication: Requirements for the Protection of Fisheries Habitat during Construction and followed."

Noted. This will be complied with. This has been considered and mitigated with Active Construction Water Management see Section 9.5.2.10 in Chapter 9: Hydrology and Hydrogeology of the EIAR.

"Continuous instream turbidity meter monitoring may be required downstream of active areas of the site where large scale earthworks are being carried out or where silt discharges occur with daily inspections. A message will be sent to dedicated environmental monitoring personnel where turbidity levels exceed set limits. IFI request that the locations for surface water monitoring are agreed with IFI prior to works commencing on site."

Noted. Monitoring will include real time turbidity monitoring for the purposes of monitoring construction activities and escalating emergency responses as necessary.

"IFI request that the locations for surface water monitoring are agreed with IFI prior to works commencing on site."

Noted. Will be complied with. A Surface Water Management Plan was submitted as part of the CEMP.

"All culvert designs, including for delivery route and connection route, must be agreed with IFI before commencement of construction on the site. Following agreement on crossing design, a method statement with relevant environmental mitigation and control measures should be forwarded to IFI (with minimum 4 weeks prior to commencing) with IFI's agreement required on the method statement before works commence."

Noted. Will be complied with.

"A Directional Drilling method including a fluid management, bentonite recovery and pressure monitoring plan must be provided to IFI a minimum of four weeks prior to works commencing. An emergency response plan in the case of break out through riverbed material or spill at entry and exit pits must also be drawn up. These works will be subject to the closed season (i.e. they cannot take place from 1st October to 30th June) as they occur in river stretches with extensive salmonid spawning and nursery habitat."

Noted. Will be complied with.

"The on-site vehicle wash must use a closed loop system with no discharge of silted waters to surface waters."

Noted. Will be complied with.

"Road construction and surfacing materials used must be of adequate strength so as not to give rise to silt/fine solids discharges due to the action of traffic and erosion. The use of sedimentary rocks, such as shale, in road construction should be avoided. This type of material has poor tensile strength and is liable to be crushed by heavy vehicles thereby releasing fine sediment materials into the drainage system which are difficult to precipitate and may give rise to water pollution."

Noted. Will be complied with.

3.5 MINISTER OF HOUSING

Minister for Housing submission relates to the existing and continued peat cutting at the Wind Farm Site and the impacts of this peat cutting;

"*The Environmental Impact Assessment Report (EIAR) provided with the application implies that peat cutting will continue within the application area throughout the lifecycle of the proposed development. However, while various chapters of the EIAR acknowledge the existing impact of peat cutting, the potential extent and intensity of this impact within the application site over the lifecycle of the proposed development is not characterised within the EIAR. The Department considers that if peat cutting continues within the application site it will constitute a form of management within the application site which may result in significant impacts during the proposed development. Consequently, the Department considers that any peat cutting that will occur within the application site during the development should be assessed in detail to inform the EIA determination undertaken by An Bord Pleanála.*
The Department notes that the Biodiversity Enhancement and Management Plan (Appendix 5.4 of the EAR) does not require the cessation of peat cutting within the application site. The Department requests that An Bord Pleanála consider whether the continuance of peat cutting within the application site during the life of the proposed development is compatible with the peatland policies and objectives set out in the Mayo County Development Plan 2022-2028."

To be clear, the Applicant confirms that peat cutting will cease within the footprint of the development infrastructure at the application site and the habitat restoration area, as all these lands are under the control of the Applicant. The Applicant does not have the legal authority to extinguish the third party turbary rights within the wider Wind Farm Site. The cessation of wider turbary cutting in line with climate action goals is a matter for Government policy and the Minister and it would be unreasonable to expect the Applicant to address this issue. Furthermore, the applicant is not seeking planning permission for the established peat cutting use on the Wind Farm Site nor is that use necessary for the development and operation of the Proposed Development.

The Applicant has taken account of the likely significant environmental impacts of continued peat cutting in cumulation with the Project in the EIAR accompanying the application.

Hydrology and Hydrogeology impacts are assessed in Chapter 9, Section 9.4.6.1 and 9.5.1.

Section 9.5.1 states:
In peatland areas, one of the main objectives of Nature Based Solutions and SuDS is to create an array of runoff stilling areas / standing water and promote diffuse discharge and recharge of runoff on peatland. Generally, and as is the case on the subject Wind Farm Site, peatlands have been subject to peat cutting and forestry operations which include extensive drainage networks and draining of peatland bogs. It is noted that peat cutting will continue adjacent to the Wind

Farm for the duration of the Project. Lowering bog water levels leads to increased erosion, release of carbon to atmosphere and the receiving surface water network and reduces the productivity and general health of the bog, potentially leading to chronic degradation and decline. The objective of nature based solutions in peatlands will be to reverse this impact where there is the opportunity and where it is appropriate through surveying and risk assessment.

And

It is noted that active peat cutting, and commercial forestry operations require networks of drainage channels, with the objective of reducing and maintaining relatively low bog water levels. This is in contrast to promoting and maintaining higher bog water levels for healthy peatland function. Much of the mitigation outlined in the following sections [of the chapter] is intended to attenuate water on site and promote the diffuse discharge and recharge of runoff on peatland at the site. Nature based solutions including SuDS will be designed in a manner that respects the ongoing land uses and stakeholder values, where valid and in line with local, national, and international, law, policy and guidance. That is, where stakeholders have a right, and value the peatland, and intend to maintain existing drainage arrangements, the Wind Farm and Hydrogen Plant drainage design will incorporate checks on suitability particular features at given locations, and to direct runoff on site to suitable locations for targeting rewetting, or the promotion and maintaining of high bog water levels.

The assessment finds that mitigation measures have the potential to have a **beneficial** impact on the hydrological response to rainfall at the site, where by; if the Proposed Development can reduce discharge rates at the site below estimated *greenfield* or baseline runoff rates, the Wind Farm Development will have a beneficial impact by reducing the site hydrological response to rainfall and mitigate against potential flood events downstream.

In terms of ecology, the baseline of the Wind Farm Site, including peat cutting is assessed in Section 5.3.1 in Chapter 5: Terrestrial Ecology with cumulative impacts assessed in Section 5.6 which states:

At the actual site of the Wind Farm, past and ongoing turbary activity has reduced the original area of intact blanket bog to a small proportion of what was once present. Turbary continues at the site and it is likely that further intact high bog will be cut into the future. As the proposed Wind Farm has almost entirely avoided the area of intact high bog (apart from approx. 0.48 ha), the contribution by the Project to an expected net loss of intact high bog is minimal.

We respectfully submit that the potential extent and intensity of the impact (including the cumulative impact) of ongoing peat cutting within the application site over the lifecycle of the Proposed Development is fully characterised within the EIAR.

For clarification, it is noted that the Biodiversity Enhancement and Management Plan is specific to an area of blanket bog habitat (10.6 ha) outside of the development area, which has been partly cutover in the past (as shown in Figures 1 & 2 of Plan). The purpose of the Plan is to off-set the loss of cutover bog as a result of the Proposed Development. It can be confirmed that further peat cutting will be prohibited within this 10.6 ha plot for the life time of the project (see page 10 of Biodiversity Enhancement and Management Plan).

3.6 EPA

The EPA submission notes that an EPA licence may be required for the Proposed Development and that when the EIAR will need to be submitted with the licence application. This is noted.

3.7 COILLTE

In its submission to the Board, Coillte asserts that they consider the best practice set back distances to neighbouring property has not been observed.

Section 5.13 of the 2006 WEGS addresses the question of 'windtake' being the adverse effect of a wind farm development on the development potential of neighbouring lands for wind farm use:

> *In general, to ensure optimal performance and to account for turbulence and wake effects, the minimum distances between wind turbines will generally be three times the rotor diameter (=3d) in the crosswind direction and seven times the rotor diameter (=7d) in the prevailing downwind direction. Bearing in mind the requirements for optimal performance, a distance of not less than two rotor blades from adjoining property boundaries will generally be acceptable, unless by written agreement of adjoining landowners to a lesser distance. However, where permission for wind energy development has been granted on an adjacent site, the principle of the minimum separation distances between turbines in crosswind and downwind directions indicated above should be respected.* (emphasis added)

Coillte, in its submission relies on the interpretation of "*two rotor blades*" proffered by the Assistant Principal Officer of the Department of Environment, Housing and Local Government contained in circular letter PD 6/06 of the 6 September 2006 issued to all city and county councils (**Circular 6/06**), namely "*two rotor blades*" should be interpreted as two rotor diameters. In the first instance we would point out that Circular 6/06 is the opinion of the Assistant Principal Officer of the Department and cannot be elevated to the status of an amendment of a statutory ministerial guideline. It is not therefore a matter which the Board must have regard.

Furthermore, the Department of Housing, Planning and Local Government published draft revised Wind Energy Development Guidelines in December 2019 (the "2019 Draft WEGS"). The 2019 Draft WEGS remain in draft form having never being adopted. However, on the question of windtake the 2019 Draft WEGS retains the language used in the 2006 WEGS ("two rotor blades") and did not take the opportunity to affirm the clarification set out in Circular 6/06.

With respect to the proposed development two rotor blades (2RB) equals 155 m. The proposed turbine locations are all outside this distance to the Coillte boundary or any adjoining property boundaries, this is consistent with a literal interpretation of the 2006 WEGS. However, if the WEGS were to be interpreted as advocated in Circular 6/06 and by Coillte, the Applicant acknowledges that 3 No. wind turbines would be located less than two rotor diameters (2RD) (310 m), from the site boundary with the Coillte Lands.

Without prejudice to our view as to the unambiguous interpretation of the term "two rotor blades", should the Board prefer the 2RD interpretation we would ask the Board to consider the status of the WEGS and their obligations with regard to same. Sections 37G and 143 of the Planning and Development Acts 2000 to 2022 (PDA) requires the Board to have regard to any regulations made under the PDA when making a decision on an application made to it pursuant to Section 37E.

In *Cork County Council v. The Minister for Housing, Local Government and Heritage & Ors*. [2021] IEHC 683 Humphreys J. explained the duty to 'have regard' to ministerial guidelines made under section 28 of the PDA where at paragraph 57 of his judgment he held that "*Having regard implies looking at the matter concerned, and factoring in its relevance, if any, and weight, if any, as those matters appear to the decision-maker*" (emphasis added).

It is clear from the judgment in *Cork County Council,* and indeed the wider jurisprudence on the point, that to 'have regard to' does not require compliance with, the decision maker must merely demonstrate that they have considered all relevant matters, including any relevant ministerial guidelines, but it has considerable discretion in determining the weight to be afforded such matters. We would also like the Board to note that this 2 rotor blade guideline is in excess of the UK planning guideline of 1 rotor blade.

In considering the relevance of the setback guidelines set out in the WEGs in any given case, it is appropriate that the Board have regard to the objective of the set-back guidelines – namely, to preserve the potential for wind farm development on adjoining lands. Therefore, to the extent that the adjoining land in question is unlikely to sustain future wind farm development, the set-back guidelines (whether "two rotor blades" or 2RD) are not relevant.

The Coillte Land to the west of the Wind Farm Site would not generally be considered suitable for wind energy development. This is due to the restrictive size of the available land and the set back requirements to nearby dwellings in close proximity to these lands. **Figure 3.8** below shows the Coillte land folio to the west of the Wind Farm Site.

The WEGs specify a 4 x tip height set back to dwellings, unless an agreement is in place with the relevant landowner to reduce the set back to the minimum of 500 m (regardless of turbine height). The purple circles in **Figure 3.8** show the minimum 500 m set back to residential dwellings as per the WEGs. As **Figure 3.8** shows, this significantly reduces the available land. If Coillte are indeed planning to operate a wind energy development on these lands, the tip height of the proposed Coillte turbines would be required to calculate the required set back. If the tip height was 185 m, which is in line with industry trends (see Section 3.8 and Table 3.6 in Chapter 3: Alternatives Considered of the EIAR) then this set back increases to 740 m. This sterilises almost all of the land in the Coillte land parcel for wind energy, this can be seen in **Figure 3.9.**

Note; The dwellings identified in **Figure 3.8** and **Figure 3.9** are all either under the control of the Applicant of the Firlough Wind Farm and Hydrogen Plant or financially involved in the project. These would therefore be unlikely to sign a reduced set back agreement with Coillte.

The trade association Wind Energy Ireland states that two rotor diameters should be "considered", "*where significant commitment has been made to developing a neighbouring wind farm*", but this is clearly not the case for the identified Coillte land. As part of the planning process, the Applicant for the Firlough Wind Farm published advertisements in the local newspaper and in the local parish newsletters on consecutive weeks of its intent to hold two Open Public Information Days. On these days the Wind Farm plans as then developed were on display and information brochures were freely available to all. The Public Information Day was well attended by local residents, local public representatives and officials, land owners and other interested parties. So far as the Applicant is aware, Coillte did not attend that consultation process and certainly did not comment directly to the Applicant on the proposals. Whilst Coillte may have a strategic intent to develop wind farms on some of its thousands of hectares of land, they have no specific public plan or detailed design to develop a wind farm on its lands adjacent to the Firlough Wind Farm Site.

If plans for wind development on this folio were to be initiated, Coillte would be required to adhere to a set back from the adjoining Firlough Wind Farm Site as this site meets the definition; "*where significant commitment has been made to developing a neighbouring wind farm*".

The set back would be either the literal two rotor blades definition (155 m) or the two rotor diameter definition (310 m), as they are advocating for. This further restricts the area available for wind energy development. As shown in **Figure 3.8** and **3.9** (155 m set back is outlined in green, 310 m set back outlined in green hatched). These buffers clearly show that the land available for wind energy development within that folio is already severely limited and not well suited to wind energy development. Assuming a proposed turbine height of 185 m and based on the 4 x tip height requirement in the WEGS, there is no land available for any turbine in the folio, see **Figure 3.9**.

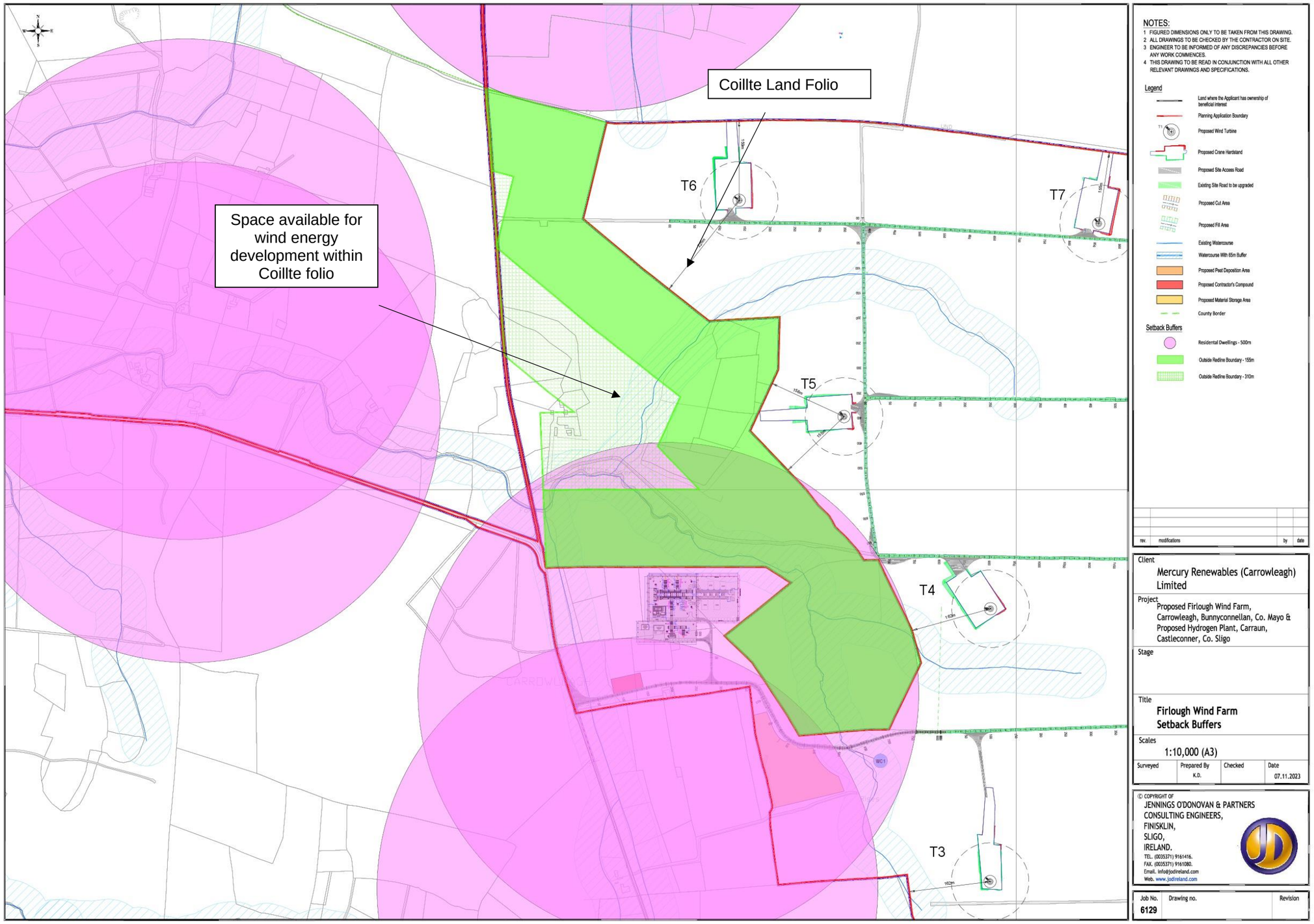


Figure 3.8: Minimum 500 m set back required to residential properties and 2 rotor blade and 2 rotor diameter set back requirements to Firlough Wind Farm Site

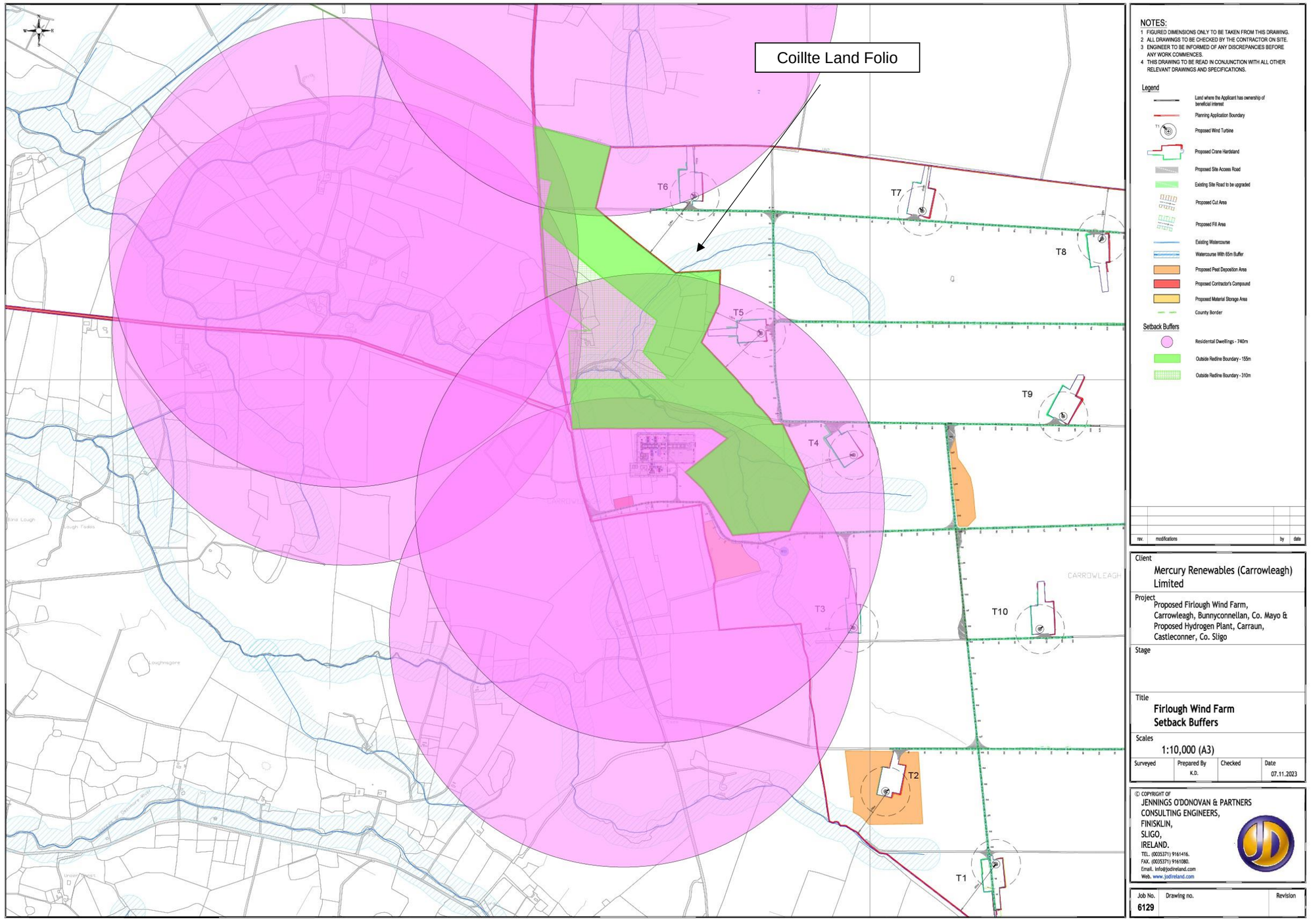


Figure 3.9: 4 x Tip height set back to residential properties; based on assumed tip height of 185 m of potential Coillte wind turbines and 2 rotor blade and 2 rotor diameter set back requirements to Firlough Wind Farm Site.

It should also be noted that planning permission was granted on the 1st of August 2013 for the construction of 21 wind turbines under An Bord Pleanála Reference PL16.241592. With respect to set-back from permitted wind farms, Section 5.13 of the 2006 WEGS provides that "*where permission for wind energy development has been granted on an adjacent site, the principle of the minimum separation distances between turbines in crosswind and downwind directions indicated above [7RD in the prevailing downwind direction and 3RD in the crosswind direction] should be respected*."

The Coillte Lands are located upwind of the consented wind farm (PL16.241592), therefore any future wind turbines developed on the Coillte lands should be 7RD distant from the consented turbines. An analysis of these setback requirements supports the conclusion that the Coillte lands do not have any future wind energy development potential.

Furthermore, the grid in the area is also not able to sustain more wind energy. The Applicant has a grid connection agreement in place with EirGrid and will use the Hydrogen Plant to offtake renewable energy to avoid curtailment of the Wind Farm.

It is therefore unreasonable of Coillte to expect An Bord Pleanála to accept its submission which is based on speculation that has no foundation in fact or consideration of the considerable constraints associated with any potential to develop the Coillte lands for wind energy generation.

In summary, Planning permission was granted on the 1st of August 2013 for the construction of 21 wind turbines under An Bord Pleanála Reference PL16.241592. The amended Firlough Wind Farm has been publicly under development for over the last two years and has been designed in accordance with the recommended two rotor blade set back from neighbouring boundaries recommended in the WEGs. The applicant has expended considerable funds and expertise in assembling a landholding owned by several local landowners and in completing all of the technical studies and designs necessary to seek planning approval for such a development. The adjacent land owned by Coillte is not well suited to wind energy due to set back requirements severely limiting the potential space for future turbines as set out in the figures above. Coillte have no public plans for a wind energy project at the site and have not engaged with the Applicant despite public consultation having been under taken over the last two years.

There is a pressing need for renewable energy in light of the climate crisis and since the invasion of Ukraine by Russia and the related supply issues and cost implications for energy

in Ireland. The wider National and European policy as outlined in the Planning Statement submitted with the EIAR reiterates the pressing need to accelerate the deployment of renewable energy projects such as the Firlough Wind Farm and Hydrogen Plant application. This project has been in development for over 2 years and is now in front of the Board for consideration. It is reasonable in the circumstances to grant permission for the proposed Firlough Wind Farm notwithstanding the objections of Coillte based on an incorrect interpretation of the WEGs and in circumstances where there is no realistic prospect of the Coillte lands sustaining viable wind farm development.

3.8 TRANSPORT INFRASTRUCTURE IRELAND

TII provided a submission to the planning application, the key points are addressed below.

"Tll has no record that a Design Report has been submitted in relation to the proposed alterations to the N59 Junction with the L66121. TII acceptance of a Design Report is required as set out in Tll Publication GN.GEO.03030 (www.tiipublications.ie). TII considers that this matter should be resolved in advance of any decision on the application in the interests of road user safety and to ensure appropriate design and safety standards are applied."

The design of the N59 L6612-1 junction has been carried out in accordance with TII specifications and has been subject to a stage 1 Road Safety Audit carried out by auditors approved by TII. A Design Report for the proposed junction has been completed by the design team as part of the preliminary junction design process to ensure compliance with TII standards. The Design Report required under NH-GEO-03030 for local improvement was scheduled to be submitted during the detailed design phase. The design report for the junction is available for inspection if required and can be uploaded to the TII Portal when required.

"Any proposed works to the national road network to facilitate turbine component delivery to site shall comply with Tll publications and shall be subject to Road Safety Audit as appropriate. Works should ensure the ongoing safety for all road users and prior to any development necessary licenses, approvals, permits or agreements with PPP Concessions, Motorway Maintenance and Renewal Contracts (MMaRC) Companies and local road authorities, as necessary, shall be in place. Tll requests referral of all proposals agreed between the road authority, PPP Concessions and MMaRC Companies and the applicant impacting on national roads. Mitigation measures identified by the applicant should be included as conditions in any decision to grant permission.

Any damage caused to the pavement of the existing national road due to the turning movement of abnormal 'length' loads (eg. tearing of the surface course) shall be rectified in accordance with TII Pavement Standards and details in this regard shall be agreed with the Road Authority prior to the commencement of any development on site."

A pre-construction and post-construction condition survey will be carried out on the public road network which form the construction haul route to site. The extent of the baseline condition survey will be agreed with the relevant County Council / TII prior to any works commencing on site. Works carried out on the public road network will be in accordance with TII and County Council specifications for the road classification and road design speed. Modifications to the public road network for the transportation of abnormal loads will be agreed with the relevant County Council / TII. The modification works will be subject to a detailed design, road opening licence and approved traffic management plan. Reinstatement details such as surfacing of the road network following the construction of the Project will be agreed with the relevant County Council / TII.

"The Authority considers that it is critical a full assessment by the applicant/developer of all structures on the national road network along the haul route should be undertaken, where relevant, and all road authorities along the haul routes should confirm their acceptance of proposals by the applicant. The Authority has reviewed the EIAR documentation referred and is concerned that no technical load assessment of structures appears to have been undertaken in support of this proposed application. However, it is acknowledged that abnormal weight loads may not be a feature of the proposed development. The Authority considers that it is critical a full assessment by the applicant/developer of all structures on the national road network along the haut route should be undertaken, where relevant, to confirm that all structures can accommodate the proposed loading associated with the delivery of turbine and associated development components to site where the weight of the delivery vehicle and load exceeds that permissible under the Road Traffic Regulations."

A detailed structural assessment of the bridges and structures on the road network which forms the construction haul route to site will be carried out prior to any works commencing on site. The structural inspection will determine if strengthening works are required for the transportation of turbine components or for general HGV construction traffic. The transportation of turbine components using abnormal load vehicles will be carried out by licensed Hauliers who will obtain all necessary load permits to operate on the public road network. The haulier will agree transportation times and requirements for escorts at sensitive locations with the relative County Council and Garda Síochána.

"In relation to any Greenway or Active Travel proposals in the vicinity of the proposed works, consultation with Mayo and Sligo County Councils own internal project and/or design staff is recommended."

The design team has held consultations and onsite meetings with Mayo and Sligo County Councils to discuss the design of the project prior to the submission of the application. No active travel or greenway proposals were highlighted or required to be incorporated into the scheme design during the meetings or during public consultations held to present the project to local residents.

3.9 DEPARTMENT OF DEFENCE

The Department of Defence Submission states:

"All turbines should be illuminated by Type C, Medium intensity, Fixed Red obstacle lighting with a minimum Output Of 2,000 candela to be visible in all directions of azimuth and to be operational H24/7 days week.

Obstacle lighting should be incandescent or, if LED or other types are used, of a type visible to Night Vision equipment. Obstacle lighting used must emit light at the near Infra-Red (IR) range of the electromagnetic spectrum, specifically at or near 850 nanometres (nm) of wavelength. Light intensity to be of similar value to that emitted in the visible spectrum of light."

Noted. This will be complied with.

4 RESPONSE TO 3RD PARTY SUBMISSIONS AND OBSERVATIONS

It is noted that having reviewed submissions from third parties, common themes have emerged. These have been addressed hereunder under headings rather than individually.

4.1 CONSULTATONS

Some submissions have asserted that the Applicant has not followed appropriate public consultation procedures. With several identifying they have not been "*personally consulted*" and implying the consultation processes was "*tokenistic*".

The Applicant would first like to draw attention to various guidance on public consultation which was followed during the EIA process.

- Århus Convention
- EIA Directive 2003/35/EC
- Code of Practice for Wind Energy Development in Ireland, Guidelines for Community Engagement (The Department of Communications, Climate Action and Environment 2016)
- 2006 Wind Energy Guidelines
- 2019 Draft Wind Energy Guidelines

Extensive public consultation was undertaken for the Project. Community Liaison Officers were assigned to the Project and made every attempt to contact people in the vicinity of the Proposed Development. It is noted that some of the third party submissions stating they had no contact were actively directly consulted by the Community Liaison Officers. See Appendix A and Appendix B for letters from local community members.

People from the local community, including those located along the L6612, were invited by the Community Liaison Officer directly, and by hand delivered leaflets and other communication methods, to engage with the Project via;

- Public Information Days
- Individual meetings
- Email and phone contact with the Community Liaison Officer
- Virtual Information Days
- The Project Website

These events were very well attended. It is an individual's right to choose not to attend these events or engage with communication materials.

As per EIA regulations, a pre-application community consultation (PACC) report was included with the EIAR in Appendix 1.3. This outlined the active steps taken by the Applicant to engage with and take in to account the views of local communities in the design of the Proposed Development. It also includes documentation of the practical effects of this engagement, i.e. the changes made to the Project as a direct result.

In summary this engagement has included:

- Virtual Public Information Days.
- Two in-person Public Information Days.
- Leaflet distribution in the local area.
- Production of project newsletters delivered to local residents, community groups and council members.
- Midwest radio interview with John Duffy (Owner of Mercury)[1].
- Provision of two community liaison officers and sharing of contact information on all materials.
- Public notices displayed and leaflets given out in the Bunnyconnellan area by community liaison officers.
- Letters sent in the post to stakeholders who may have an interest in the Project.
- Notices in church Newsletters.
- Advertisements for the Public Information Days in the Western People and the Sligo Champion.
- Banners presented at the Public Information Days were subsequently provided to individuals that requested copies and were also posted on the Mercury Renewables website.
- A dedicated website has been set up for the Project and can be accessed at; https://mercuryrenewables.ie/portfolio/firlough-wind-farm/
- National Newspapers have published articles on the Project, especially the benefits the Hydrogen element and provision of jobs to the region. These include Independent.ie[2], Western people[3], RTE[4] and the Irish Times[5].
- A Neighbourhood meeting with induvial households closest to the hydrogen plant.

[1] Midwest Radio. (2022). https://www.midwestradio.ie/index.php/news/53382-plans-announced-for-new-200m-facility-in-north-mayo Accessed 01/12/2022
[2] The Independent. (2021) https://www.independent.ie/business/irish/mercury-renewables-plans-200m-wind-farm-and-hydrogen-facility-in-co-mayo-41139140.html Accessed 01/12/2022
[3] The Western People. (2021) https://westernpeople.ie/2021/12/10/new-e200m-development-has-potential-to-provide-hundreds-of-jobs-in-north-mayo/ Accessed 01/12/2022
[4] RTE. (2021). https://www.rte.ie/news/business/2021/1210/1266080-new-green-hydrogen-production-plant-planned-for-mayo/ Accessed 01/12/2022
[5] The Irish Times. (2021). https://www.irishtimes.com/business/energy-and-resources/mercury-renewables-plans-200m-wind-and-hyrdogen-plant-1.4752258 Accessed 01/12/2022

The steps taken to engage the community in consultations are over and above those required by the Planning Regulations, the WEGs and the Arhus Convention.

The PACC also outlines the community benefits provided by the Proposed Development and how the Project will perform as a good neighbour (as noted in the Sligo County Council submission). The report shows that the level of community engagement was above what is required or recommended and far exceeds the accusation that engagement was "*tokenistic*".

The development of wind farms in rural areas provides important economic gains for local communities. Long term income flow for landowners, which can be substantial and dispersed in the case of developments of scale, enhances the overall economic base of the communities in which they are located. Local Authority income benefits from the expansion of the rate base, thus providing additional resources for the provision of essential public services to the wider community. The investment and construction stage directly creates significant economic and business activity in the locations concerned, including substantial employment.

Notwithstanding the substance of these factors, it is essential that communities who facilitate the development of wind farms in their midst are convinced that the companies involved recognise and respect the role that the local community plays in the long-term success of the industry. For this reason, it is vital that developers and operators are committed to active participation with them and that they strive to contribute in a wider way to community life, on the basis of goodwill and interdependency. Mercury Renewables (Carrowleagh) Ltd. is committed to such an approach and will create a long-term Community Benefit Fund should An Bord Pleanála grant permission for the Firlough Wind Farm and Hydrogen Plant.

The community benefits of the Project include:

- Establishing a community benefit fund of €500,000 per annum for the first 15 years of operation that will be administered by a management committee. The management committee will have responsibility for administering the fund and will support local projects, clubs, schools, education grants, tourism projects, sports clubs and energy efficiency programmes.
- Supporting development and employment. For instance, the Proposed Development would represent an investment of €200m and would directly bring 100-150 jobs to the area at construction stage and support 10-20 jobs at operational stage.
- Annual rates of between €650,000 - €780,000 payable to Mayo County Council over the Wind Farms 40 years of operation.

- Annual rates payable to Sligo County Council over the operational life of the Hydrogen Plant.
- Supporting Rural Development. The participation by groups of landowners is a form of rural diversification that can help increase farm incomes. Local services, suppliers and products will be used where possible.

This is in addition to the wider public benefits of reducing greenhouse gas emissions by displacing fossil fuels and thereby helping to mitigate climate change, improving air quality, reducing the requirement for imported fossil fuels which are subject to external cost influences thereby helping to stabilise and reduce the costs of energy.

The Applicant has provided meaningful public engagement which has enabled the public to influence the design of the Project. Access to information regarding the community benefits has been enabled, this was one of the most popular topics discussed at the Public Information Days (see Section 3.8 of the PACC). The potential effects of the Proposed Development were shared with the public along with the mitigation measures implemented to avoid, reduce or remediate these. A high number of specialist consultants were on hand at the PIDs to discuss the Project and answer questions (see Section 3.6 of the PACC). Approximately 150 people attended the two days and discussions were held with many of the community members who have now raised submissions. The overwhelming response from the public during the Public Information Days was positive.

4.1.1 Wind Energy

A number of submissions outline concerns that wind energy is an intermittent source of energy and that the grid constraints around the northwest region limit the effectiveness of the Wind Farm.

For example:

"Sporadic nature of wind power: wind power is dependant on wind. To state the obvious, this is highly variable, sporadic and erratic. This causes all sorts of challenges for management of the grid in that it must be replaced by alternative sources of energy (usually gas (fossil fuel)). In short; neither solar nor wind are dispatchable forms of energy, meaning that both have to be backed up by forms that are; mainly fossil fuel plants; usually gas which can be fired up in an instant to generate electricity as demand dictates. As stated above; Deep-bore Geothermal Energy is an alternative sustainable energy that is dispatchable."

The separate Planning Statement submitted with the planning application outlines the many International, National and Regional/Local policies that support wind energy as a renewable energy source. Ireland's vast wind resources make wind energy an important contributor to climate change mitigation and renewable energy targets as outlined in the policies identified by the Irish Government, EU and international bodies. Chapter 1: Introduction, Section 1.3 of the EIAR states:

In the North Mayo and Sligo region, the full renewable energy generation potential of the area cannot be realised due to physical shortcomings and restrictions in the electricity network. The Hydrogen Plant would provide a viable off-take and route to market for renewable energy that otherwise would have been lost due to these constraints.

Section 2.3.4 of the Planning Statement, in relation to Irelands National Energy and Climate Plan (NECP)[6] states:
The NECP highlights that green hydrogen has the potential to play a key role in sectors which are difficult to decarbonise with existing technologies, such as heavy vehicles, industry and maritime traffic. It notes that hydrogen production could provide a variable demand that utilises renewable electricity and can help to decarbonise the natural gas grid, and that existing combined cycle gas turbines could be reconfigured for hydrogen and potentially hydrogen turbines could be developed as backups for intermittent renewables.

Ireland supports further exploration of hydrogen to support the integration of variable renewable electricity generation in particular for electrically isolated regions and in order to **mitigate curtailment of wind energy**.

The NECP emphasises that the national targets relating to increasing renewable electricity mean that at times, the electrical grid will not be able to use all this renewable generation so having the option to produce green hydrogen will help to fully utilise renewable resources. This is noted to have the potential to reduce the overall cost of reaching decarbonisation targets. The Proposed Development is in an area of grid constraint, the Hydrogen Plant will enable surplus energy produced by the Wind Farm to be captured.

The submission goes on to state that:
"Dispatchable generation refers to sources of electricity that can be used on demand and dispatched at the request of power grid operators and according to market needs. Dispatchable generators can be turned on or off, or can adjust their power output according to an order."

[6] Department of Communications, Climate Action and Environment. (2021). National Energy and Climate Plan https://energy.ec.europa.eu/system/files/2020-08/ie_final_necp_main_en_0.pdf Accessed 19/04/2023

Since the submission of the planning application, the national Hydrogen Strategy has been published (see Section 2.10). Renewable hydrogen is identified in the strategy as having the potential to contribute to dispatchable generation. Section 1 of the Hydrogen Strategy states that:

"Indigenously produced renewable hydrogen offers an incredible opportunity for Ireland and could play a significant role in enabling this transition to a net zero economy. As it does not emit carbon dioxide (CO_2) when used, renewable hydrogen (often referred to as "green hydrogen") has the potential to become a zero-carbon substitute for fossil fuels in many hard to decarbonise sectors. Specifically, in the coming years renewable hydrogen is envisioned to play an important role in decarbonising industrial processes, long duration energy storage of renewable energy, as a ***zero emission source of dispatchable flexible electricity*** *and as a transport fuel in sectors such as heavy goods transport, maritime and aviation."*

Indeed, the strategy goes on to state in section 3.2 in relation to Hydrogen end use priorities:
"*Ireland has a target of 80% of electricity to come from variable renewable sources by 2030 (which will be increased even further beyond 2030). It is likely that some of this will be required to be renewable dispatchable generation to maintain system reliability and efficient operations. For example, a recent report from the IEA estimates that approximately 5-15% of electricity needs will come from zero carbon dispatchable generation in a net zero power system. Renewable hydrogen used in gas turbines or fuel cells is well placed to meet this requirement."*

In the National Hydrogen Strategy on page 8, Table 2 includes a list of actions to be delivered, Action 5 is:
"*Develop a roadmap to bring net zero dispatchable power solutions to market by 2030, to support the delivery of a near net zero power system by 2035."*
This action is given a timeline of 2024-26.

A submission also notes that:
"The proposed building of North Connaught 110kv line should be an integral part of this project proposal as it will be used to transport out electricity of this windfarm."

Chapter 3: Alternatives addresses constraint in further detail along with the alternative technologies assessed as part of the EIA process. Section 3.11 states that:
The primary driver for the Applicant considering a hydrogen plant at or near the Wind Farm was to address the issue of constraint in the North Mayo and Sligo region of the national electricity network.

In EirGrid's Shaping our Electricity Future report[7] constraint is defined as "*a change to any generator's output from the planned "market schedule" due to transmission network limitations or operating reserve requirements"*. EirGrid is developing a new piece of electrical infrastructure in the region known as the North Connacht 110 kV Project which will connect the Moy substation near Ballina, Co. Mayo to the Tonroe substation in Ballaghaderreen, Co. Roscommon. Even once the North Connacht 110 kV Project is commissioned, EirGrid expects constraint in the North-West to be 11% - 20%[8]. These levels of constraint are a distinct economic disadvantage for new wind electricity generation in North Mayo compared to new wind electricity generation in parts of the electricity network where constraint is estimated to be between 0% - 1%.

In terms of alternatives to renewable hydrogen, Chapter 3: Alternatives Considered included assessment of Battery Energy Storage Systems, Electronic Vehicle Fleet Charging and Liquid Air Storage which were alternatives considered by the Applicant (see Section 3.11). Solar Energy was also considered as an alternative in Section 3.6.

The Revised EIA Directive Consultation states in terms of alternatives:
"*Guidance will be developed on the requirement to study reasonable alternatives, including reference to the fact that some alternatives may already have been studied in relevant SEAs. The guidance will also deal with relevant considerations, including 'do nothing' alternative(s), alternative site(s), alternative design(s)/layout(s), alternative processes(s), alternative mitigation measure(s). Reference will also be made to the requirement that "reasonable alternatives ... relevant to the project and its specific characteristics" are required to be studied*".

Deep Bore Geothermal, has potential to contribute to renewable energy in Ireland in the future. In order to address the climate crisis, deep cuts to green house gas emissions are required across all sectors and in all areas of society. Indeed, the Government of Ireland in July 2023 published the Policy Statement on Geothermal Energy for a Circular Economy[9] which states:
"*The full geothermal potential of Ireland is not yet fully understood because more needs to be known about the temperatures and geology in Ireland's deep subsurface. Subsequent work to develop the sector will include understanding the pathways for geothermal energy projects to contribute to our climate goals and how to compare these projects to other forms of renewable energy."*

[7] https://www.eirgridgroup.com/site-files/library/EirGrid/Shaping_Our_Electricity_Future_Roadmap.pdf
[8] https://www.eirgridgroup.com/site-files/library/EirGrid/ECP-1-Solar-and-Wind-Constraints-Ireland-Summary.pdf
[9] https://www.gov.ie/en/publication/9def7-policy-statement-on-geothermal-energy-for-a-circular-economy/

The development of Deep Bore Geothermal energy in Ireland is in its infancy. The Applicant welcomes the progression of Deep Bore Geothermal renewable energy in Ireland. However, it is not considered a reasonable alternative to the Firlough Wind Farm and Hydrogen Plant as it is not currently commercially proven in Ireland.

Indeed, one 3rd party submission outlines Hydrogen as an alternative to Wind Energy stating that:
"Hydrogen: Hydrogen can be used to power future transportation and may be the power of the future given that hydrogen is the most common element in the Universe. Power can either be through the use of electric motors powered by fuel cell technology or by improved internal combustion engines. In both cases emissions would be zero. The difficulty is that Hydrogen power is currently prohibitively expensive, but progress is being made in the technology to achieve this. A big challenge is to source the hydrogen from renewable resources. Honda has produced the first 'commercial' hydrogen powered vehicle in the form of the Honda FCX Clarity, although this has limited availability….."

There are also some submissions that refer to solar energy, highlighting concerns with the environmental impacts and dispatchability of solar. To clarify, the Firlough Wind Farm and Hydrogen Project does not include any solar energy.

There are some submissions that call renewable energy in general into question. Due to the overwhelming volume of scientific research into this topic, and the wealth of policy and legislation supporting renewable energy in general, this response to the submissions will not address the validity of renewable energy as a whole. It is considered that this is beyond the scope of the Project and outside the Applicant's control.

In this same light, there are also comments regarding government policy on data centres, Strategic Environmental Impact Assessment on Wind Energy across Ireland and the Wind Energy Guidelines having dated information, again these topics are not further addressed as they are beyond the scope of this Project and outside of the Applicant's control.

In terms of community led wind energy and developer led wind energy the following submission was made:
"The current spate of solar and wind instillation proposals are developer led. i.e. it is from the bottom up rather than from the top down. The effect of these proposals is to divide local communities between local residents on the one hand and landowners benefiting from the grant revenue from solar and wind turbine sites on the one hand and others on the other.

This is inappropriate developer led rather that national and strategic based planning. Any future Irish wind and solar energy proposals needs to be plan led and not developer led, taking into account the common good of all citizens. This proposal is inappropriately developer led acting without any proper national strategic energy planning and/or location selection strategy."

The Policy Statement submitted with the application sets out how the Proposed Development is compliant with International, European and National policy on energy security, emission reductions and renewable energy production. It reviews policy for the Northern and Western region and local Mayo and Sligo County policies and finds the Proposed Development complies with key renewable energy, landscape and environmental policy objectives. In as such it is a "*plan led*" development.

In relation to the location of the Wind Farm, the Planning Statement states that:
Mayo Renewable Energy Strategy (RES) 2011-2022 (the current renewable energy strategy for the county) outlines the renewable energy potential for County Mayo and how the county can capitalize these resources and meet energy targets. It acknowledges the benefits renewable energy can deliver for the county including providing a more secure energy supply, reducing reliance on fossil fuels and enabling future energy export. The strategy identifies **areas most suitable for renewable energy developments** in a tier system. The Wind Farm Site is designated in a 'Preferred' area for wind farms. **The Wind Farm Site lies within a sub-category 'Tier 1 (Preferred Large Wind Farms)'** indicating it is an area with the potential for large scale wind energy developments. This is a regional statutory plan, which has been subject to Strategic Environmental Assessment (SEA).

Again, emission cuts are required across all sectors of society to address the urgent climate and energy crises and the Applicant welcomes the development of community led wind energy. The Proposed Development does not prevent community led wind energy from proceeding.

Public engagement has showed there is significant local support for the Proposed Development, see the PACC in Appendix 1.3 of the EIAR. The displacement of polluting fossil fuels with renewable energy and the resulting positive benefits to air quality and climate are without doubt in the "*common good for all citizens".*

4.2 HYDROGEN

4.2.1 New Industry/Regulations

There were several observations relating to hydrogen being a new industry to Ireland and concern suggesting there is a lack of guidelines for hydrogen energy and that the proposal is therefore premature. Since the planning application was submitted Ireland has released its National Hydrogen Strategy. This is summarised in Section 2.1 above.

The Hydrogen Plant will also be governed by the COMAH regulations, which were made, introduced, and laid before parliament in 1988. Chapter 16: Major Accidents and Natural Disasters, section 16.3 of the EIAR states:

The Seveso III Directive, the main EU legislation dealing specifically with the control of onshore major accident hazards, along with the Chemical Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 which implements the SEVESO directive, governs the inventory of substances stored at the Hydrogen Plant Site. The Hydrogen Plant will be designed, constructed and operated in line with the requirements set out by COMAH Regulations, including 24/7 monitoring. The maximum onsite storage of hydrogen (approximately 40.128 tonnes) classifies the Hydrogen Plant as a 'Lower-tier' COMAH site as this is below 50 tonnes.

Section 16.3 further establishes the raft of regulations and guidelines already in place for the Proposed Development:
As per COMAH requirements, the Developer is required to provide a Major Accident Prevention Policy (MAPP) to the HSA prior to commencement of operations, to detail their approach to controlling the risks associated with the Hydrogen Plant, an outline MAPP has been produced and is included in Appendix 16.2. In addition, an Emergency Response Plan will also be generated (recommended, but not required for lower-tier COMAH sites). A Risk Management Programme, Operational Management Plan, Traffic Management Plan, ATEX Assessment and Safety Management System will also be in place for the Hydrogen Plant prior to commencement of operations, in accordance with guidance from the HSA.

The HSA has made an observation on the Proposed Development and has confirmed that the Hydrogen Plant will constitute a lower tier COMAH establishment:
Appendix 16.3 of the EIAR - Land Use Planning QRA for the Firlough Windfarm Hydrogen Generation Facility Prepared for — Mercury Renewables was reviewed by the Authority. The Health and Safety Authority can confirm, from the details received, that the development will constitute a new lower tier COMAH establishment.

Section 16.3.2 of the EIAR establishes details of the EU ATEX Directive:

There are two European directives that address potentially explosive atmosphere. ATEX Directive 2014/34/EU covers equipment and protective systems in potentially explosive atmosphere and outlines various health and safety requirements as well as assessment procedures to ensure conformity. This is implemented in Ireland through SI No 230 of 2017 European Union (Equipment and Protective Systems for use in Potentially Explosive Atmosphere) Regulations 2017. ATEX Directive 1999/92/EC also addresses explosive atmospheres but focusses on the health and safety of workers in such environments. Ireland's 2007 Safety Health & Welfare at Work Regulations implements this directive (Part 8) and sets out the minimum requirements that should be deployed to ensure workers are protected from potential hazards.

Table 2.4 in the EIAR Chapter 2: Project Description outlines the many relevant standards and codes of practice applicable to the Hydrogen Plant.

These long-standing regulations and directives outline that hydrogen safety is a well understood and established field.

In terms of health and safety, Section 16.3.2.1 of the EIAR outlines that:

Hydrogen has a proven safety track record as a fuel for more than 100 years worldwide. Hydrogen has various properties that make it an ideal energy carrier:

- Hydrogen is non-toxic and non-poisonous, unlike conventional fuels. A hydrogen leak will not contaminate the environment or endanger the health of humans or wildlife. Hydrogen does not create "fumes."
- Hydrogen is 14 times lighter than air, consequently when it is released it dilutes quickly into a non-flammable concentration, significantly reducing the risk of ignition at ground level.
- Hydrogen has a higher oxygen requirement for explosion than conventional gasoline.
- Hydrogen has a lower radiant heat than conventional gasoline, i.e. the air around the hydrogen flame is less hot than around a gasoline flame, reducing the risk of secondary fires.

Section 16.3.2 outlines the development of a Quantitate Risk Assessment (QRA).

A Quantitative Risk Assessment (the "TLUP QRA") has been prepared by Risktec Solutions Ltd, an independent and specialist provider of risk management consulting, resourcing, learning and inspection services, in accordance with the guidelines set out in the HSA's Technical Land Use Planning Guidelines. This is included in Appendix 16.3. It includes consequence mapping using software to model loss of containment scenarios which show:

- Distances to the lower flammability limit (LFL) and upper flammability limit (UFL) from flammable gas dispersion (showing the flash fire extent);
- Distances to specified thermal radiation levels from jet fires; and
- Distances to specified vapour cloud explosion overpressure levels.

The individual location-based risk contours relevant to new establishments are presented in Figure 16.1 in the EIAR as follows:

- 1E-06 /year - maximum tolerable risk to a member of the public; and
- 5E-06 /year - maximum tolerable risk to a person at an off-site work location.

It can be seen from Figure 16.1 (in the EIAR) that there are no buildings or occupied areas within the contours.

Consultations with the HSA have been ongoing throughout the planning and design phases, these are outlined in Section 3.2 of this report.

4.2.2 Hydrogen Tanker Safety and Number of Movements

Submissions have suggested that there has been some confusion over the maximum installed capacity of the Hydrogen Plant and the number of traffic movements during the operational phase, with some readers being under the assumption that the traffic during operation of the Hydrogen Plant may be higher than those stated at some point in the future, e.g.:

"There is conflicting information regarding these times because when the plant is phased up and production increases dramatically. The initial operation equates to 52 movements per day."

Section 2.6.6.12 of Chapter 2: Project Description in the EIAR sets out how the hydrogen will be transported from the Hydrogen Plant, it states:

The green hydrogen will be transported from the Hydrogen Plant Site using tube trailers, the impact of this on the local road network is assessed in Chapter 15: Traffic and Transport. Tube trailers are currently used to transport a number of compressed gas products on Ireland's roads including natural gas, compressed air, nitrogen and oxygen.

The below has been summarised from this section in the EIAR to improve the clarity regarding the number of tube trailers – to confirm 52 movements is not initial operation – this is at full installed capacity and peak output.

The Hydrogen Plant electrolyser will be built in phases to match the growth of demand for hydrogen in Ireland. Initially a 10 MW electrolyser will be installed, with a maximum daily hydrogen production of 4,000 kg of Hydrogen. Tube trailers currently in operation in the U.K. can hold 384 kg of hydrogen at 380 bar, this gives a maximum daily number of hydrogen trailers, filled with hydrogen, leaving the Hydrogen Plant Site of **11** during this initial phase.

The capacity of the hydrogen tube trailers currently offered by vendors but are not common in the UK and Irish market at the time of writing is 1,200 kg of hydrogen at 380 bar pressure. It is a working assumption that as the hydrogen market develops, the tube trailer market will also evolve. This results in a maximum predicted number of tube trailers filled with hydrogen leaving the Hydrogen Plant Site per day of **26** when the full capacity of 80 MW is installed.

This results in **52** round trips to and from the Hydrogen Plant at **maximum capacity**. However, in practice, maximum daily hydrogen production, and so the requirement for transport, would rarely be achieved due to the intermittent nature of the input energy source i.e. wind energy. The above are based on the wind blowing at the ideal amount over 24 hours, which will rarely occur. The wind energy may also be exported to the grid rather than used to produce hydrogen at certain times (depending on commercial aspects such as balancing grid electricity and hydrogen production demands).

To clarify the total installed capacity of the electrolyser at the Hydrogen Plant will not exceed 80 MW as per Chapter 2: Project Description, Section 2.6.6.1. The regulations that govern tube trailers and transporting hydrogen are stated in the EIAR Section 2.6.6.12.

4.2.3 Volume of Hydrogen

It was requested in a submission to clarify the volume of hydrogen stored at the Hydrogen Plant. Section 2.6.6.2 of the Project Description chapter in the EIAR states:

The Hydrogen Plant is expected to be designated a lower-tier COMAH site due to the provision of 26 tube trailer bays onsite, which based on current tube trailer technology could store a total of 31.2 tonnes of hydrogen at any one point in time. Maximum onsite capacity to store hydrogen is 40.128 tonnes, with 26 filled tube trailers occupying the tube trailer bays, plus 7 filled tube trailers, one at each of the filling stations plus the buffer tank capacity of 528 kg.

The HSA has since confirmed that the Hydrogen Plant will be designated as a lower-tier COMAH site. Section 2.6.6.2 goes on to state that:

Should external factors limit the removal of hydrogen from the Hydrogen Plant Site for transportation, a shutdown system will stop production in order to stay within COMAH lower tier regulation volumes.

To clarify, the Hydrogen Plant will **never store more than 50 tonnes of hydrogen**, the system will simply be shut down and further production stopped should this be required.

4.2.4 Hydrogen Demand

Some submissions also suggested there is no demand for hydrogen in Ireland. Production of green hydrogen already occurs at a BOC facility using electrolysis, this fuels hydrogen buses which are already in use in Dublin. Hydrogen demand was outlined in Chapter 1: Introduction in the EIAR, Section 1.6; Need for the Development. Key points have been summarised below.

Hydrogen is a multi-million-dollar industry globally with a demand of between 70 and 90 million tonnes per year worldwide. The demand for hydrogen worldwide is growing, with the International Energy Agency predicting it will play a major role in their "Net Zero Scenario 2020-2030" in their report on hydrogen.[10] Initial demand pathways for green hydrogen in Ireland include switching the current supply of hydrogen to green hydrogen in an existing application. The demand for hydrogen in Ireland is current approximately 2,000 tonnes per year[11]. In Ireland, in 2021, the transport sector was the second largest emitter of GHG emissions, producing 10.89 million tonnes of carbon dioxide equivalent (Mt CO_2eq), 17.7% of overall GHGs[12]. There are approximately 2,215,127 Heavy-goods vehicles (HGVs) in Ireland[13], almost all diesel fuelled, these produce around 20% of road transport emissions[14]. The haulage industry is considered a hard to decarbonise industry. Hydrogen fuel cell electric vehicles offer a solution. Switching to 10 hydrogen heavy duty vehicles is equivalent to decarbonising approximately 400 passenger cars, therefore introducing even a small number of zero emission heavy duty vehicles has a large effect on overall transport emissions. Following the successful rollout of green hydrogen buses in Dublin and Belfast, heavy-transport, due to its large impact on emissions, and its difficulty to both decarbonise and reduce air pollution issues, is an obvious potential route to market for a new green hydrogen industry. Ireland's renewable energy in transport target (RES-T) under REDII is

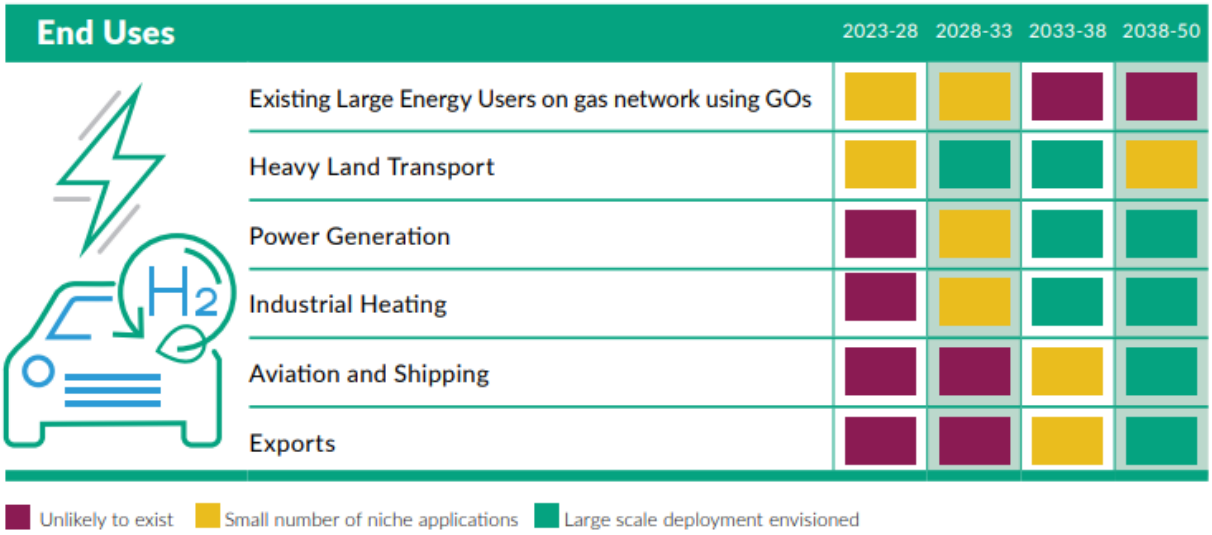
[10] IEA. (2021). Hydrogen https://www.iea.org/reports/hydrogen Accessed 01/12/2022
[11] Energy Ireland. (2021). Developing Ireland's hydrogen potential. https://www.energyireland.ie/developing-irelands-hydrogen-potential/
[12] EPA. (2022). Latest Emissions Data https://www.epa.ie/our-services/monitoring--assessment/climate-change/ghg/latest-emissions-data/ Accessed 03/03/23
[13] ACEA. (2022). Report – Vehicles in use, Europe 2022. https://www.acea.auto/files/ACEA-report-vehicles-in-use-europe-2022.pdf
[14] EPA. (2020). Final GHG emissions report. https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/Irelands-Final-Greenhouse-Gas-Emissions-report-1990-2020_finalv1.1.pdf

14% by 2030, the renewable energy share in 2021 was 4.3%[15]. This indicates that there is a strong justification for the decarbonisation of the transportation sector, which could be assisted by the Proposed Development with the production of green hydrogen.

The National Hydrogen Strategy (see section 2.10) includes the below clarification on hydrogen end uses in Ireland:

- The deployment of renewable hydrogen in Ireland will focus on hard-to-decarbonise sectors where energy efficiency and direct electrification are not feasible or cost effective solutions.
- **Heavy duty transport** applications where there are binding EU targets for 2030 are anticipated to be the first end use sectors to develop, followed closely by industry and flexible power generation.
- Aviation and maritime are expected to be large high priority end-users but these sectors will take longer to develop.
- Indicative projections estimate that Ireland's domestic hydrogen energy demand needs could equate to between 4.6 and 39 TWh by 2050. When including nondomestic energy needs such as International Aviation and Shipping, these values could rise to between 19.8 to 74.6 TWh. This wide range demonstrates the significant uncertainties which exist due to the nascent nature of the market.

The below graphic is from the Hydrogen Strategy and outlines the expected uses of hydrogen over the next 3 decades.



[15] SEAI. (2022). Energy in Ireland. https://www.seai.ie/publications/Energy-in-Ireland-2022.pdf

4.2.5 Rare Earth Metals

Submissions raised concerns regarding the use of rare earth metals in the Hydrogen Plant:
"It is important to note that hydrogen is also associated with the use of rare earth metals. We understand that precious metals such as platinum and iridium are typically required as catalysts in fuel cells and some types of water electrolyser, which means that the initial cost of fuel cells (and electrolysers) can be high. This high cost has deterred some from investing in hydrogen fuel cell technology. Such costs need to be reduced in order to make hydrogen fuel cells a feasible fuel source for all. We ask the board to conduct a full analysis of this issue."

The design of the Hydrogen Plant incorporates Alkaline Water Electrolysers, these use nickel anodes, avoiding the use of rare earth metals. Alternative technology was assessed as part of Chapter 3: Alternatives Considered. This included Proton Exchange Membrane Electrolysers. Most Proton Exchange Membrane electrolysers do currently use platinum and iridium. In terms of costs, Proton Exchange Membrane electrolysers are seen as the more expensive option currently when compared to Alkaline Water electrolysis. The costs of both technologies are expected to decline towards 2030 as the market matures and supply chains become more robust. The overall cost and established commercial use are some of the reasons that Alkaline Water electrolysis was selected as the preferred alternative.

A submission also stated:
"We ask that the board request the applicants provide a complete breakdown of heavy metals together with rare earth metals, which are used in the production of solar panels and also the quantities required."

Note, no solar panels are included in the Project. The same submission also includes a description of Gallium arsenide, this is a semiconductor who's end uses include computing, transistors, light emitting diodes, oscillators and amplifiers, the relevancy of this in relation to hydrogen production or wind energy is not clear.

4.2.6 Hydrogen Efficiency

A submission raises concerns regarding the energy efficiency of hydrogen when used to heat homes. It references several articles that compare hydrogen unfavourably to heat pumps. These articles refer to hydrogen being produced by coal and natural gas, i.e. not renewable hydrogen, which is what the Proposed Development will produce. The renewable hydrogen produced by the Proposed Development can be used to displace fossil fuel hydrogen and is expected to initially be used to decarbonise the transport sector. This is in line with Ireland's

National Hydrogen Strategy. Climate change is a global and complex problem and requires action in all sectors, the Applicant welcomes the use of heat pumps and other renewable energy sources which are all needed to address greenhouse gas emissions across all sectors in Ireland.

4.3 COOLING SYSTEM

Submissions requested answers to questions around the cooling system for the Hydrogen Plant and the use of Glycol:

"Cooling System: We ask the board to clarify precisely what chemicals are to be used in any cooling systems? We understand that some cooling systems used either ethylene glycol or propylene glycol."

"We further understand that a closed loop of water or water-glycol mixture is used to cool all the different coolers in the hydrogen production process. And the closed loop is cooled in a central system."

To clarify, the cooling system is described in Section 2.6.6.7 of Chapter 2: Project Description which states:

The electrolysis process generates heat through voltage losses. Cooling is required to maintain optimum operating temperatures. In addition, hydrogen is heated during the compression stages and therefore cooling is required for the safe operation of the installed compressors. A fin fan cooling system will be used, these comprise of fans that utilise air as the cooling medium. A system comprising of nine fin fan cooling modules, each with three fans, has been incorporated into the system design and located adjacent to the electrolyser building. This is based on modelling of the cooling requirements for an 80 MW system and compressors. The system is designed with an element of redundancy. The fin fan coolers are modular and therefore can be installed in blocks as the Project capacity increases up to the maximum 80 MW electrolyser.

An alternative of using a water based system was considered and is discussed in Section 3.12.3 of Chapter 3: Alternatives Considered.

To clarify, ethylene glycol is used in the closed-loop electrolysis process, this is mixed with water but it is not consumed in the process and does not enter the waste water system. This is separate to the fin fan cooling system.

"The purpose of the fin fans is to dissipate the considerable heat generated during its process, if this were a truly green process the heat would be fed back into the plant to power another process and not dissipated into the environment."

The Applicant is utilizing technology available at the time of writing. It is possible that in the future, a system may be developed to accommodate the above. Renewable hydrogen will displace fossil fuels which produce greenhouse gases and pollutants that negatively effect the environment on a much larger scale than minor energy inefficiencies in the design of renewable energy plants, the technology of which is constantly evolving. There is a pressing need for renewable energy in light of the climate crisis and since the invasion of Ukraine by Russia and the related supply issues and cost implications for energy in Ireland. The wider National and European policy as outlined in the Planning Statement submitted with the EIAR reiterates the urgent need to accelerate the deployment of renewable energy projects such as the Firlough Wind Farm and Hydrogen Plant application. Delaying the introduction of more renewable energy to wait for perfect technology to exist is not a reasonable option.

4.4 HEALTH AND SAFETY

4.4.1 Hydrogen Safety

Understandably, as hydrogen is a new industry to Ireland, there were a number of concerns raised about health and safety of the Hydrogen Plant. The Applicant would like to reiterate at this point that hydrogen is a significant industry worldwide with robust legislation and guidelines in place and a strong safety track record.

Section 2.6.6.2 of the EIAR states that:
Design standards specific to hydrogen production facilities (NFPA 2, NFPA 55, ISO 22734, ISO 19880 and ISO 15916 as shown in Table 2.4 of the EIAR) have been used throughout the preliminary design phase and regulations and separation distances required by industry good practice have been incorporated into the design. Site specific safety measures in accordance with COMAH, ATEX, Safety, Health and Welfare at Work Act and Regulations and other relevant standards and codes will be in place for the full life of operation. An outline Major Accident Prevention Policy has been prepared and is included in Appendix 16.2. An Emergency Response Plan (recommended, not required for lower-tier COMAH sites) will be produced for the plant. A risk management programme, ATEX Assessment and Safety Management System will be in place for the Proposed Development.

One submission stated:
"Confirm without doubt that my family home is outside the blast zone indicated on the plan. What are the set-back distances for residences? What is the legislation of calculating set back distances? I would like for a risk assessment on potential damage to properties in the vicinity to be carried out?"

The risks of the Project contributing to or being vulnerable to Major Accidents and Natural Disasters is assessed in Chapter 16 of the EIAR. The chapter states that:
A Quantitative Risk Assessment (the "TLUP QRA") has been prepared by Risktec Solutions Ltd, an independent and specialist provider of risk management consulting, resourcing, learning and inspection services, in accordance with the guidelines set out in the HSA's Technical Land Use Planning Guidelines. This is included in Appendix 16.3 of the EIAR. It includes consequence mapping using software to model loss of containment scenarios which show:

- Distances to the lower flammability limit (LFL) and upper flammability limit (UFL) from flammable gas dispersion (showing the flash fire extent);
- Distances to specified thermal radiation levels from jet fires; and
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The individual location-based risk contours relevant to new establishments are presented in Figure 16.1 as follows:

- 1E-06 /year - maximum tolerable risk to a member of the public; and
- 5E-06 /year - maximum tolerable risk to a person at an off-site work location.

It can be seen from Figure 16.1 (of the EIAR) that there are no buildings or occupied areas within the contours.

Societal risk is a measurement of the potential for accidents from the Hydrogen Plant to affect multiple people. To take account of societal risk from the Hydrogen Plant, an estimate of the Expectation Value (EV) is necessary. The EV of a single release scenario is the product of the individual risk (expressed in chances per million) and the potential number of people affected. Due to the very limited occupancy/ populations around site the EV of the Hydrogen Plant Site is less than 1. This is significantly below the level required for further evaluation (100). On this basis societal risk is considered broadly acceptable at the location.

These results provide evidence that the Hydrogen Plant location satisfies the HSA criteria for new establishments.

Some submissions raise queries in relation to precautions and safeguarding against fire and explosion. This is described in Section 2.6.6.2 of Chapter 2: Project Description. This section states:
Safety equipment installed will include:

- Leak/fire detection + isolation/automatic shut-off
- Emergency stops
- Building ventilation (passive + active)
- Piping pressure/flow rate monitoring
- Impact sensors at dispensers
- Audible and visual alarms
- Fire protection and suppression equipment
- Pressure-relief systems will be installed on relevant equipment.
- 24 hour monitoring by staff

The detection system in place at the Hydrogen Plant will be capable of detecting hydrogen gas or hydrogen fire and a Supervisory Control and Data Acquisition ("SCADA") system will monitor the facilities performance. Fire-fighting systems will include alarms, water spray deluge systems, sprinkler systems, carbon dioxide suppression systems and mobile fire protection equipment in accordance with the relevant codes and standards shown in Table 2.4.

The Hydrogen Plant Site location is a significant distance from most receptors. The public would have no access to the Hydrogen Plant. The nearest public road L-6611-1, is 600 m to the west and the nearest buildings which are not associated with the Hydrogen Plant are 299 m away.

The risks of fire and explosion and the impacts of the same are fully assessed in Chapter 16: Major Accidents and Natural Disasters.

There is a submission that queries the stability of hydrogen as a molecule. At this point the Applicant would like to point out that hydrogen has a proven safety track record as a fuel for more than 100 years worldwide and for the last 25 years in Ireland. Ireland recently published its Hydrogen Strategy (See section 2.1 above) which is in line with the EU Hydrogen Strategy and the RePowerEU plan. This is not a new industry and is carefully governed by safety regulations.

Chapter 16 describes the likely significant effects on the environment arising from the vulnerability of the Project to risks of major accidents and/or natural disasters. It has been completed in accordance with the guidance set out by the Environmental Protection Agency (EPA) in 'Guidelines on Information to be contained in Environmental Impact Statements' (EPA, 2022) and the European Commission in relation to Environmental Impact Assessment

(Directive 2011/92/EU, as amended by 2014/52/EU), namely 'Guidance on the preparation of the Environmental Impact Assessment Report'. The assessment of the vulnerability of the Project to major accidents and natural disasters was carried out in compliance with the EIA Directive, as amended, which states the need to assess:
"the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or natural disasters which are relevant to the project concerned."

A submission also raised concern regarding the Preliminary Hazard Log (PHL):
"The hazard Report submitted for the proposed development is only a preliminarily one and so is unable to draw definitive conclusions in key areas as equipment has not been selected and defined. Safety parameters & audits on these key pieces of equipment are unknown in relation to the production to hydrogen gas. This is not acceptable at this level of application."

The PHL is the first draft of a 'living document' and will be reviewed and updated as the project matures through the design phases. This is in line with guidance from the HSA.

A submission, in relation to specific hydrogen standards states that:
"ISO 12100:2010 has been used beyond its scope & purpose in this preliminary hazard log report. 'ISO 12100:2010 (4) specifies basic terminology, principles and a methodology for achieving safety in the design of machinery. It specifies principles of risk assessment and risk reduction to help designers in achieving this objective. These principles are based on knowledge and experience of the design, use, incidents, accidents and risks associated with machinery.' 'ISO 12100:2010 is also intended to be used as a basis for the preparation of type-B or type-C safety standards."
"No ISO standards for the production storage and use of hydrogen gas were given in the provisional hazard analysis report. ISO/TR 15916:2015, ISO 14687:2019, ISO 19880-1:2016 &ISO 19880- 1:2020 ISO TC 197 all relate to this project (6,7,8,9,10). Blast radius for the level amount of hydrogen in a worst-case scenario are very conservative based on safety reports of minor explosions which have occurred in other plants worldwide. A small blast in a pipe which showed no warning signs having just been checked at a shift change resulted in a blast radius of 165 m. No safety equipment sounded, and the blast was attributed to poor maintenance. Hydrogen gas has a TNT equivalency of 2.2 kg and a naked blast radius of 506 m (11). At max production the plant will produce 31.2 tonnes of hydrogen gas per day. This will have a blast radius of 1,125 m if the tank containing it were to ignite. The Baker-Strethlow equation is then applied to take more complex scenarios into account. Hydrogen gas burns at a hotter temperature than natural gas, it has a quick flame speed and a wide combustion range which makes it difficult to control."

"Hydrogen gas is very reactive and an event such as failure of straps on the cylinder loads or untrained/ill trained staff are enough to cause a major hazard. These issues are not addressed or foreseen in the preliminary hazard report."
"Hydrogen embrittlement is not mentioned anywhere in the preliminary hazard log report. It is more relevant & specific to the production of hydrogen and of consequence in relation to pipes, welds in pipes, anodes in electrolysers and the discharge valves of compressors. It has been the cause of past explosions in hydrogen plants and is mentioned as a safety issue in compressors especially relating to the couplings for filling gas bottles."

ISO 12100 was appropriate for the initial stage hazard log given the level of detail available and the maturity of the design. The intent of the document was to develop an initial hazard log which will be further investigated using appropriate, more detailed, methods during Front End Engineering Design (FEED) and detailed design, this has to include Hazard Identification (HAZID), Qualitative assessment, QRA and Hazard and Operability Analysis (HAZOP) given the level of risk associated with hydrogen. This is well beyond the scope of the PHA. Process risk assessment could not be considered as the design had not been formulated to a level that would allow assessment. Use of relevant ISO standards for process assessment will be considered once the design is mature enough to allow determination of which standards should be applied.

Whilst the list of standards provided appears extensive, only ISO 15916 is directly relevant to safe design and operation at the Hydrogen Plant, with ISO 14687 being relevant to fuel quality and ISO 19880 being relevant to fuelling stations.

ISO 15916 does not present a method for undertaking a risk assessment only that one should be conducted, it goes on to provide guidance on the types of control for prevention and mitigation that should be in place which will be relevant during design and operation of the Hydrogen Plant but are too detailed to consider at such a preliminary stage.

Hazards identified within the current PHA related to hydrogen can be aligned with those defined within ISO 15916 related to gaseous hydrogen, i.e. hazards with a top event of loss of containment. Assessment of the consequences has been conducted separately within the QRA. The detailed causes of these releases should be established as part of further assessment once the design has reached maturity, e.g. equipment malfunction as part of a functional safety assessment.

Hydrogen embrittlement (HE) refers to mechanical damage of a metal due to the penetration of hydrogen into the metal causing loss in ductility and tensile strength. Hydrogen has a

proven safety track record as a fuel for more than 100 years worldwide, safety concerns such as embrittlement are well understood.

Whilst the preliminary hazard log report did not specifically mention hydrogen embrittlement, material selection for components associated with the electrolyser package was flagged as a safety requirement in Table 4 (SR26). The preliminary hazard log focussed on identifying high level causes such as piping failure, rather than specific reasons like hydrogen embrittlement. The Front End Engineering Design is the next design phase, and one of the deliverables will be a materials selection report. This will involve the engineering team identifying materials and assessing suitability for selection for all plant equipment, including compressors, piping, valves etc. The design team will interface with the safety team and participate in safety studies/assessments during this process. The hazard log will be updated during the design phases so potential causes of hazards like hydrogen embrittlement will be included in future versions as we begin to define materials.

The QRA has also assess the risk associated with hydrogen explosions in accordance with HSA Technical Land Use Planning guidance. The worst case scenarios associated with Major Accidents and Natural Disasters have been identified and potential significant impacts associated with this worst case has been fully assessed and documented in the EIAR and assessed as part of the EIA.

4.4.2 Fire Service

Sligo Fire Service was consulted via a Microsoft teams call during the EIA process on 8th September 2022. The attendees were:

- Marian Coakley – Chief Fire Officer (CFO) Sligo Fire Service
- Damien McSharry – Assistant Chief Fire Officer (ACFO) Sligo Fire Service
- Tom O'Boyle - Operations Manager Sligo Fire Service
- Representatives from JOD and the Applicant.

A presentation was given to Sligo Fire Service on the Project and a discussion included the following key topics:

- Fire Safety Certificates
- Design Standards
- Similar Projects
- COMAH Tiers
- Tube Trailers
- Operational hours

- Backup electrical supply to the facility
- Traffic movements
- Volume of hydrogen on Site
- Forest Fires/Fire breaks
- Source of water – provision of fire water tanks
- Overhead lines in the vicinity of the Hydrogen Plant

Discussions and consultations with the Fire Service will be ongoing post consent and through the detailed design phase. Detailed drawings of the Hydrogen Plant Site were sent to the Fire Service to review the location of fire tanks etc.

4.4.3 High Voltage Underground Cabling and Electromagnetic Fields

Concern regarding the presence of high voltage underground cabling was raised in 3rd party submissions. Section 2.6.12 of the Project Description chapter of the EIAR outlines the requirement for underground cabling in the public road network:

The Wind Farm Substation will be connected to the national grid by two 110 kV UGC circuits to two tower structures that will intersect with the existing Moy - Glenree 110 kV overhead line. The Wind Farm Substation will be connected to the 110 kV Hydrogen Plant Substation via one additional 110 kV UGC circuit. This will conduct electricity from the Wind Farm to the Hydrogen Plant for electrolysis.

This section states that:
Construction method statements and templates will be implemented to ensure that the UGC is installed in accordance with the correct requirements, materials, and specifications of ESBN and EirGrid (CDS-GFS-00-001-R1).

Working with live electrical equipment is identified in Chapter 16: Major Accidents and Natural Disasters as a potential hazard during the construction stage in Section 16.3.2.4. This section states that:
Due to the health and safety legislative environment associated with the construction, operation and decommissioning of projects such as windfarms and hydrogen production, this embedded mitigation reduces the risk materially. The construction of the Proposed Development will be managed in accordance with the Safety Health and Welfare at Work (Construction) Regulations 2006 – 2013. A comprehensive health and safety assessment is required for all major construction projects in Ireland. This will be carried out prior to construction by the selected contractor in accordance with legislation and best practice guidelines.

Chapter 13 of the EIAR; Material Assets includes assessment of the Project on Electricity Networks. It includes mitigation for the underground cabling elements of the Project:
Mitigation by design and avoidance will minimise impacts on existing electricity networks.

- The Grid Connection will be constructed to the requirements and specifications (CDS-GFS-00-001-R1) of EirGrid and in line with the grid connection offer.
- Confirmatory drawings for all existing services will be sought upon consultation with ESB Networks.
- Immediately prior to construction taking place, the area where excavation is planned will be surveyed by CAT scan (sub-surface survey technique to locate any below-ground utilities) and all existing services will be verified. Temporary warning signs will be erected.
- The as-built location of the installed ducts will be surveyed and recorded using a total station/GPS before the trench is backfilled to record the exact location of the ducts. The co-ordinates will be plotted on as-built record drawings for the grid connection cable operational phase.
- Clear and visible temporary safety signage will be erected all around the perimeter of the live work area to visibly warn members of the public of the hazards of ongoing construction works.

Chapter 4: Population and Human Health assesses the impact of underground cables on human health in terms of electromagnetic frequency. It states that:
The extremely low frequency (ELF) electric and magnetic fields (EMF) associated with the operation of the proposed cables fully comply with the international guidelines for ELF-EMF set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), a formal advisory agency to the World Health Organisation, as well as the EU guidelines for human exposure to EMF. Accordingly, there will be no operational impact on properties (residential or other uses), construction staff, operational and maintenance staff or recreational users of the Wind Farm Site as the ICNIRP guidelines will not be exceeded at any distances even directly above the cables. Electromagnetic fields from wind farm infrastructure, including the grid connection, substation and Hydrogen Plant Site are very localised and are considered to be imperceptible, long-term impact.

4.5 HYDROLOGY AND HYDROGEOLOGY

A number of concerns were raised regarding abstraction of water from the aquifer. The worst case scenario has been assessed fully in the EIAR. The queries raised in the submissions have been grouped into topics below.

4.5.1 Water Abstraction

4.5.1.1 Impacts on aquifer/ground water

Some submissions flagged concerns regarding the volume of water being abstracted from groundwater and how this would affect groundwater levels/the aquifer. These included the below.

Sligo County Council; "*Hydrology: Noting that the proposal requires significant volumes of water, and this will be partly sourced from bore holes and potentially from mains water supply, that this would have a significant impact on ground water level and water supply within the vicinity of the proposed development in the long-term*."

3rd Party Submission "Can Mercury Renewable provide evidence that Water levels in the aquifer will not be depleted over time as a result of large volumes of water being extracted on a daily basis."

"The proven yield of groundwater wells (232 m^3/d) is only 21.5% above the predicted demand. This does not allow a large factor of safety for climate change, prolonged drought spells, reduction in well efficiency or pump efficiency, encountering groundwater boundaries following prolonged pumping."

"The response to pumping of BH6 at observation wells SHI, BH2, BHS, BH8 BH9 and BHII show a steady decline in groundwater levels. This steady decline continues at a consistent rate until the end of the test. This infers that longer term pumping may indeed dewater the aquifer such that the yield proven at BH6 may not be sustainable."

"Pumping has had a clear impact on groundwater regime at local springs. The applicant acknowledges that further works are required to explore this connectivity."

"BH6 and BH7 are located in close proximity and will likely not be capable of providing stated yields, independently, in the long-term. Hence the sustainable yield stated for BH6 should be regarded as the maximum groundwater supply available."

A full hydrological assessment was included in Chapter 9: Hydrology and Hydrogeology of the EIAR. The sensitivity of the receiving environment, namely surface water and groundwater is identified in the assessment. The assessment uses Environmental Quality Standards (EQS) in line with relevant legislative instruments including Surface Water reference concentrations.

The EIAR includes the assessment of the underlying aquifer in terms of identifying the sustainable yield by means of a pumping test. Pumping for the duration of the test was carried out concurrently from BH6 and BH7 in order to account for interactions between the two wells and in turn identify the potential sustainable yield. The duration of the pumping test (546 hours) was significantly longer than the industry standard 72 hour pump test in order to add

confidence to the assessment of the long term sustainable yield. Likely steady drawdown conditions were identified during the prolonged pumping of BH6 and BH7 which is consistent with the yields identified being sustainable (Figure 3.1 and 3.2 in Report Ref 3131-043). It would not be practical to extend the duration of the pumping test longer to achieve steady conditions in the observation network. A delineated Zone of Contribution (ZOC) for the abstraction is presented in Appendix F of Report Ref 3131-043. The pumping test was completed at a time of lower than average rainfall, with EPA hydrometric data for this time showing reduced groundwater levels and spring flows in their monitoring network (Section 3.3.7 in Report 3131-043). This is consistent with the identified yields being sustainable. Several mitigations are referenced in Report Ref. 3131-043 including the use of rain water harvesting (Conclusion 2), backup supply (Conclusion 4) and monitor and mitigate approach (Conclusion 5).

The EIAR identifies that the groundwater underlying the site is important for a number of reasons but identifies that mitigation will include the sustainable use of groundwater as resource. Groundwater abstraction and groundwater levels will be monitored continuously. The water demand stated is based on the expected production based on anticipated wind take etc. It is also the total demand for source water.

The design team recognise that the use of rain water with groundwater for the production of demineralised water for electrolyses will provide beneficial effects in terms of; facilitating the sustainable use of groundwater (not over pumping), and reducing the pollutant concentration / loading in wastewater arising and in turn reducing the potential for discharge quality and/or assimilative capacity to be observed as unfavourable. Source water will be a mixture of groundwater, rain water, and as necessary main water. Groundwater has the benefit of 'dependability' as a resource under normal conditions, in contrast to rain water which will be replenished intermittently in line with variable weather conditions.

This blending of source waters to maximise the use of rainwater and the associated overall reduction of groundwater concentrations in wastewaters is a form of mitigation and will be used to manage the Site in terms of ensuring sustainable use of groundwater and discharging under favourable conditions.

Working back from worst case scenario whereby during extended drought conditions groundwater levels are low, and rain water volumes are low, and the sustainable use of groundwater is not achievable, mitigation includes the following:

1. Cease operation of the Hydrogen Plant Site, specifically, cease abstraction of groundwater, and if required cease operations fully until such time as raw water sources are replenished.

2. The use of mains water as source water for the Hydrogen Plant Site. This is only anticipated under extreme conditions, and will only be permitted where mains supply is adequate and with approval of appropriate stakeholders.

The two scenarios outlined above are unlikely to occur. This is because predicted high wind production seasons (when it is windy) and therefore peak groundwater demand for hydrogen production, is in line with predicted higher periods of rainfall which replenish the groundwater resources and volume of harvested rain water.

This can be seen in Table 4.1 below, which compares meteorological data in relation to wind speed and rainfall from Bellmullet and Knock Airport meteorological monitoring stations to the water abstraction and water discharge rates at the Hydrogen Plant.

Table 4.1: Meteorological data compared to water metrics of the Hydrogen Plant showing that when water demand and discharge are high (due to windier conditions), rainfall is higher

Month	Water Demand m^3 per month	Avg Waste Water (m^3) per month	Belmullet Meteorological Station Data Averages (1991-2020) mean monthly total RAINFALL (mm)	Monthly Rainfall at Knock Airport Long term Average	Belmullet Meteorological Station Data Averages (1991-2020) Mean Monthly Wind Speed
January	6,404	1,727	137	135	15
February	7,525	2,029	110	103	14
March	5,748	1,550	91	118	13
April	4,707	1,269	74	82	12
May	4,750	1,281	71	92	12
June	4,534	1,223	73	92	11
July	3,264	880	86	96	11
August	4,324	1,166	101	108	11
September	4,775	1,288	103	111	12
October	6,333	1,708	131	141	13
November	5,773	1,557	140	134	13
December	6,883	1,856	127	141	14

Water extracted from groundwater and from rainwater harvesting will be stored in two separate circular underground precast concrete storage tanks. This provides a total of 12,816 m^3 of water, which is stored before it is fed into the water treatment process. This acts as a feed tank, providing a backup water supply which would meet the requirements of the Hydrogen Plant for between approximately one and a half months and four months, depending on the month of the year. Using a combination of groundwater and rain water will be preferred whenever possible with a view to minimising the effect on groundwater as a resource, and reducing concentrated groundwater chemistry loading in wastewater arising from water treatment systems. The management and sustainable use of source water will be achieved through continuous monitoring and establishment of critical thresholds.

Ongoing monitoring will be conducted as part of the operational phase of the Proposed Development to facilitate management of raw water sources. This monitoring will include quality and volumetric monitoring of processes associated with the Hydrogen Plant. For example, stored rain water volumes, abstracted groundwater, waste water arising from source water treatment, effluent arising from foul sewage, treated waste water / effluent, water storage volumes, discharge quality. Realtime monitoring of groundwater, surface water, and Hydrogen Plant systems will facilitate management of processes and control of groundwater resource. As a further back up, the Hydrogen Plant can use mains water as a raw water source.

Several submissions also raised concerns regarding private wells and drinking water supply including:
"Please note that this being a very rural area. Many people outside of the town depend on deep private wells for their water supply. It follows that any interruption of the groundwater aquifer and by extension potable water supply at local wells is of concern to local residents."

Impacts to the aquifer and public water supply was assessed in Chapter 9: Hydrology and Hydrogeology of the EIAR. With reference to the Groundwater Supply Assessment in Appendix 9.8, the Proposed Development has committed to sustainable use of groundwater. The ongoing monitoring will ensure that groundwater and therefore wells and drinking water supplies do not have significant adverse effects.

As per the Groundwater Supply Assessment in Appendix 9.8 of the EIAR, current estimates indicate that an annual water budget of **65,021 m^3** is required for hydrogen production. Sustainable yields of 2.25 Litres per Second (l/s) (194 cubic metres per day (m^3/d)) and 0.44 l/s (38 m^3/d) have been established for boreholes 6 and 7, respectively, with a cumulative

yield of 232 m^3/d or **84,680 m^3/year.** This is consistent with the two boreholes being able to meet the water demand of the plant. Therefore, it is unlikely that the Hydrogen Plant Site will exceed the sustainable yield in the underlying aquifer.

Dividing this figure by the annual average recharge (0.2 m/year) gives an estimated theoretical ZOC or well catchment area of approximately 325,000 m^2. If a safety factor[16] of 50% is applied to the required volume (65,021 x 1.5 = 97,532 m^3), the ZOC increases to approximately 488,000 m^2. The Zone of Contribution is shown in Figure 4.1 below. The Zone of Contribution is discussed in Section 4 of the Groundwater Supply Assessment. Figure 4.1 below, should have been included in Appendix F of the Groundwater Supply Assessment, in error this was omitted from the final version. The zone of contribution is likely predominantly to the north of the site, consistent with local topography (Figure 4.1). In practice, the actual size, shape and orientation of the ZOC will be highly dependent on fracture flow.

If half of the required water demand is met by rainwater harvesting, this reduces the demand for water abstraction on the boreholes. This also reduces the size of the ZOC (see Figure 4.1).

The Hydrogen Plant will abstract groundwater at rates below the sustainable yield, therefore draw down of groundwater levels will be minimal. The Hydrogen Plant has a backup mains water supply.

[16] Safety Factor; This is a conservative estimation whereby the 50% '*safety factor'* allows for seasonal variation including climate change and draught conditions.

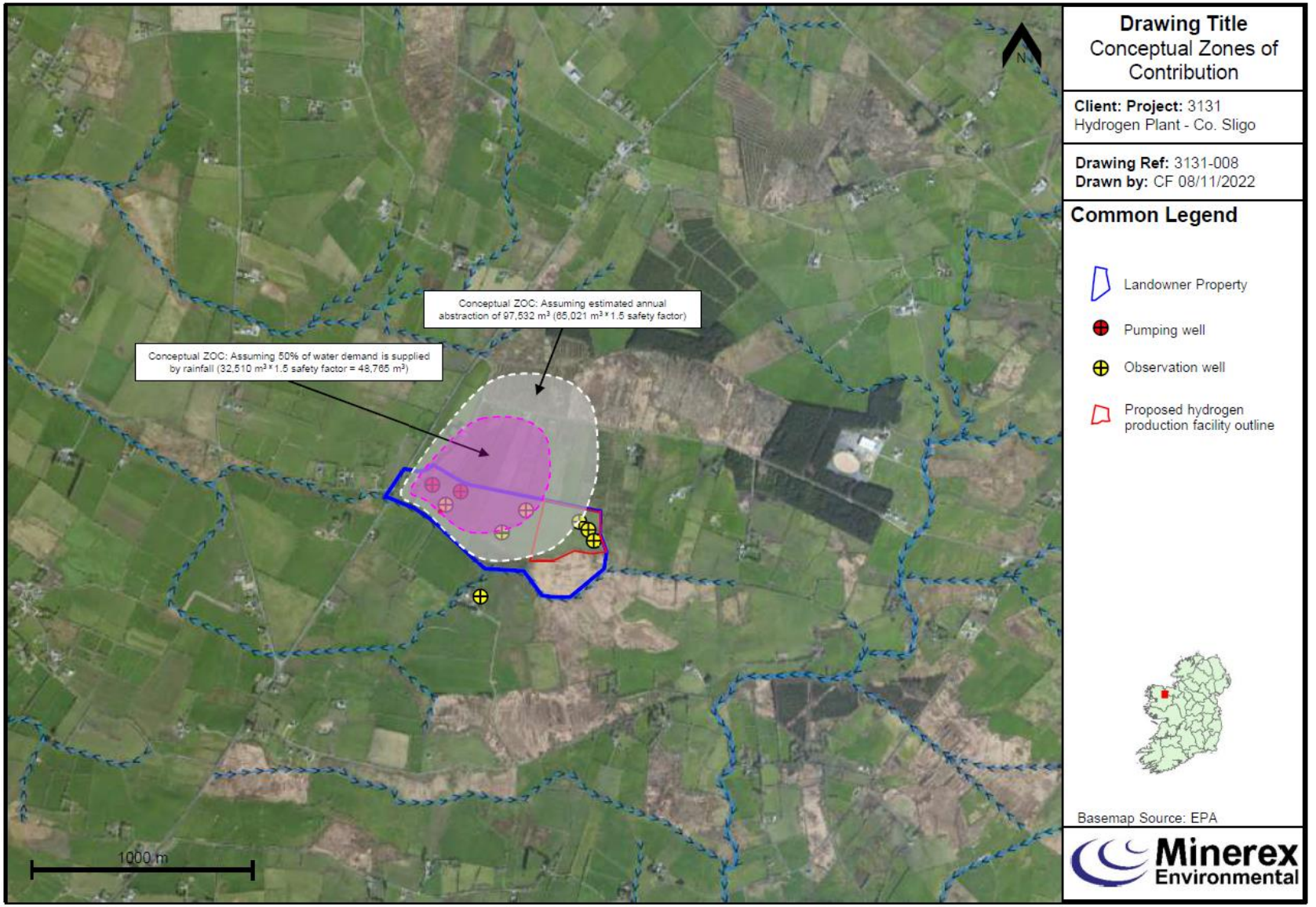

Figure 4.1: Zone of Contribution for the Hydrogen Plant.

4.5.1.2 Impacts on habitats downstream

Submissions raised concerns regarding the volume of abstracted water and the impact to habitats, including wetlands down stream of the Hydrogen Plant, these included the following extracts:

"In addition to this, and of further concern, is the fact that there will be an abstraction of groundwater as part of the proposal at this same location. The nearby Dooyeaghny/ CIoonIoughan river system (Figure 3) and additional downstream connected hydrological network has significant potential to support a large and diverse range of species such as Otter (Lutra lutra) which more than likely utilises the full extent of the stream for foraging and commuting, rest ups. Salmonid spawning habitat which is extremely important for the towns Of Ballina and Foxford from an economic perspective and more importantly the continued existence and protection of Salmon (Salmo salar) themselves into the future, European Eel (Anguilla Anguilla), Brown Trout (Salmo trutta) and Stickleback (Gasterosteidae). Further to this, the stream is situated 2 m below the proposed hydrological habitat for all of these species which is of concern with regard to the potential for contaminant run-off and entry to this sensitive river system and its downstream tributaries."

"The groundwater vulnerability classifications of High and Extreme, directly linking both the SAC where the Vertigo species are located and the proposed Hydrogen Plant, in addition to the considerable differences in elevations (35 m) and short distance between sites (2.2 miles) and the fact that both locations are located within the same WFD River Sub Basin."

"I am worried that over a number of years in the operational phase of this project, that long term water pumping may dewater the aquifer and dry the natural springs, I would like to ask under the precautionary principle if Mercury Renewables. can provide evidence that water levels in the water will not be depleted over time as a result of large volumes of water being extracted on a daily basis."

The sensitivity of the receiving environment, namely surface water and groundwater is identified in the EIAR. The assessment uses Environmental Quality Standards (EQS) in line with relevant legislative instruments including Surface Water reference concentrations. Ground water abstraction at the Hydrogen Plant is assessed in Section 9.4.6.3 of the EIAR. The Groundwater Supply Assessment Report in Appendix 9.8 of the EIAR also assesses the potential impacts of ground water abstraction.

The EIAR (Section 9.4.6.3) states:

The conservative estimate of water demand for the plant is 182 m^3/day, therefore it is unlikely that the Hydrogen Plant Site will exceed the sustainable yield in the underlying aquifer. However, seasonal variation particularly in light of climate change still need to be considered on an ongoing basis.

Ongoing monitoring will be conducted as part of the operational phase of the Proposed Development to facilitate management of raw water sources. This monitoring will include quality and volumetric monitoring of processes associated with the Hydrogen Plant. For example, stored rain water volumes, abstracted groundwater, waste water arising from source water treatment, effluent arising from foul sewage, treated waste water / effluent, water storage volumes, discharge quality. Realtime monitoring of groundwater, surface water, and Hydrogen Plant systems will facilitate management of processes and control of groundwater resource.

The abstraction of groundwater is likely to increase capacity and rates for recharge of rainwater to ground. Wetlands in the area, specifically within the zone of contribution (see Figure 4.1) and in close proximity to the Hydrogen Plant Site are peatland in nature. Peatlands depend on persistent wetting e.g. rain, and peat has low infiltration / recharge rates. The underlying aquifer recharge capacity is not directly correlated with peatland formation or heath, for example; peatland can form over karstic aquifers where the underlying bedrock is shallow and readily accepting recharge under peat. The Proposed Development has committed to sustainable use of the groundwater resource, and will discharge to receiving surface waters only when conditions are favourable i.e. discharge quality and /or assimilative capacity. Significant provision within the design of the Hydrogen Plant has been made for rainwater harvesting which will be used in preference to groundwater.

4.5.1.3 Impacts to soils

Some submissions raised concerns regarding the abstraction of water and the impact to soils, and in turn impacts to grass and livestock.

As discussed in relation to the potential dewatering wetland or peatland areas above, abstraction of groundwater at sustainable yields, is very unlikely to adversely effect soil moisture and productivity. This has been assessed in the EIAR in Chapter 8: Soils and Geology. On a national scale, existing industrial, commercial and residential wells are abstracting groundwater daily and adverse effects to soil moisture is not a concern.

4.5.1.4 Ground subsidence

One submission stated:

"*We are worried that this possible depletion could undermine the ground structure that could eventually lead to subsidence causing property damage or even sink holes. Should this be the case, it would be impossible for us and others to get insurance on our properties or at the least, it could lead to very high risk premiums."*

As discussed in Section 4.5.1.1 above, the Hydrogen Plant will abstract groundwater at rates lower than the sustainable yield, as demonstrated in the Groundwater Supply Assessment submitted with the EIAR. This will not lead to soil dewatering or ground subsidence.

Pumps to abstract water for the Hydrogen Plant will be installed at approximately 80 mbgl (metres below ground level), within the underlying bedrock. The bedrock is part of the Ballina Limestone Formation (Lower), this is comprised of dark-fine grained limestone and shale. Limestone is usually within the range of unconfined compressive strength of rock[17], from 'Medium Strong' (25-50 MPa) to 'Extremely Strong' (>250 MPa). There is approximately 6 m of overburden overlying the bedrock. The bedrock, due to its strength and depth is well able to support this overburden. The boreholes will be cased with sleeves so there is no potential for the overburden to leach in o the borehole and therefore no potential for the overburden to be undermined or cause subsidence.

4.5.2 Water Supply Mains

Concern was raised about the potential impacts of suppling the water demand from the mains water supply. Section 2.6.6.3 of Chapter 2: Project Description, outlines the water supply to the Hydrogen Plant. The EIAR identifies three sources of a raw water for use at the Hydrogen Plant; Groundwater, rain water, and mains water. The principal source is identified as groundwater, which will be supplemented by rainwater to ensure sustainable use of resources (groundwater) and to manage raw water and wastewater quality when required. Use of harvested rainwater has been maximised in the design of the plant. The design includes rainwater storage, with a volume to accommodate 5,287 m^3 (5,287,000 litres) of rainwater. Under worst case scenarios, for example; extended dry periods whereby groundwater levels are low and rain water is scarce, the Proposed Development will use mains water to supplement raw water supply. A pre-connection feasibility application was submitted to Irish Water, (ref CDS23001225) it was confirmed that the connection was feasible to meet the demand of the Hydrogen Plant.

4.5.3 Water Discharge

Submissions raised concerns regarding the wastewater discharge referencing potential impacts to groundwater vulnerability, wildlife and drinking water. The impacts of these are assessed in Chapter 9 of the EIAR; Hydrology and Hydrogeology, Chapter 5: Terrestrial Ecology and Chapter 6: Aquatic Ecology. The EIAR identifies that without mitigation, under worst case scenarios there is likely to be a significant adverse effect to surface water quality.

[17] Norbury D. (2010) *Soil and Rock Description in Engineering Practice*. Whittles Publishing, Scotland, UK.

With mitigation this effect can be managed and reduced to acceptable levels i.e. no significant adverse effect to downstream surface water quality.

The submissions included:

"The discharge report states that 'discharge waters will be reflective of groundwater, with additional nutrients also emanating from domestic effluent.' This has not been accounted for in the assimilative capacity assessment."

"The Minerex report also states that: 'Contaminants released due to an environmental incident have the potential to infiltrate soils/subsoils potentially reaching the water table and in turn adversely impacting on groundwater quality'. This has the potential to not only have a significant long-term and permanent negative impact on species of Vertigo but also species such as Otter, European Eel, Brown Trout, Stickleback and Salmon which is of the utmost importance for the nearby economies and tourism benefits of Ballina and Foxford where salmon return to year on year in conjunction with successfully spawning."

"*If there is a malfunction in the wastewater treatment system or an overloading of harmful contaminants (as will be stored onsite — stated in the EIAR) of the groundwater or adjacent river system, in an area that is categorised as having a High/Extreme groundwater vulnerability, then QI's such as Estuaries [1130], Narrow-mouthed Whorl Snail (Vertigo angustior) 110141, Sea Lamprey (Petromyzon marinus) [1095] and Harbor Seal (Phoca vitu/ina) (13651 are at a significant risk of a negative and adverse impact as a result of the proposed Hydrogen Plant proceeding. All of these species are water dependent."*

"Discharge Quality: The proposal states that domestic effluent generated at the hydrogen plant will undergo primary treatment in a septic tank. Primary treated wastewater will then be treated through an ICW. No design specifications or drawings of the ICW are included in the planning submission. The retention times of the ICWs do not factor in storage for rainfall. It is proposed to discharge treated domestic effluent to surface water. Composition of domestic effluent does not appear to have been incorporated into final discharge composition and assimilative calculations. The composition of the proposed discharge is not known."

"There will also be a discharge point for wastewater from the proposed Hydrogen Plant into the adjacent Dooyeaghny/Cloonloughan river system as indicated within the EIAR Hydrology and Hydrogeology section of the EIAR. Groundwater vulnerability here is high, this is concerning with regard to the adequacy and sufficiency of any 'treatment' of wastewater that will be entering the nearby river system. There is significant potential for subterranean and potentially surface water related hydrological connectivity and subsequently contamination given the categorisations of both High and Extreme groundwater vulnerability and also the relatively short distance between the 2 sites (2.2 miles) where Vertigo is located in the SAC

In addition to these factors, the significant drop in elevation, as also described, between the 2 sites is of concern with respect to the sensitive receptors along with the fact that both locations are located within the same WFD River Sub Basin."
"We are located between the Brusna River SAC and Moy River SAC. Mercury Renewables Ltd. intends to discharge into the Dooeighney (also spelled Dooyeaghny) river, which is an important river located between these two protected areas, and is close to my home."
"Also, can they prove beyond doubt that no fish or animals will be sick or die because of the discharge they will put in the Dooyeaghny, or Brusna rivers, either on purpose, or accidently?"
"I am also worried about the water to be discharged into the Dooeighney river, and the implications for aquatic life, in the event of an accidental chemical leak from the hydrogen plant site."

The assessment of the impacts of water discharge is addressed in Chapter 9: Hydrology and Hydrogeologyof the EIAR, Section 9.4.6.5. The assessment identifies the potential for groundwater chemistry and existing pollutants, and that the treatment of the source water for use at the Hydrogen Plant will generate wastewater. The Hydrogen Plant will treat source water with c. 70% efficiency, i.e. the wastewater arising from this process will be c. 30% the original volume with nearly 100% of the original groundwater hydrochemical constituents. This wastewater will therefore possess elevated concentrations of constituents present in the groundwater which will potentially adversely impact on water quality in the receiving surface water network and therefore this wastewater will not be directly discharged.

Wastewater arising on site will undergo treatment, this is described in Section 2.6.6.6 of Chapter 2: Project Description of the EIAR. Table 2.8, shows the discharge volumes. This will be monitored (see Section 9.5.3.6 of Chapter 9) and will not be discharged in the event discharge quality or river assimilative capacity are unfavourable.

The design of the treatment system is such that the discharges are managed to take account of actual conditions in the receiving watercourse, namely flow rate and specific water quality criteria and therefore the discharge will not have adverse impact on the receiving environment.

The necessary monitoring system will be implemented to ensure that the emissions from the Hydrogen Plant are at all times within the water quality parameters set out in the EIAR. Section 5.3 of the pDACA (Appendix 9.3 in the EIAR) outlines the Detailed Monitoring Plan for the Hydrogen Plant which will establish critical thresholds (e.g. critical river discharge rate or assimilative capacity) for discharges of the specific characteristics of the facility.

Therefore, the wastewater treatment system includes a comprehensive monitoring system and controls to ensure the discharges are maintained within the qualitative and quantitative thresholds specified in the EIAR.

The Hydrogen Plant and wastewater treatment systems have been designed and will be managed in a way that discharging of trade effluent of unacceptable quality and/or discharging of trade effluent to surface water with inadequate assimilative capacity will not be permitted to occur. This will be achieved through continuous monitoring of treatment systems, effluent quantity and quality, and surface water discharge and quality to inform management and decision making. These systems and fail safes can also be automated as part of the monitoring systems where emergency response is activated when certain thresholds are exceeded. The Hydrogen Plant will require an EPA licence due to the type of activity occurring, this will have specific stipulations in terms of discharge, ongoing monitoring and reporting.

A submission states that:
"Taken from Page 77 of the Hydrology and Hydrogeology section of the EIAR for the project: "There will be a relatively large-scale volume of various chemicals stored on the Hydrogen Plant Site, including Hydrogen itself making up a large portion during production. Other chemicals or potential pollutants include hydrocarbon fuels stored on site. With relatively large volumes of fuel being stored on site there is the potential for a correspondingly significant worst-case scenario involving a significant release of hydrocarbons into the environment. This is considered to be of a potentially profound adverse effect".

In terms of chemicals stored on site, all hazardous materials will be managed and stored in an appropriate manner including bunding. Use of such materials on site will be managed and monitored, including identification of specific emergency procedures where required. The development storm / drainage / fire water systems are designed to ensure any potential accidental spills on site are contained on site and will not discharge direct to surface waters or infiltrate to groundwaters. The effects of this are assessed in Section 9.4.6.6 of Chapter 9: Hydrology and Hydrogeology and in Table 16.4.1.4 in Chapter 16: Major Accidents and Natural Disasters.

4.5.3.1 Discharge Rates

Submissions regarding the discharge of process water from the Hydrogen Plant included:
"Page 133 of EIAR Chapter 9 states that 'the discharge rate will also be reduced as required depending on water chemistry or other environmental variables, namely insufficient

assimilative capacity in the river during dry weather flow or prolonged drought conditions'. It is not feasible to adjust discharge rates in such a dynamic approach in response to changes in receiving water flows and quality."

"Discharge Rate: The actual maximum discharge rate is not known. A maximum must be stated for the purposes of a discharge license application, and this value should be used across all assimilative capacity calculations. It is not clear how the proposed discharge rate is linked to groundwater abstraction rates. The control of discharge rates in response to river flows seems complex."

"I am concerned that there is lack of clarity in relation to water discharge amounts, and effect on groundwater in the area. Ultimately excessive discharge could impact the Dooyeaghny, and Brusna river nearby end wildlife herein, protected wilder the Habitats Directive."

Section 2.6.6.6 of Chapter 2: Project Description in the EIAR outlines the waste water discharge rates. The EPA has been consulted during the EIA process this is outlined in Section 1.10.2 of Chapter 1: Introduction in the EIAR. Licences will be applied for post consent and all requirements will need to be complied with before operation begins.

As part of the assessment and development design, the wastewater treatment system line will include waste water storage in the order of 1,500 m^3 (as outlined in Section 2.6.6.4 in Chapter 2: Project Description of the EIAR). Wastewater storage will allow monitoring of loading on systems including constructed wetlands, and with storage the dosing rate and in turn discharge rate from the system can be directly controlled and managed. The volume of storage / capacity available at a particular point in time will allow production at the Hydrogen Plant to continue without discharging for a period of time. In the event of unfavourable discharge quality / inadequate assimilative capacity whereby discharge cannot be permitted for extended periods of time (e.g. drought) and wastewater storage nearing full capacity, the wastewater will be tankered off site to an appropriate facility. In the unlikely event that the aforementioned scenario occurs and the wastewater storage is at full capacity, the Hydrogen Plant can cease production (specifically; treatment of source water will cease). This scenario is very unlikely to occur in practice. The waste water storage tank can provide a minimum of 1 months waste water storage (at peak installed capacity of the Hydrogen Plant and predicted high wind production seasons e.g. February, longer during the phase up period and periods of lower hydrogen production e.g. July). Should waste water discharge to the receiving water course be required to stop, removal of this stored waste water by tanker to a licensed facility can commence. It is therefore unlikely to reach a scenario where production is required to cease due to the storage being full. Periods of forecasted high wind also line up with periods of higher forecasted rainfall and higher assimilative capacity, i.e. at windy times of the year

(October to February), it is also generally rainy and the flow of water courses is likely to be higher (see Table 4.1).

"The proposals for treatment of domestic effluent generated at the hydrogen plant site does not comply with EPA Code of Practice (EPA, 2021)."

In the submission, a full reference could not be located for the EPA 2021 citation. However, it appears to be in reference to "The Environmental Protection Agency Domestic Waste Water Treatment Systems (Population Equivalent ≤10)[18]". This document as per the title is relevant to domestic waste water treatment systems. It states:
"Its purpose is to provide guidance on domestic waste water treatment systems (DWWTSs) for single houses or equivalent developments with a population equivalent (PE) of less than or equal to 10."

The Proposed Development does not meet this description. The EPA has been consulted during the EIA process, this is outlined in Section 1.10.2 of Chapter 1: Introduction in the EIAR. Licences will be applied for post consent and all requirements will need to be complied with before operation begins.

All engineered water and wastewater treatment systems have been designed and specified by competent, qualified and experienced engineers.

The design of the waste water treatment system took cognisance of the below references:

- EPA (2018) Licence Application Form Guidance
- Sligo County Council (No Date) *Guidance on Applying for a Discharge Licence to Surface Waters*
- Constructed Wetland Association (CWA) (2017) *Guidelines – Constructed Wetlands to Treat Domestic Septic Tank Effluent*
- Cawley A.M., Healy M. (2000) *Evaluation of the waste treatment performance of constructed wetlands with special reference to Williamstown Co. Galway Wetland System*
- Department Of Agriculture, Fisheries and Food (2011) Minimum Specification for Integrated Constructed Wetlands, and Ancillary Works.

[18] https://www.epa.ie/publications/compliance--enforcement/waste-water/2021_CodeofPractice_Web.pdf

4.5.4 Assimilative Capacity of nearby Water Courses and Monitoring Plan

A number of submissions raised concerns regarding the assimilative capacity of streams in the environment surrounding the Hydrogen Plant. These included:

"Receiving Surface Water Quality; It is submitted that the applicant has not provided adequate information to describe the quality of the receiving waters. The assimilative capacity of the stream appears to be based one upstream sample retrieved in December 2022. Typically at least 3 samples would be retrieved, and these should be taken under low flow conditions, i.e. preceded by c. 10 days Of little or no rainfall"

"Assimilative Capacity Assessment (ACA): The assimilative capacity calculations are difficult to follow. What is the Inferred variable Q95 vs Inferred Constant River HYDRO Tool 95%ile flow. The river is deemed to Fail under Scenario 3.

"This suggests that the surface watercourse has inadequate low flow rates to receive generated wastewater flows. It appears that the Q95%le flows in the river are simply too small to safely assimilate the discharge. The threshold for a PASS result in the ACA is not stated. It appears to be 100%. This would utilise all head room available in the stream and would not permit any additional third party discharges downstream or upstream. Though not stated in legislation the maximum percentage of the available head room that should be used by a proposed discharge is 25% (according to the guidance as issued by the Department of Environment 'Guidance, procedures and Training on the Licensing of Discharges to Surface Waters and Sewer for Local Authorities (Volumes 1 and 2 of the Water Services Training Group Manuals, Department of the Environment and Local Government, 2011). Assimilative capacity and mass balance calculations have not been included for nitrates, ammonia, orthophosphate and suspended solids. Ammonia concentrations in surface waters within the wind farm area were shown to exceed Surface Water Regulations (2019). Representative baseline surface water quality has not been established. The applicant has used an EQS for BOD of 5 mg/l which is incorrect. The ACA should be repeated using the Surface Water Regulations threshold Of 2.6 mg/ for 95%ile flow conditions in a river waterbody of good status."

"Receiving Surface Water Low flow: Dry weather flow is equivalent to flow exceeded 98% of the time. The applicant states that the EPA advised this flow rate be used in discharge calculations. The applicant has not presented calculations for dry weather flow. The applicant has used Q95 flows in discharge calculations. The Q95% is stated as 0.004620 m3/s. A site-specific Q95 should be established prior to application for planning permission. Use of a variable Q95%, changing from month to month, is not appropriate. Hence the calculations presented in Scenario C Of the ACA should be disregarded. The applicant has not provided stream flow measurements following a sufficiently long dry spell to validate the Q95%ile values, as derived from EPA HydroT001. 27."

"I am concerned that the Dooyeaghny River was not tested to the same degree as other streams in the area. I feel that this river should have been tested in light of the fact that the applicant has a discharge point directly int the Dooyeaghny river, prior to it running through my land."

The EIAR submitted with the application identified key water quality parameters for the worst case scenario associated with wastewater discharges from the Hydrogen Plant; i.e. dry weather conditions and peak average wastewater. The unmitigated potential significant impacts associated with this worst case has been fully documented in the EIAR.
The EIA Directive requires the assessment of the likely significant effects, and having identified these, to propose mitigation measures to avoid or reduce the likely impacts. The approach which we have adopted in the EIAR accompanying the application is to identify and assess the worst-case scenario and having identified this present a suite of mitigation measures to ensure that any residual impacts can be adequately managed within stated parameters. The continuous monitoring of flow rates and relevant water quality parameters is included as part of the mitigation and monitoring measures proposed by the Applicant in the EIAR. We are satisfied that this approach ensures the likely significant effects have been adequately identified and presented in the EIAR to allow An Bord Pleanála to conduct the EIA and the mitigation and monitoring measures proposed are designed to and will ensure that any residual impacts will, at all times, be managed in accordance with the parameters identified in the EIAR. A long-term monitoring program will be put in place to ensure accurate river flow and water quality data is used to assess the assimilative capacity of the Dooyeaghny/Newtown river during operations.

The key water quality parameters for the worst case scenario associated with wastewater discharges from the Hydrogen Plant identified in the EIAR submitted with the application was dry weather conditions and peak average wastewater.

The peak average wastewater will occur when the Hydrogen Plant is built to maximum capacity and during predicted high wind production seasons. The worst case scenario would be one in which this occurs at the same time as a prolonged period of dry weather.

The wastewater generated from the water treatment process will be variable month to month depending on wind energy production, i.e. the Hydrogen Plant will have largest volumes of wastewater generated when there is the most wind. This is expected to be in February, with lowest volume of discharge in summer months. This is also generally in line with rain fall trends throughout year, i.e. it is generally wettest in the windier months. Therefore, the peak average wastewater is likely to coincide with wetter weather and more favourable assimilative capacity and the worst case scenario is unlikely to occur.

However, the potential significant impacts associated with this worst case scenario have been fully documented in the EIAR and may be assessed as part of the EIA.

The EIAR also identified mitigation measures. The mitigation measures included in the EIAR were as follows, starting from absolute worst case scenario whereby extended drought conditions lead to low river discharge rates and unfavourable assimilative capacity for an extended period of time:

1. With several weeks worth of wastewater storage available (buffer capacity), the Hydrogen Plant can be managed whereby discharge can be regulated and restricted i.e. gated down, to achieve a discharge loading which the observed assimilative capacity can accommodate without significant adverse effects on downstream water quality. During this period waste water can be tankered off site to maintain space in waste water tank storage. The Preliminary Discharge and Assimilative Capacity Assessment (pDACA), included in Appendix 9.3 of the EIAR, demonstrates that under these conditions during worst case scenario where the assimilative capacity is inadequate to receive the anticipated peak average wastewater with quality in line with typical licence limits (BOD), restricting the discharge rate by 50% will be sufficient to ensure discharging to surface waters will not have an adverse significant effect on downstream surface water quality.

2. When continuous monitoring of the river depth / river discharge rate and discharge quality indicates that there is inadequate assimilative capacity to discharge, and there is no buffer capacity on site for wastewater storage (wastewater storage is nearly full), the Hydrogen Plant can cease operations including the treatment of raw source water i.e. the principal source of wastewater arising on site.

   There is a waste water storage tank sized 1,500 m^3 which provides 1,500,000 l of storage space, enough for a minimum duration of one month waste water storage. In this scenario wastewater in storage will be tankered off site to an appropriate facility to be disposed of, and operations will resume only when two weeks worth of wastewater storage is available once again. The Hydrogen Plant can continue operating under this regime (without discharging) during worst case conditions where river discharge rates / assimilative capacity are unfavourable.

These scenarios are unlikely and are only expected to occur very rarely, as predicted high wind production seasons during periods of forecasted high wind resource are in line with predicted higher periods of rainfall, i.e. at windy times of the year (October to February) it is also generally rainy. This can be seen if the existing climate baseline rainfall in Table

10.4 of Chapter 10: Air and Climate is compared to the predicted waste water discharge in Table 2.8 of Chapter 2: Project Description. Table 4.1 in this response shows this comparison.

The pDACA demonstrates under typical operating conditions the wastewater treatment system will manage discharge rates such that there will be no likelihood of significant impacts on the receiving environment. The waste water storage tank can provide a minimum of 1 months waste water storage (at peak capacity of the Hydrogen Plant and during predicted high wind production seasons e.g. February, longer during the phase up period and periods of lower wind resource and therefore lower hydrogen production e.g. July). Should waste water discharge to the receiving water course be required to stop, removal of this stored waste water by tanker to a licensed facility can commence. This makes space for further waste water storage, and so it is unlikely to reach a scenario where production is required to cease due to the storage being full.

The necessary monitoring system will be implemented to ensure that the emissions from the Hydrogen Plant are at all times within the water quality parameters set out in the EIAR. Section 5.3 of the pDACA (Appendix 9.3 in the EIAR) outlines the Detailed Monitoring Plan for the Hydrogen Plant which will establish critical thresholds (e.g. critical river discharge rate or assimilative capacity) for discharges of the specific characteristics of the Hydrogen Plant. Section 4.5.3 and 4.5.4 of this response sets out the progress of the development of the monitoring plan and brings together the monitoring outlined in the EIAR and pDACA. Therefore the wastewater treatment system includes a comprehensive monitoring system and controls to ensure the discharges are maintained within the qualitative and quantitative thresholds specified in the EIAR.

The waste water storage tank can provide a minimum of 1 months waste water storage (at peak capacity of the Hydrogen Plant and during predicted high wind production seasons e.g. February, longer during the phase up period and periods of lower hydrogen production e.g. July). Should waste water discharge to the receiving water course be required to stop, removal of this stored waste water by tanker to a licensed facility can commence and so it is unlikely to reach a scenario where production is required to cease due to the storage being full.

The Hydrogen Plant and wastewater treatment systems have been designed and will be managed in a way that discharging of trade effluent of unacceptable quality and/or discharging of trade effluent to surface water with inadequate assimilative capacity will not

be permitted to occur. This will be achieved through continuous monitoring of treatment systems, effluent quantity and quality, and surface water discharge and quality to inform management and decision making. These systems and fail safes can also be automated as part of the monitoring systems where emergency response is activated when certain thresholds are exceeded. The Hydrogen Plant will require an EPA licence due to the type of activity occurring, this will have specific stipulations in terms of discharge, ongoing monitoring and reporting.

The design of the system as set out in the application contemplates continuing monitoring of critical river discharge rate and assimilative capacity during the design, construction and operation of the Hydrogen Plant to ensure that the system operates within acceptable limits at all times. The below lays out the progress of the development of the monitoring plan and brings together the monitoring outlined in the EIAR and pDACA, it scopes what is needed and how that data will be used.

Monitoring

Ongoing monitoring at the site will be used to confirm the Q95%ile, Q98%ile and if necessary the treatment system calibrated to ensure the EQS of the receiving surface water body are not exceeded.

Surface Water Quality & Discharge Monitoring

Ongoing monitoring will take place throughout the operational life of the Hydrogen Plant and the treatments system will be designed to adjust and account for changing conditions with the receiving water body.

In field Monitoring events will be undertaken at least once per month and will obtain data representative of seasonally wet (winter) and extended dry conditions (summer). This is in addition to continuous monitoring by telemetry.

Ongoing monitoring includes obtaining samples at upstream, discharge point, and downstream (2 no.) locations. Field sampling will include grab samples, field hydrochemistry measurements, river section, flow and discharge assessment (ISO748), and analytical analysis by an accredited laboratory.

Laboratory testing will include a comprehensive suite of parameters, including those relevant to EQS (e.g. Surface Water regulations), and including parameters carried out for groundwater monitoring such as major ions and particular metals.

In field discharge assessment results will be used to inform and calibrate continuous river discharge monitoring.

River Hydrometry & Discharge

River Discharge (Q, volume/time) rates will be monitored continuously using telemetry monitoring systems. This system will monitor river water level i.e. river depth (m depth) using a water level logger. Water level data (m depth) will be used with in field discharge assessment results (Q) to develop and calibrate hydrographs for the river, and in turn water level monitoring can be presented as estimated discharge by means of a formula.

The river discharge data and hydrographs developed for the Hydrogen Plant Site will be reviewed to confirm the Q95%ile and Q98%ile at the proposed discharge point. Telemetry monitoring equipment will be positioned at or in close proximity to the proposed discharge point. This system will include a rain gauge which will record site specific rain data which can be graphed and assessed with observed river depth / discharge rates, including rates of inundation and relief during and after rainfall / storm events.

The telemetry systems will also be equipped with some basic physiochemical probes including; turbidity, pH, temperature, and electrical conductivity. This will be particularly useful to monitor the potential for variable physiochemical trends during variable meteorological conditions. Monitoring will be undertaken to obtain data representative of seasonally wet (winter) and extended dry conditions (summer).

Groundwater Level & Quality

Groundwater levels will be monitored continuously using water level loggers installed in existing boreholes on site. Groundwater levels will be monitored for the same duration as surface water monitoring, and the data obtained will be assessed a long with river discharge and rainfall data obtained.

Groundwater quality monitoring events will be undertaken at least once per month and will obtain data representative of seasonally wet (winter) and extended dry conditions (summer).

Groundwater quality monitoring in boreholes will include obtaining groundwater samples using submersible pumps, field hydrochemistry measurements, groundwater level manual dipping, and analytical analysis by an accredited laboratory. Groundwater quality monitoring will also include sampling of observed groundwater springs to the west of the Hydrogen Plant Site.

Laboratory testing will include a comprehensive suite of parameters, including those relevant to EQS (e.g. Surface Water regulations), and including parameters carried out for groundwater monitoring and typing such as major ions and particular metals.

Groundwater level and quality data obtained will be representative of seasonally wet (winter) and extended dry conditions (summer).

Purpose of Continuous Data Monitoring

The data obtained will be representative of site conditions at a point in time, and therefore ongoing monitoring is necessary. The wastewater treatment system will be calibrated to ensure that the discharge from the Hydrogen Plant will, at all times, have no greater impact to the receiving environment than set out and assessed in the EIAR.

The following data will be collected during continuous data monitoring to accommodate the dynamic receiving environment and to facilitate ongoing management and re-calibration to ensure the treatment system operates within the specified parameters:

River discharge data will be used to develop site specific hydrographs and determine the Q95%ile and Q98%ile at the proposed discharge point and in turn update and refine the assimilative capacity assessment.

River quality data will be used to confirm concentration ranges, including peak concentrations particularly during Q95%ile and Q98%ile discharge conditions. Worst case data will be used to update and refine the assimilative capacity assessment.

Groundwater quality data will be used to confirm concentration ranges for key parameters, and in turn update and refine the expected composition of wastewater arising from source water treatment processes on site.

River discharge, rain, and groundwater level data will be used to confirm groundwater level and resource seasonal variability, characterize hydrology and hydrogeology connectivity, and in turn update and refine the groundwater resource assessment. River and groundwater quality data will also be used in this process.

River discharge, rain, and groundwater level data, and developed hydrographs will be used to confirm the response to rain fall at the Hydrogen Plant Site and within the surface water and groundwater bodies.

This ongoing, continuous monitoring will take into account the changes in the receiving environment and facilitate the treatment system's management and adjustment. This is the system that is proposed and will be put in place and the Applicant and technical consultants involved in the design believes this to be the most robust approach.

The Hydrogen Plant is designed to continually monitor relevant water quality parameters and flow rates to ensure that the facility will not exceed stated limits. The treatment system will be managed and adapted throughout its operational life to meet the prevailing background environmental conditions.

The ongoing continuous monitoring will be used in real time during the Operational Phase to facilitate real time source water treatment, wastewater treatment, and discharge management and failsafe controls.

The EIAR and associated reports including the pDACA, identify the requirement to enhance the characterization of expected wastewater, expected wastewater treatment efficiency, and expected discharge quality. This will be in line with the requirements of anticipated licensing/ permitting including requirements of EPA Licence application for the Proposed Development.

To summarise, the EIAR identifies that, under worst case conditions, the unmitigated effect of the Proposed Development is likely to be significant and adverse in terms of compromising Environmental Quality Standards for downstream water quality. With mitigation this effect is managed and reduced to acceptable levels i.e. no significant adverse effect to downstream surface water quality. Mitigation includes the treatment of process waste water and welfare waste water and controlled discharge with waste water storage. It also includes the use of blended source water (groundwater and rain water) to reduce potential groundwater chemistry concentrations or loading in wastewater.

The EIAR confirms that the Hydrogen Plant will not discharge trade effluent to surface waters in the event that discharge quality, and/or assimilative capacity are unfavourable. In this case the mitigation measures inherent in the system will ensure discharge is stopped.

4.5.5 Waste Water Storage

Submissions raised concerns regarding waste water storage these included:

"*There is inadequate mitigation in the event of processed wastewater exceeding on-site storage capacity."*

"Will the wastewater generated be pumped to sewer network in Ballina or Enniscrone? Has the effects on these urban wastewater treatment plants been assessed as part of the planning?"

"For what duration of process will 1500 m storage cater for? This appears to be a ballpark size. No design specifications or drawings show this storage facility."

The waste water storage is described in Section 2.6.6.6 of the EIAR in Chapter 2: Project Description, which states:

The water treatment process, controls to avoid risks of accidental spillage or release of chemicals, controlled discharge and assimilative capacity of the receiving waters will mitigate this risk. Groundwater and surface water quality, levels and discharge rate in the receiving river will be monitored on a routine and continuous basis. A wastewater storage tank, sized c.1,500 m^3 will be constructed to achieve the ability to stop discharging to constructed wetlands or surface water completely for a minimum duration of one month. This means that should contaminants that could potentially impact human health be found in the wastewater discharge, the discharge can be halted and wastewater stored and recirculated until acceptable levels are attained or taken off site for disposal at registered waste water treatment facilities.

The sizing of the tank is based on the discharge rates outlined in Table 2.8 of Chapter 2: Project Description.

To clarify, mitigation includes for worst case scenarios whereby; when conditions are not favourable for discharging in terms of either discharge quality or assimilative capacity, trade effluent will not be discharged and waste water storage on site will be capable of facilitating a minimum of a months worth of 'buffering' whereby the Hydrogen Plant can continue production without the need to discharge. Under circumstances whereby the storage and buffering capacity of the system is reached, the Hydrogen Plant will cease production until conditions improve and/or tanker wastewater off site to a licensed wastewater treatment facility. Should waste water discharge to the receiving water course be required to stop, removal of this stored waste water by tanker to a licensed facility can commence. It is therefore unlikely to reach a scenario where production is required to cease due to the storage being full.

In other words, the Hydrogen Plant and wastewater treatment systems have been designed and will be managed in a way that discharging of trade effluent of unacceptable quality and/or discharging of trade effluent to surface water with inadequate assimilative capacity will not be permitted to occur. This will be achieved through continuous monitoring of treatment

systems, effluent quantity and quality, and surface water discharge and quality to inform management and decision making. These systems and fail safes can also be automated as part of the monitoring systems where emergency response is activated when certain thresholds are exceeded.

The Hydrogen Plant will require an EPA licence due to the type of activity occurring, this will have specific stipulations in terms of discharge, ongoing monitoring and reporting.

The waste water treatment system will not be connected to the public sewer network, so the impacts of this have not been assessed. It does not make practical or economic sense to construct a pipeline to transport wastewater off site. This is especially relevant during the phase up stages where the volume of waste water will be low. The Hydrogen Plant will be operated in accordance with all industrial emissions and discharge licences applicable to the facility and the discharge of waste water to the adjacent water course. The water discharge will be in compliance with the applicable licence or water will not be discharged.

4.5.6 Excavations – Impact on Hydrology

Submissions raised concerns regarding excavations and replacing green field surfaces with man-made surfaces, these included:

"*The removal of large parts of the bog and replacement with hard surface will naturally mean that essential soakage area will be removed. Also given the amount of road network required to service the development, it is submitted that newly constructed roads comprising aggregate will largely be impermeable and thereby act as a potential barrier to drainage. This is a cause of great concern for local residents. We therefore submit that the proposed development is not in accordance with proper planning and sustainable development*."

"*It is submitted that the excavations necessary to lay infrastructure i.e. haul routes and service roads together with foundations will likely have an adverse affect on the hydrology of the area. It follows that excavation of the naturally occurring porous material and replacing it with hardcore will almost certainly give rise to trapped bodies of water. The large foundations necessary to ground such large turbines may also give rise to displacement of significant volumes of water.*"

The replacement of greenfield or vegetated soil areas with proposed infrastructure will lead to ground sealing and a net increase in runoff. This is identified in FRA and EIAR (Chapter 9: Hydrology and Hydrogeology) and mitigated. Mitigation includes Sustainable Urban Drainage Systems (SuDS) on the Wind Farm and Hydrogen Plant Site to attenuate and control runoff. At the Wind Farm Site SuDS will include, inter alia; check dams, stilling ponds, and buffered outfalls. At the Hydrogen Plant Site SuDS will include large volumes of rain water harvesting, and constructed wetlands.

At both Sites, due to the attenuation and design of the drainage system, it was assessed that there will be a net benefit in terms of reducing flooding risks.

4.5.7 Flood Risk Assessment

There were a number of 3rd party submissions that raised concerns regarding the Flood Risk Assessment (FRA) provided with the application in Appendix 9.1 and Appendix 9.2 Site Flood Risk Assessments for Firlough Wind Farm and Hydrogen Plant, respectively.

These included:

"*The flood risk assessment is generic and does not contain any site-specific information with respect to flood risk. It fails to make any reference to the mapped EPA watercourses within the application area. There is no map of the surface water drainage network. 11. The lack of NIFM and CFRAM mapping on watercourses that run through and adjacent to the site doesn't mean there is no pluvial or flood risk. It merely means they weren't included in the programmes."*

"No details of attenuation proposals, or specifications of same, have been presented. This is a critical measure to ensure runoff rates and flow velocities are restricted to the pre-development equivalent. Greenfield runoff rates have not been calculated and should utilise 11-1124 method rather than rainfall intensity multiplied by area. Upgradient catchments to each of the proposed hardstanding areas has not been calculated. Lack of adequate attenuation and flow velocity control measures has the potential to cause significant scouring and erosion of downstream watercourses. These measures need to be assessed as part of the planning process."

"A Stage 3 FRA is required and should include a hydraulic model to accurately determine flood levels in the nearby watercourse under Q1000 flow conditions. Flows should be determined using appropriate catchment based calculations. The model quantify the hydraulic capacities of watercourses and hydraulic structures (e.g. downstream culverts)."

Flood Risk Assessment has been carried out in accordance with the Department of Housing and Local Government (DEHLG) and the Office of Public Works (OPW) document "The Planning Process and Flood Risk Management Guidelines for Planning Authorities" published in November 2009. This Assessment identifies and sets out possible mitigation measures against potential risks of flooding from various sources. Sources of possible flooding include coastal, fluvial, pluvial (direct heavy rain), groundwater and human/mechanical error.

Results of FRA Stage 1 (Flood Risk Screening) concludes that, the neither site is situated in or proximal to any probable flood zone (OPW, Flood Info Flood Maps) or any recorded flood

event. There is no evidence which suggests that either FRA should progress to FRA Stage 3 (Detailed Flood Risk Assessment). The FRA identifies a net increase in runoff as a product of the Proposed Development and the associated risk to on site pluvial flooding and /or exacerbating flooding downstream. Results of the FRA Stage 2 (Preliminary Risk Assessment) presents water balance calculations and mitigation measures which will at minimum aim to neutralise the net increase of runoff during a 1 in 100 year (plus Climate Change) storm event. The project design includes SuDS features to mitigate storm runoff but also as part of source water and wastewater systems. Features include rainwater harvesting storage volumes which far exceed minimum mitigation objectives identified in FRA.
The Sites are not within or proximal to mapped probable flood zones. The on-site risk of fluvial flooding is therefore screened out at FRA Stage 1. The FRA identifies and assesses the residual on site risk in terms of surface water runoff or pluvial flooding.

A submission states:
"*A map of the surface water catchment to the discharge point has not been included."*

Baseline information including EIAR figures are presented in Volume III of the EIAR, these show the catchment/s and surface water network associated with the Proposed Development and assessments.

A submission states:
"When calculating stream flow, average flow velocity should not be applied across the entire cross- sectional area of the channel. The recommended approach for measuring stream discharge is the Velocity — Area method, in accordance with IS0748 Hydrometry - Measurement of flow in open channels using water meters and floats."

Surface water flow and discharge assessments on site include correction factor based on channel and bed characteristics. Continuous monitoring will be done in accordance with ISO748 Hydrometry and using handheld flow meters and floats. Flow/discharge will also be monitored by telemetry as part of the continuous monitoring.

4.5.8 Sea Water Entering Aquifer

A concern was raised by a 3rd party around the possibility sea water will enter the aquifer when water is abstracted at the Hydrogen Plant. The coast is approximately 7.4 km from the Hydrogen Plant. The Hydrogen Plant Site elevations range from 53 m OD at the north-west corner to 45 m OD along the southern boundary. Salt water incursion in to the aquifer is highly unlikely due to this distance and the site elevations.

4.6 TRAFFIC AND TRANSPORT

Several submissions were received that related to Traffic and Transport. A summary of the submissions is laid out below.

4.6.1 Planning Conditions

Sligo County Council: "*Local roads effected by the development should be improved and maintained. There should be a Bond in place to ensure that roads damaged during the construction phase will be repaired and reinstated."*

This has been noted and can be complied with.

4.6.2 Safety Junction L6612 and N59

Several submissions raised concerns regarding the junction of the L6612 and N59 in terms of health and safety, the hard shoulder in proximity to the junction and the steepness of the N59 contributing to the risks of accidents. These included:

Sligo County Council; "Concern that the proposed access onto the N59 would be prejudicial to highway safety given the number and nature of proposed vehicular movements serving the hydrogen plant."

3rd party submissions included:

"In the traffic section, appendix 15.3-RSA Pdf there is a drawing of the new road layout and the accompanying text is unclear whether traffic will be exiting either towards Ballina or Sligo on the N59 but mentioned is the fact that HGVs will have to cross the white line to manoeuvre this new junction. This section of the N59 has limited vision from either approach and the fact that vehicles may have to cross the centre line is worrying for vehicular traffic, cyclists and pedestrians."

"The proposed developments would give rise to significant traffic movements giving rise to unnecessary interference with public amenity."

"There is a concern on the amount on accidents on N59/L6612 and this junction is deemed dangerous. The junction at the N59 and L-6612-1 already exists on a dangerous stretch of the N59. There now will be trucks, carrying hydrogen at high pressure, entering and leaving the N59 via this junction. The sight lines within the L6612-1/N59 junction raises safety concerns."

"The proposed entrance is part of a 'staggered junction' incorporating the L6611 and the L6612 which join the N59 on either side any HGV turning in or out of the proposed L6612 site entrance would have to 'swing out' and cross over into the oncoming lane to make the turn, HGV's, especially articulated and pulling trailers, have to use gears to establish speed travelling up an incline, and likewise to slow down on a downward incline therefore HGVs drawing hydrogen trailers, travelling on the N59 from the turn at the L6612 in any direction,

will be louder when they are slowly leaving or approaching the L6612 junction, and the resulting noise and vibration will be very intrusive for local residents, the HGVs traveling on the L6612 road, it's difficult for cars to pass each other without taking HGVs into account. Currently, no more than one vehicle at a time can travel across the bridge over the Brusna river."

"I would also voice concerns about the increase in traffic both during construction and operational times as the N59 where the hydrogen plant and the windfarm entrance locations are both accident blackspots with many serious incidents over the years occurring at both locations."

The proposed realigned junction between the N59 national secondary road and the L6612 local road at Carraun, Co. Sligo has been designed as a simple priority junction with priority for N59 through traffic on the N59 National Road. The junction is located in a 100 km/h speed limit zone. The junction has been designed in accordance with TII Specifications, primarily DN-GEO-03036 Geometric design of junctions. The design team have met with representatives of Sligo County Council Roads Department to discuss the location and layout of the proposed junction. The layout of the proposed junction is shown on Drawing No. 6129-PL-121 included in the planning application drawings. The proposed junction has been subject to a Stage 1 road safety audit carried out by an independent audit team approved by the TII. The road safety audit report is included in Appendix 15.3 of the EIAR. The recommendations of the auditors have been accepted by the design team as shown in the audit feedback form appended to the audit report and the recommendations of the audit have been incorporated into the final junction design. The junction has been designed to TII specification, autotrack analysis has been used to replicate the turning movements of vehicles, land acquisition has been under taken to accommodate junction realignment / visibility splays, these, combined with the road safety audit process, have resulted in a safe and serviceable junction. The junction will provide access to the proposed Hydrogen Plant and to the existing L6612 local road at the roundabout junction. The layout of the N59 junction has been designed to facilitate future widening of the N59 National Secondary Road.

The main design features of the proposed junction include:

- 215 m visibility splays measured at a 3.0 m setback from the N59 carriageway edge, the visibility splays provided are in accordance with TII specifications for a 100 km/h design speed.
- Radii at the N59 junction are in accordance with TII specifications and include junction tapers to accommodate the swept path of HGV vehicles. Additional width has been provided on the local road at the junction to accommodate HGV vehicles and prevent

HGV vehicles crossing the white line and conflicting with opposing traffic streams when entering or exiting the junction.

- Surfacing texture at the N59 / L6612 junction will be checked and upgrades if necessary to ensure that the surfacing will provide high levels of skid resistance at the junction as recommended by the road safety audit.
- The N59/L6612 junction and associated L6612 roundabout will have road markings and regulatory / directional signage in accordance with the requirements of Traffic Signs Manual.

The redundant section of the realigned L6612 will be used for pedestrian purposes and will link the N59 to the existing L6612 at the proposed L6612 roundabout. The proposed L6612 realignment will have grass verges and crossing points at the roundabout junction.

During the operation of the Hydrogen Plant, the Proposed Development will generate a maximum of 26 HGV arrivals and 26 HGV departures at the N59/L6612 junction on a daily basis. The Proposed Development will also generate 10 Light Goods Vehicles (LGV) arrivals and 10 LGV departures on a daily basis. HGV traffic associated with the Proposed Development will be distributed throughout the day with morning, afternoon and evening peaks and may result in 4 HGV arrivals and 4 HGV departures during the morning and evening peak periods on the N59. LGV traffic will arrive and depart to match work schedules.

During the construction of the Hydrogen Plant, the Proposed Development is expected to generate a total of 150 HGV arrivals and 150 HGV departures at the N59/L6612 junction on a daily basis. The Proposed Development will also generate 40 LGV arrivals and 40 LGV departures on a daily basis. HGV traffic associated with the Proposed Development will be distributed throughout the day with morning, afternoon and evening peaks and may result in 20 HGV arrivals and 20 HGV departures during the morning and evening peak periods on the N59. LGV traffic will arrive and depart to match work schedules.

The design team carried out traffic analysis at the N59/L6612 junction using classified traffic counts recorded at the junction in January 2023 during peak morning and evening traffic periods on the N59. The results of the traffic analysis show that the existing junction is operating within capacity and has capacity to accommodate construction and development traffic associated with the proposed Hydrogen Plant. Further analysis at the junction by the design team has shown that the junction will continue to operate within capacity with future predicted traffic growth when combined with short term construction traffic and long-term operational traffic. The results of the traffic counts at the N59 junction are shown in Section 15.3.5.6 of the EIAR.

4.6.3 Impact on other Vehicles

Some submissions included concern regarding other road vehicles such as emergency vehicles, link buses being delayed and the inconvenience that the construction phase would cause to local traffic including farm vehicles. Other concerns were raised regarding safety of vulnerable road users such as bikes, pedestrians, horse riders and farm animals on public roads especially the L-6612. Concerns were also raised regarding access to properties around the Hydrogen Plant during construction.

Chapter 15: Traffic and Transport assesses the impacts of the Proposed Development on the local road network, including other road users. Section 15.5.9; assesses the impacts of the Proposed Development on Pedestrian and Vulnerable Road Users. Section 15.5.10 assesses Driver Delay.

A Traffic Management Plan (TMP) has been developed (see Management Plan 7 attached to the CEMP in the EIAR). Prior to construction and once the Contractors have confirmed their suppliers, the TMP will be updated in consultation with Sligo County Council and Mayo County Council and An Garda Síochána as necessary.

All access points (domestic, business, farm) will be considered when finalising the proposed road closures and diversions. Additional measures such as local road widening, traffic shuttle systems and 'Stop-Go' systems will also be considered subject to agreement with Sligo County Council and Mayo County Council. Road closures will be scheduled in consultation with local residents and the Contractor shall endeavour to avoid times of high agricultural activity e.g. silage cutting.

To clarify, traffic will be allowed to utilise the constructed passing bays on the L-6612. With reference to the Transport and Traffic Chapter (Section 15.3.5), the volume of traffic on this road is low (227 AADT). The layout of the proposed L6612 realignment and the N59/L6612 junction is shown on Drawing No. 6129-PL-121 included in the planning application drawings. The proposed upgrade to the L6612 local road between its junction with the N59 and the proposed roundabout at the entrance to the Hydrogen Plant will be offset from the existing L6612 in order to upgrade the junction in accordance with TII standards. This means that, in accordance with TII standards, the proposed upgrade of the L6612 local road will have a wider bellmouth, a roundabout at the entrance to the Hydrogen Plant and a wider roadway than that of the existing L6612 local road. The redundant section of the L6612 will be used as a temporary diversion during the construction of the proposed road to provide local access for residents. The road construction works will be carried out using a traffic management plan

which will be agreed with Sligo County Council and will include detailed traffic management proposals for works on the N59 and the L6612 including proposals for pedestrians and other road users. Upon completion of the proposed L6612 road realignment, the redundant section of the L6612 will be landscaped and used as a pedestrian facility linking the N59 to the L6612 at the proposed roundabout. The proposed L6612 will also have grass verges and pedestrian crossing points at the junctions.

The construction of the Interconnector along the local road network will be carried out in stages using an approved traffic management plan agreed with Sligo County Council. Works of this nature will be confined within a short section of the public road and will not result in long term and widespread closure of the public road network. When the width of the road is not sufficient for vehicles to safely pass the works area, diversions will be put in place. Local access for residents, pedestrian, cyclists, and emergency services will be provided through the works. Passing places have been provided along the public road network as shown on Drawing No. 6129-PL-013, 6129-PL-014, 6129-PL-015. The location of the passing places have been chosen by the design team at intervisible locations in so far as is practical on the local road network.

Drawing No. 6129-PL-121 shows the measures that will be taken to ensure visibility for road users. In the operating phase of the Hydrogen Plant, 26 HGVs per day will use the junction. The effect of traffic associated with the operation of the Hydrogen Plant on the existing public road network will be imperceptible due to the type of traffic and the low volume of traffic generated during operation.

In terms of capacity concerns on the L-6612, Drawings 6129-PL-013, 6129-PL-014, 6129-PL-015 show the passing bays on the L-6612. Landowner consents are in place for these.

4.6.4 Swept Path Analysis

One submission stated that:

"In appendix 15.2a Swept Path analysis for Firlough Windfarm, Galway to site, there are only images present to the N4 in Ballisodare omitting the route through Ballisodare and the route on the N59 to the windfarm site. In appendix 15.2b Swept Path Analysis for Firlough windfarm, Killybegs to site, the images cease about 1 km short of Dromore West and fail to make any reference to the route to the proposed windfarm site. The incomplete locations from both these surveys provide a major gap in the planning application and therefore cannot be evidence of definitive findings. There are no swept path analysis on the haulage route after the loads reach Dromore West."

Collett & Son owns a fleet of over 60 vehicles and 100 trailers and is one of the main transport contractors who deliver wind turbine components to locations in Ireland. They also provide consultancy services in relation to the assessment of turbine haul routes. They prepared the Swept Path Analysis in the Appendix referred to above.

The feasibility of delivering turbines between port and the Wind Farm Site has been assessed by the design team and independently by Collett & Son. Collett & Son have assessed the haul route between the Port of Killybegs and the Wind Farm Site entrance and between the Port of Galway and the Wind Farm Site entrance. The preliminary route assessment which outlines the works required for the transportation of turbine components between Killybegs Port and the wind farm site entrance is included in Appendix 15.1a of the EIAR. The preliminary route assessment which outlines the works required for the transportation of turbine components between Galway Port and the Wind Farm Site entrance is included in Appendix 15.1b of the EIAR. Detailed swept path analysis drawings carried out by Collett & Son at pinch points between the Port of Killybegs and the N59 are shown in Appendix 15.2b of the EIAR. Detailed swept path analysis drawings carried out by Collett & Son at pinch points between the Port of Galway and Ballisodare are shown in Appendix 15.2a of the EIAR. The section of the turbine haul route between Ballisodare and the site entrance from Galway Port is similar to transportation from Killybegs Port and is covered in Appendix 15.2a. Swept path analysis between the N59 / L2604 junction and the Wind Farm Site entrance has been carried out by the design team and incorporated into Drawing No.'s. 6129-PL-251 to 6129-PL-258 which are included in the application.

The swept path analysis for Galway Port to Site is to follow on with the Killybegs to site route at the point they both merge onto the N59, and this is covered in the swept path analysis from Killybegs harbour to the Wind Farm Site.

According to the Primary Route Assessment report (Appendix 15.1), there is no pinch points in Dromore West, only temporary works such as street furniture to be removed. The first pinch point (Drawing No. 6129-PL-251) after Dromore West is shown in the JOD Planning Drawings. This indicates that road widening is required. Thereafter the route requires a 4.5 m roadway, which was checked on-site and verified on-site. The N59 Killybegs Route has been used successfully for turbine delivery for wind farms such as Killala, Sheskin, Oweninny I and Oweninny II.

4.6.5 Bridge on Turbine Raul Route

A submission was received concerning a bridge located along the turbine haul route:

"According to both route survey reports 15.a & 15.b considerable upgrading will be required of the road 1.2604 including the replacement of a bridge. The replacement of the bridge for delivery of the wind turbines is not mentioned in section 2.2 Project Overview."

The bridge is located on the L2604 local road and has been identified by Collett & Son as a location which will require modifications in the preliminary Turbine Haul Route Assessment Reports carried out for transportation of turbine components to the Wind Farm Site. The Collett & Son reports are included in Appendix 15.1a and 15.1b of the EIAR. The bridge is located near the L2604 local road junction approximately 0.3 km from the Wind Farm Site entrance. Traffic counts carried out in October 2021 at the junction near the bridge show that existing traffic volumes crossing the bridge are very low. The results of the traffic counts are shown in Figure 15.9 of the EIAR traffic Chapter 15.

A detailed topographic survey which identified road and boundary features was carried out along the L2604 from the N59 junction to the Wind Farm Site entrance. The topographic survey and measurements taken by the design team during site visits show that the bridge has 3.0 m wide clearance between parapets. The bridge parapets consist of 1.0 m high x 0.3 m wide block parapets. Autotrack analysis carried out by the design team show that turbine delivery vehicles which have a wheelbase of 2.75 m wide can traverse the bridge which is located on a straight section of L2604 local road. Temporary works may be required to modify the bridge parapets in order to allow wide loads mounted on low loading trailers such as turbine towers to cross over the bridge. Any modifications to bridge parapets will be agreed with the County Council and modified parapets will be demountable to facilitate easy reinstatement for public safety following each delivery. A detailed structural assessment of the bridge will be carried out to determine if strengthening works are required on the bridge prior to the transportation of turbine components. Parapets will be fully reinstated post turbine deliveries.

4.6.6 Spoil Removal Traffic

One submission states:

"Many of the residents also take issue with the amount of traffic that would be necessary to transport so much excavated material out and ship in very significant quantities of aggregate together with the machinery and component parts of the turbines themselves."

Section 2.7.8.3 of Chapter 2: Project Description in relation to spoil management at the Wind Farm Site states:

Subsoil and bedrock which are excavated as part of the construction phase of the Proposed Development will be reused onsite where possible. Peat material excavated will be reused as backfill in areas previously excavated as much as possible, and/or for reinstatement works elsewhere on the Wind Farm Site. To facilitate this the acrotelm (living layer) and the catotelm (lower layer) will be treated as two separate materials. Catotelm peat will be used to backfill, for example; around turbine foundation pads once established. Acrotelm peat will be used as a dressing on top of deposited catotelm peat in order to promote and re-establish flora. **The excavated peat material will be stored in designated spoil deposition areas as shown on Drawing No. 6129-PL-100.** There are 3 areas designated for peat storage on the Wind Farm Site. The locations chosen for temporary storage are based on gradient, geotechnical data and ground stability assessment, habitat type, and the adequacy of the ground to support the surcharge material. Further information can be found in **Chapter 8: Soils and Geology** and in the Peat and Spoil Management Plan in the CEMP in **Appendix 2.1.**

Section 2.7.9.3 in relation to spoil management at the Hydrogen Plant states:
Subsoil and bedrock which are excavated as part of the construction phase of the Hydrogen Plant will be reused onsite where possible as fill material and for landscaping. Bedrock material arising at the Hydrogen Plant site will be reused as fill material where applicable, e.g. access tracks. Using the local geology as fill will ensure that impacts to hydrochemistry are minimised.

To clarify, the majority of spoil will not leave either site, it will be reused on-site as part of reinstatement works.

Section 15.5.1 of Chapter 15: Traffic and Transport assesses the impact of construction materials delivery vehicles on the local road network. The assessment concludes that:
In terms of the Construction Haul Routes, the Proposed Development is likely to have a minor residual effect on the local road network given increased traffic volumes on the road network are unavoidable. However, with the mitigation outlined, these will be minimised and the resurfaced roads will produce a positive residual benefit.

4.7 AIR AND CLIMATE

Submissions in relation to Air and Climate included:
"Lack of clarity as to impact on air quality from proposed development' was raised as a concern in two observations."
"I am concerned about my health in the construction phase of this project, as dust from this site has previously blown in the direction of my home."

"The quality of air around my family home may be compromised due to dust from traffic during construction and the production of the gas hydrogen plant…… I believe chemical waste was mentioned in planning, can you confirm to me that westerly winds will not carry chemical fumes and compromise air quality around my premise."

4.7.1 Air Quality

Air quality, including dust, has been assessed in EIAR Section 10.2. This assessment has identified no potentially significant negative effects on air quality, given implementation of the mitigation measures embedded in the Project design.

EIAR Section 10.2.7 assesses the potential impacts of the Proposed Development on Air Quality.

4.7.1.1 Potential Effects - Construction Phase

Dust

Dust has been identified as the main potential source of impacts on air quality during construction works. Dust has the potential to be generated from excavations, the construction of access roads and hardstands, the underground water storage tanks, electrolyser buildings and along the Grid Connection and Interconnector Routes. The potential impact from dust becoming friable and being a nuisance to workers, and local road users, if unmitigated, is considered, a slight, negative, short-term, direct impact during the construction phase.

Mitigation measures to address the generation and suppression of dust from construction activities are outlined in EIAR Chapter 15: Traffic and Transport and in the CEMP in EIAR Appendix 2.1. The measures outlined in EIAR Chapter 10: Air and Climate are in alignment with Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes (NRA, 2011)[19].

Dust has been fully assessed in EIAR Chapter 10: Air and Climate. With strict adherence to mitigation measures and the distance from the main locations of dust generation, the impacts would be predicted to be slight and short-term.

Exhaust Emissions

The construction phase is likely to result in an increase in exhaust emission from construction vehicles and transport vehicles associated with the site works.

[19] National Roads Authority (2011) Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes. Available online at: https://www.tii.ie/technical-services/environment/planning/Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes.pdf Accessed 01/12/2022.

The engines of plant and machinery during the construction phase have potential to emit carbon dioxide, carbon monoxide, nitrogen oxides and particulate matter.

The Institute of Air Quality Management document 'Guidance on the Assessment of Dust from Demolition and Construction'[20] states:
"*That Experience of assessing the exhaust emissions from on-site plant and site traffic suggests that they are unlikely to make a significant impact on local air quality."*

Exhaust emissions have been assessed in EIAR Chapter 10: Air and Climate. The impact on air quality from an increase in exhaust emissions will be a short-term, slight negative impact.

4.7.1.2 Potential Effects – Operational Phase

Dust

There will be a small number of light vehicles accessing the Wind Farm Site during the operational phase. This could lead to some localised dust being generated though this will be small and sporadic as only approximately one to two site visits per week will occur at the Proposed Development. This is fully assessed in EIAR Chapter 10: Air and Climate.

Hydrogen Plant

The Hydrogen Plant production capacity will be scaled up to a maximum 80 MW, to meet demand for green hydrogen in the Irish market. The physical infrastructure of the entire Hydrogen Plant, (i.e. buildings, roads, water treatment, cooling and fuelling, etc) will be built during a single construction phase with the modular electrolyser system installed in 5 MW batches. As the additional electrolysers will be installed into existing physical infrastructure and existing ancillary infrastructure such as cooling fans and water treatment, there could be a small volume of localised dust and emissions being generated through delivery vehicles. Due to the small volume of vehicles required, this will have an imperceptible impact. This is fully assessed in EIAR Chapter 10: Air and Climate.

Hydrogen Transportation

During the operational phase, green hydrogen will be transported along the national roads from the Hydrogen Plant Site located near the N59 (EIAR Section 10.2.7). These vehicles will produce some localised dust during the operational life of the Hydrogen Plant. It is anticipated that tube trailers, powered by zero emissions green hydrogen will be used to transport green hydrogen resulting in no CO_2 or NO_x pollutants, these vehicles only emit water vapour and heat.

[20] IAQM. (2014). Guidance on the Assessment of Dust from Demolition and Construction'. https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf

If these types are vehicles are not commercially available during the operation phase of the Project, traditional (diesel) haulage vehicles will be used until a time that hydrogen trailers are available. Diesel trailers will produce pollutants such as nitrogen dioxide (NO_2) PM_{10}, and $PM_{2.5}$.

The Hydrogen Plant operational traffic does not meet the criteria of Transport Infrastructure Ireland (TII 2022) Air Quality Assessment of Proposed National Roads - Standard and is therefore scoped out of having significant impacts to air quality by vehicle emissions. This is further detailed in EIAR Section 10.2.7.2.1.

Hydrogen Production

Based on the available wind, hydrogen production will vary month to month (EIAR Section 10.2.7.2.2). Hydrogen production per year has been conservatively estimated at 4,547 tonnes (average 12.5 tonnes per day).

It is not anticipated that there will be any air pollution or hazardous emissions generated by the Hydrogen Plant Site. The green hydrogen produced by electrolysis at the Hydrogen Plant will result in zero greenhouse gas emissions due to using renewable wind energy. The only atmospheric emission to be emitted from the electrolysis process will be oxygen. This is released to the atmosphere via a vent stack. A licence will be required from the Environmental Protection Agency for the process of venting O_2 and an application for this licence depends on the successful grant of planning permission for the Proposed Development. O_2 is not considered a pollutant by either the Air Quality Standard Regulations 2011, World Health Organisation, Environmental Protection Agency or the CAFE Directive (Directive 2008/50/EC). This has an imperceptible neutral impact. The assessment of potential effects as a result of hydrogen production is further detailed in EIAR Section 10.2.7.2.2.

4.7.1.3 Potential Effects – Decommissioning Phase

Impacts during the decommissioning phase of the Proposed Development are anticipated to be similar to those arising during the construction phase.

4.7.1.4 Mitigation Measures and Residual Effects of the Proposed Development

Mitigation Measures have been included in EIAR Section 10.2.8.

The use of plant and machinery during the construction phase is not likely to have a significant impact on air quality in the area, both in terms of dust generation and exhaust emissions.

During the construction phase, with mitigation in place, this impact is assessed as slight/ imperceptible, negative, direct and temporary/short-term in nature.

During the operational phase of the Wind Farm, exhaust emissions will arise from occasional machinery use and Light-Good Vehicles (LGV) that will be required for occasional on-site maintenance works. The impact will be a long-term imperceptible negative.

The decommissioning phase impacts, and consequential effects will be similar to the construction stage, albeit of less impact as the works required will be less as described in EIAR Chapter 2: Development Description.

4.7.1.5 Conclusion

The Proposed Development has been assessed as having no significant negative effects on air quality during the construction, operation, or decommissioning phases of the Project (EIAR Chapter 10: Air and Climate).

Significant indirect positive effects of the displacement of fossil fuels have been identified. If the Proposed Development was not to proceed, the opportunity to reduce emissions of carbon dioxide, nitrogen oxides (NO_x), and sulphur dioxide (SO_2) to the atmosphere would be lost due to the continued dependence on electricity derived from coal, oil and gas-fired power stations, and vehicles fuelled by fossil fuels rather than renewable energy sources such as the Proposed Development.

4.7.2 Potential Effects of a Hydrogen Leak on Climate Change

One Submission stated:

"I am concerned about a possible hydrogen leak which will affect climate change."

Every effort will be made in the maintenance of the Hydrogen Plant to optimise the efficiency of Hydrogen Production. In the event of a hydrogen leak from the Proposed Development, the volume of gas released relative to climate change is imperceptible. Hydrogen leaks have been identified as a potential technological hazard in EIAR Chapter 16: Major Accidents and Natural Disasters. Hydrogen is non-toxic and non-poisonous, unlike conventional fuels. A hydrogen leak will not contaminate the environment or endanger the health of humans or wildlife. Hydrogen does not create "fumes."

4.7.3 Carbon Footprint

Submissions raised concerns regarding the carbon footprint of the construction of the Proposed Development, these included:

"The Wind Turbines: The manufacture of steel and other components to assemble a wind turbine (particularly on the scale proposed) must also be assessed as regards its impact on the environment vis å vis carbon footprint and environmental sustainability of natural and finite resources."

"Carbon footprint of wind energy: The manufacture of cement requires significant temperatures. Likewise the manufacture of other component parts must also be assessed. The carbon footprint per ton is therefore very significant. It is submitted that the use of such a vast quantity of concrete, rare earth metals and other finite resources would give rise to an unacceptably high carbon footprint…"

"RARE METALS: Each and every wind turbine has a magnet made of a metal called neodymium. The mining and refining of neodymium is extraordinarily dirty and toxic — involving repeated boiling in acid, with radioactive thorium as a waste product — 90% of it comes from — Baotou, China. Neodymium is a rare earth metal, which is generally sourced in China and which is causing [sic]. There are c. 4 tons of neodymium magnets in each turbine."

"It would also be essential to establish the carbon footprint involved: -

In the manufacturing process?

The decommissioning process?

In the construction process; diesel consumption, PM, N02 emissions and so forth?

Ware and tear during construction, lifespan and demolition?"

"The FUEL: The sheer volumes of concrete required together with access roads and hard standing areas, which in turn would require massive quantities of infilling to facilitate the construction of the proposed turbines is vast. It follows that the amount of diesel fuel necessary to fuel the truck to haul all this material on site would be enormous. This too must be factored into the carbon footprint equation together with the sustainability of consuming so much fossil fuel in the construction of the proposed wind turbines."

"Has this company taken climate change into consideration?"

Climate Change, carbon emissions and greenhouse gases are discussed in EIAR Section 10.3. The carbon emitted or saved as a result of the Wind Farm was determined using a carbon calculator (Scottish Government). The online carbon calculator aims to assess, in a comprehensive and consistent way, the carbon impact of wind farm developments. The model has also been used to assess the Hydrogen Plant carbon losses. The calculations include the access tracks, concrete and any peat removed from Hydrogen Plant element of the Proposed Development.

The completed worksheet, including the assumptions used in the model, is provided in EIAR Appendix 10.1. The model calculates the total carbon emissions associated with the Proposed Development including manufacturing of the turbine technology, transport, construction of the Proposed Development and tree felling.

The assessment concludes that based on the Scottish Government carbon calculator between 139,496 and 161,482 tonnes of CO_2 will be lost to the atmosphere due to changes in the peat environment and due to the construction and operation of the Proposed Development. This represents 6-9% (lower to higher turbine range and electrolyser range) of the total amount of carbon dioxide emissions that will be offset by the Proposed Development.

The 139,496 (lower range) and 161,482 (higher range) tonnes of CO_2 that will be lost to the atmosphere due to changes in the peat environment and due to the construction and operation of the Proposed Development will be offset by the Wind Farm and Hydrogen Plant in between approximately 27 and 47 months of operation (or 2 to 4 years). This depends on the selected turbine and the installed capacity of the electrolyser.

4.8 CULTURAL HERITAGE

Chapter 14 sets out the impact assessment of the Proposed Development on the Cultural Heritage resource together with a range of mitigation measures to avoid, reduce and/or offset any identified direct or indirect significance of effects. All identified mitigation measures align with response recommendations received from the Development Applications Unit (DAU), Department of Housing, Local Government and Heritage Submission.

Items raised in submissions in relation to Cultural Heritage are listed below and responded to separately:

- Impact on solar alignments and megalithic tombs
- Impact on recorded archaeological barrow site
- Impact on recorded archaeological ringfort (with children's burial ground)

4.8.1 Solar Alignments and Megalithic tombs

Submissions concerned with impacts to cultural heritage stated:

"The Court Tomb RMP (MA031-034) is aligned with the sun. T11 will potentially interfere with this amazing spectacle, as the sun illuminates the inside of the tomb at the spring equinox."

"The Wedge Tomb (MA031-005) is also aligned with the sun at the summer solstice. T6 is highly likely to interfere with this alignment."

"Tombs positioned for solar alignments are incredible historical monuments and enable us to experience something that is thousands of years in existence. Allowing turbines to block such spectacular events will be denying future generations the chance of experiencing this."
[after sunrise, spring equinox] *"It was amazing to be inside the tomb* [court tomb MA031-034---] *with the sun shining in a line." "This tomb is located close to turbine number 11".*
[summer solstice – time of day not defined] *"There was a fern growing under the top flagstone* [wedge tomb MA031-005---]. *The sight was beautiful to see…the sun shining through the tomb. I noticed that only the top of the tomb was visible." "I am concerned that turbine 6 may disturb the alignment of the sun with this tomb".*

A full impact assessment of court tomb MA031-034--- is presented in Chapter 14 of the EIAR. The Proposed Development has avoided direct impact on the monument. There is a predicted (negative) indirect long-term reversible impact on the landscape setting associated with the monument.

The monument has been surveyed by the Archaeological Survey of Ireland[21] and recorded as having an orientational axis aligned east-west, with the chamber gallery opening located at the eastern side. There has been no recorded indication from this survey that infers a deliberate solar astronomical alignment. The court tomb series as a whole in Ireland has a predominant site layout following a NE or E / SW or W axis. Court tomb MA031-034--- is typical of its series classification in this regard. It cannot be ascertained that court tomb MA031-034--- (or any other court tomb in the series) was deliberately aligned with the rising sun at spring equinox, simply because the gallery faces an easterly direction. There is no published academic reference, research or archaeological excavation to support that this phenomenon was an integral element to the function and use of court tomb monuments in Ireland.

A full impact assessment of wedge tomb MA031-005--- is presented in Chapter 14 of the EIAR. The monument is located 225 m northwest of the Redline Boundary and there is no predicted direct impact. There is a predicted (negative) indirect long-term reversible impact on the landscape setting associated with the monument.

The monument has been surveyed by the Archaeological Survey of Ireland[22] and recorded as having an orientational axis approximately northeast-southwest, with the wide entrance opening to the south-western side. There has been no recorded indication from this survey

[21] De Valera, R. and Ó Nualláin, S (1964) *Survey of the Megalithic Tombs of Ireland. Vol. II. County Mayo*. Dublin: Stationery Office.
[22] De Valera, R. and Ó Nualláin, S (1964) *Survey of the Megalithic Tombs of Ireland. Vol. II. County Mayo*. Dublin: Stationery Office.

that infers a deliberate solar astronomical alignment. The wedge tomb series as a whole in Ireland has a predominant site layout following a NE or E / SW or W axis, with the entrance areas facing towards the NW-W-SW. Wedge tomb MA031-005--- is typical of its series classification in this regard.

It cannot be ascertained that wedge tomb MA031-005--- (or any other wedge tomb in the series) was deliberately aligned with an archaeo-astronomical phenomenon. The southwest-facing entrance opening would not align with summer solstice sunrise (at the northeast) or sunset (at the northwest). The monument location is currently within overgrown dense vegetation and commercial tree planting, with reduced landscape setting integrity (views from) as a result.

There is published academic reference (O'Brien, W[23]) and research (Robb. K[24]) which examines the archaeo-astronomical potential of the wedge tomb series in Ireland. These recognised findings indicate that the W/SW entrance alignments are not deliberately focused on significant solar or lunar events. Instead, may be representative of a general connection with the setting sun at the western/south-western sky during the winter months. Winter may have been a time of year when Bronze Age tomb builders had more human capacity to undertake such monumental constructions when there was less available hunting, foraging and farming duties. It may also have been an expression of ritual beliefs centred on themes of birth and rebirth based on an association between death and the setting/dying sun.

4.8.2 Impact on barrow site SL022-026---

Submissions raised the following concerns regarding the barrow near the N59:

"It has also been noted that Barrow (SL022-26) is adjacent to the junction of N59 and the L6612-1. This barrow is very close to the existing dwelling that is to be demolished, and we are worried that there will be damage to this barrow which should not be desecrated."

"There is also a mound (barrow), close to the house to be demolished close to the N59 SL022-026. I hope that the mound will also be inspected before any work is done there."

Response:

A full impact assessment of barrow site SL022-026--- is presented in Chapter 14 of the EIAR. The monument has been inspected by JCA and recorded by the Archaeological Survey of Ireland. It is located 14 m south of and outside the Redline Boundary. It is well defined and

[23] O'Brien, W. (2012) *Iverni: A prehistory of Cork*. The Collins Press. pg 192-3.

[24] Robb, K. (2001) *Archaeo-astronomy, Landscape and Belief: A Study of Wedge Tombs in Ireland*. Unpublished MA Thesis. University of Galway.

not directly impacted by the Proposed Development. A range of mitigation measures have been outlined for this monument which include a works exclusion zone during construction stage, and licenced archaeological testing of adjacent areas. The former will safeguard any potential inadvertent damage, while the latter will address the possibility of encountering sub-surface associated or contemporary archaeological remains in the vicinity of the barrow monument, within the Redline Boundary.

4.8.3 Impact on ringfort MA031-023--- and children's burial ground MA031-023001-

Submissions raised the following concerns regarding the Childrens Burial Ground:

"There is a Ring fort (MA031-023), known historically as 'rath', which was used as a children's burial ground as listed in the Cultural Heritage Chapter 14 p 29. Further exploration of this fort is needed."

"There is a fort (ringfort), with a reference to a childrens' burial site mentioned MA031 023. This fort (ringfort) is close to the interconnector, and the land around this fort (ringfort) should be inspected."

Response:

A full impact assessment of ringfort and children's burial ground sites MA031-023--- and MA031-023001- is presented in Chapter 14 of the EIAR. The ringfort MA031-023--- has been inspected by JCA (from the roadside – site is within private lands) and fully surveyed and recorded by the Archaeological Survey of Ireland. According to local tradition, the site was used as a children's burial ground (MA031-023001-), although no grave-markers are visible. Such sites are known to have been commonly used for the burial of unbaptised children that often died during or shortly after childbirth, from the later medieval to early modern periods. The ringfort is located 35 m from the Grid Connection Route. The upstanding remains of the site will not be directly affected and the Grid Connection Route will be in-road only along the adjacent existing road network. It is acknowledged that the children's burial ground is not clearly defined and although likely to be retained within the banks of the ringfort, there is a possibility of associated remains to lie outside of and adjacent to same. The previous construction of the existing road in the early nineteenth century is likely to have heavily disturbed the area to the west of the ringfort site. In order to address this presently unknown archaeological risk, mitigation measures in the form of licenced archaeological monitoring of the in-road cable trench at this location has been specified in Chapter 14 of the EIAR.

4.9 ECOLOGY

4.9.1 General Ecological Concerns of the Proposed Development on the Receiving Environment

Several submissions raised concerns about the general environmental impact of the Proposed Development, including:

"Concern as to the environmental impact of the proposed development"

An Environmental Impact Assessment Report was prepared as part of this planning application and in accordance with the EIA Directive as amended, as well as national implementing legislation, in particular, the Planning Acts and the Planning Regulations as amended.

As per Section 171A of the Planning and Development Act 2000, the direct and indirect significant effects of the proposed development on the following are assessed:

I. population and human health (assessed in EIAR Chapter 4: Population and Human Health);
II. biodiversity, with particular attention to species and habitats protected under the Habitats Directive and the Birds Directive (assessed in EIAR Chapter 5: Terrestrial Ecology, EIAR Chapter 6: Aquatic Ecology and EIAR Chapter 7: Ornithology);
III. land, soil, water, air and climate (assessed in EIAR Chapter 8: Soils and Geology, EIAR Chapter 9: Hydrology and Hydrogeology and EIAR Chapter 10: Air and Climate);
IV. material assets (assessed in EIAR Chapter 13: Material Assets &Other Issues), cultural heritage (assessed in EIAR Chapter 14: Cultural Heritage) and the landscape (assessed in EIAR Chapter 12: Landscape and Visual Amenity);
V. the interaction between the factors mentioned in clauses (I) to (IV) (assessed in EIAR Chapter 17: Interactions of the Forgoing).

4.9.2 Species and habitats of concern in the observations made to An Bord Pleanála

4.9.2.1 Bats

Cumulative Effects

Submissions in relation to bats included:

"The bat survey has not taken into account the cumulative effects [of] the project in conjunction with the current number of wind turbines in the area of the Ox mountains."

The bat landscape association model (Lundy et al. 2011) suggests that all turbines are situated within a landscape of low bat importance, with a slight improvement in bat suitability from turbines 1 to 10. This has been addressed in Section 5.3.2 of the EIAR.

There are ten wind farms within a 20 km radius of the Proposed Development (see EIAR Table 5.10 and EIAR Figure 2.3), comprising a total of 66 turbines. All the wind farms and other projects have been rigorously assessed by the competent authorities for environmental and ecological effects and where such effects are identified, mitigation has been incorporated into the planning.

With mitigation measures as presented in EIAR Chapter 5: Terrestrial Ecology implemented in full, it is considered that the significance of the predicted impact on bats as a result of the Proposed Development will be Not Significant.

Bat survey at the Hydrogen Plant

Submissions included:

"I am concerned that [there] has been no proper ornithological or bat survey carried out at the hydrogen plant site."

"I have concerns regarding ornithological and Bat surveys carried out at the hydrogen plant site, the Bat survey was carried out in February 2022 and according to batconservationireland.org in their How To Watch Bats header, 'The best time of year is summer when bats are most active'. The mistiming of the survey conducted may be seen to be in favour of this project. There was plenty of opportunity during the summer of 2022 and summer 2023 to carry out extensive survey and if this had been done they would have observed plenty of bat activity at this location as we spend many evenings in the summer watching the bats."

"What Bird (ornithology) and Bats surveys were carried out for Hydrogen Plant Site?"

Extensive surveys within and surrounding the Wind Farm and the Hydrogen Plant (Section 5.7 of the EIAR) were carried out in accordance with the below guidance:

- Northern Ireland Environment Agency, Natural Environment Division (2021) Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland. Belfast: Department of Agriculture, Environment and Rural Affairs (Northern Ireland).
- Scottish Natural Heritage (2019). Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation.
- EUROBATS 'Guidelines for consideration of bats in wind farm projects' Revision 2014.
- Bat Conservation Trust 'Bat Survey Good Practice Guidelines' 2012 (BCT Guidelines).

- Bat Conservation Ireland (2012). Wind Turbine/Wind Farm Development Bat Survey Guidelines, Version 2.8 December 2012 Bat Conservation Ireland, www.batconservationireland.org.
- Marnell, F., Kelleher, C. & Mullen, E. (2022). Bat Mitigation Guidelines for Ireland. V2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Dublin, Ireland.
- England, N. (2014). Bats and onshore wind turbines Interim guidance. Rodrigues, L., Bach, L., Dubourg-Savage, M., Karapandža, B., Kovač, D., Kervyn, T., Minderman, J. (2015).

A Preliminary Bat Roost and Badger Survey for a Proposed Hydrogen Plant has been included as Appendix 5.3 of the EIAR. This report (May 2023) details the findings of a bat and badger survey completed as part of a planning application for the construction of a Hydrogen Plant and associated access road. As detailed in EIAR Appendix 5.3, a Preliminary ground level roost assessment was carried out on 22nd February 2023 and "*the preliminary tree roost survey and badger survey were conducted within the optimum period for such surveys*".

The desk review study area also extended to a distance of 10 km for roost sites and to 4 km for known caves. A habitat assessment for bat potential, including assessment of value of trees as bat roosts, was also carried out.

Following detailed surveys for bats within and surrounding the Wind Farm and Hydrogen Plant Sites, it is considered that the Proposed Development will not have a significant long term negative effect on the local bat populations in the area.

4.9.2.2 Birds

Ornithological survey at the Hydrogen Plant

A submission stated:

"I am concerned that [there] has been no proper ornithological or bat survey carried out at the hydrogen plant site.."

"I have concerns regarding ornithological and Bat surveys carried out at the hydrogen plant [site]..."

The study area for the ornithological surveys included the Hydrogen Plant Site, the house and sheds to be demolished, as well as the Grid Connection Route and Interconnector Route (EIAR Section 7.2). However, as it was considered highly unlikely that the Hydrogen Plant

Site (largely improved agricultural grassland), Grid Connection Route and Interconnector Route will have a significant effect on bird species, detailed surveys for birds were not carried out for these components of the Project. However, a desktop study was conducted for all areas of the Proposed Development prior to the commencement of the field surveys. In addition to this, a preliminary bat roost and badger survey were conducted in February 2023 (EAIR Appendix 5.3) for the Hydrogen Plant Site. No ground nests for birds were noted during this survey.

Vantage Point Surveys

In relation to vantage point surveys a submission stated:

"On Appendix 7.1 of the vantage point surveys, the individual surveys are carried out on two consecutive days of each month, would it of been more beneficial to the survey to space these days out more?"

The purpose of the vantage point surveys is to collate baseline data so that Collision Risk Modelling can be carried out on relevant species in relation to wind turbines. The method used in the Project was in strict accordance with Scottish Natural Heritage Guidance (2017). The objective is to achieve 36 hours of coverage from each vantage point in both the summer and winter seasons. The Guidance does not refer to spacing of the survey days but only the need to achieve the required number of hours in each season.

Golden Plover

A submission raised concerns regarding flight data submitted with the project:

"On Appendix 7.2 of the Firlough Wind Farm Site – Bird Flightline Data 2019-2021, an entry on the 13/02/2020 in which 12 Golden Plover were spotted was recorded, however on Appendix 7.1 no such date and data can be found."

The observer has correctly identified a typo error in Appendix 7.2 (row no. 2) – the date given as 13/02/2020 should in fact be 18/02/2020 (as given correctly in Appendix 7.1).

The submissions continues with the below text in italics which the ornithologist on the project has responded to accordingly:

"On the Flightline number map for the Golden Plover it appears that 2 flights have interactions with the Ox Mountains Special Area of Conservation. Flightline 2 consisting of 12 Golden Plover originates in the wind farm site and is tracked leaving the wind farm in the direction of the area of conservation. However on Appendix 7.2 they are noted to be flying towards an adjoining windfarm. Flightline 7 originates from the special area of conservation and tracked flying into the wind farm site."

Flightline 2 is indeed heading in the direction of the SAC as noted by the observer (though the flightline could equally veer northwards over the forestry to northeast of Firlough site) – however, it is also heading towards the adjoining Carrowleagh Wind Farm which is located between the Firlough site and the SAC. Flightline 7 does appear to have originated from the direction of the SAC as noted by the observer.

"On the Flightline number map for the Golden Plover, flightlines 6 and 9 demonstrate a presence of Golden Plover in the Wind Farm site. Flightline 6 consisted of 6 Golden Plover in transit over the site. Flightline 9 consisted of 21 Golden Plover in low flight and then landing in the bog within the Wind Farm."

The above observations by the observer are correct and are as described in EIAR (Section 7.3.3 Flight Activity Survey – Non-Breeding Season).

"In addition to the Golden Plover observed in the vantage point survey there was a further 48 observed during the red grouse survey on 23rd March 2021. During transect 2 on 23rd March 2021, 8 Golden Plover are recorded in the observation section. During transect 9 at 14.10 on 23rd March 2021, 40 Golden Plover are recorded in flight and calling in the observations section."

The above observations as noted by the observer are correct and are referred to under Golden Plover in Section 7.3.9 of the EIAR (Evaluation of Ornithological Receptors).

Breeding and wintering birds

One submission states:

"Figure 7.1 of the Ornithology survey the transect line for breeding and wintering birds appears to be mainly conducted along the roads of the bog, as a result of this it may have been difficult to observe these wintering birds and breeding pairs in nests. Why was this transect not carried out in the same manner as the transect from the Grouse Survey?"

The transect survey method will often utilise local tracks for ease of accessibility and often a slight elevation advantage is gained. The method is based on detecting birds to both sides of the transect to up to at least 100 m distance using both sight and sound. Also, as the transect may be repeated in further years, a recognisable track is more useful than a cross-country unmarked route. It is noted that the purpose of the transect survey is not to locate nests but rather to identify breeding territories.

The Grouse Survey method is highly specific to red grouse only and is carried out strictly to a standard method involving two observers using a tape lure (and under licence).

4.9.2.3 Narrow-mouthed Whorl Snail (Vertigo angustior)

A submission raised the below points about the narrow-mouther whorl snail:

"Narrow-mouthed Whorl Snail (Vertigo angustior) potential impacts upon the wider Killala Bay/Moy Estuary SAC 000458 as a result of the Hydrogen Plant proceeding at Carraun, Castleconnor, co. Sligo..."

"Killala Bay/Moy Estuary SAC 000458 comprises 13 Qualifying Interest species and habitats. If there is a malfunction in the wastewater treatment system or an overloading of harmful contaminants (as will be stored onsite — stated in the EIAR) of the groundwater or adjacent river system, in an area that is categorised as having a High/Extreme groundwater vulnerability, then QI's such as Estuaries [1130], Narrow-mouthed Whorl Snail (Vertigo angustior) 110141, Sea Lamprey (Petromyzon marinus) [1095] and Harbor Seal (Phoca vitu/ina) (13651 are at a significant risk of a negative and adverse impact as a result of the proposed Hydrogen Plant proceeding. All of these species are water dependent."

"There is considerable potential for impact upon the Killala Bay/Moy Estuary SAC habitat, the very rare Vertigo species as described and a variety of other species (described above) as a result of the proposed project proceeding."

"There is significant potential for subterranean and potentially surface water related hydrological connectivity and subsequently contamination given the categorisations of both High and Extreme groundwater vulnerability and also the relatively short distance between the 2 sites (2.2 miles) where Vertigo is located in the SAC In addition to these factors, the significant drop in elevation, as also described, between the 2 sites is of concern with respect to the sensitive receptors along with the fact that both locations are located within the same WFD River Sub Basin."

"Significant potential for hydrological input cannot be ruled out from the proposed Hydrogen Plant site and Its associated ongoing activities at Carraun, Castleconnor, Co. Sligo to both the Killala Bay/Moy Estuary SAC species and habitats and the extremely rare Narrow-mouthed Whorl Snail (Vertigo angustior) species given the High and Extreme groundwater vulnerability conditions between the sites. A source-pathway-receptor linkage for direct and indirect impacts exist and thus cannot be ruled out.'

'Should this project proceed, there will be an adverse and negative impact upon the SAC QIs and the rare Vertigo angustior species."

The presence of *Vertigo angustior* among other qualifying interests of the Killala Bay/Moy Estuary SAC have been identified in the Natura Impact Statement (NIS). It is noted in the NIS that *Vertigo angustior* is confined to one location of marsh habitat near Killanly and is unlikely to be affected by contaminants potentially carried to the estuarine waters as a result of the Project. Furthermore, embedded mitigation measures have been included in the EIAR and NIS to prevent the release of contaminants into waterbodies.

4.9.2.4 Otter (Lutra lutra)

One submission raised concerns regarding otters. Otter (*Lutra lutra*) have been identified as a qualifying interest of the River Moy SAC in the NIS which was included as part of this planning application.

Aquatic invertebrate communities and aquatic macrophytes can be affected by sediment loading which reduces both the biotic diversity and the food resource for fish populations through direct toxicity to fish and invertebrates, and also indirectly affecting top predators such as otter through a reduction in prey availability. Suspended solids often hold nutrients such as phosphorus that can result in eutrophication and reduced oxygen levels, which can affect aquatic communities.

As the conservation objectives of the River Moy SAC could potentially be affected adversely, measures are required to avoid or reduce harmful effects of the proposed project, i.e. mitigation measures. Mitigation measures have been included in Section 3.4 of the NIS and throughout the EIAR (EIAR Chapter 5: Terrestrial Ecology, EIAR Chapter 6: Aquatic Ecology, EIAR Chapter 8: Soils and Geology, EIAR Chapter 9: Hydrology and Hydrogeology) and will be implemented in full where planning permission is granted.

4.9.2.5 Freshwater Pearl Mussels (Margaritifera margaritifera)

Submissions relating to Freshwater Pearl Mussels included the below:

"This project connects to the Easkey River and to its population of Fresh Water Mussels. Given the importance of this population at not just an Irish but a European level no risk should be taken to help ensure it survives. It is impossible for the developer to guarantee that nothing will leak into Easkey river which could harm or wipe out the FWM. Planning permission should be refused on this issue as important that last few remaining FWM sites in Europe remain protected."

"The Gowlan River provides important salmon and trout spawning and nursery habitat for the Easky River Fishery which is a valuable fishery in County Sligo and attracts anglers to the area. The Easky River also provides habitat for a population for freshwater pearl mussel. Both salmonids and freshwater pearl mussel are sensitive to pollution, such as siltation. This catchment has been allocated good ecological status in the River Basin Management Plan and this status must be protected."

"I would like exact information on what Specific Studies have been carried out for fresh water mussels?"

Records of Freshwater Pearl Mussel (Margaritifera margaritifera)

A sensitive species data request was made on 31st May 2021 to the NPWS for aquatic flora and fauna, including Freshwater Pearl Mussel, within 10 km grid squares G30 20, G40 20, G30 30 and G40 30. Consultations were also undertaken with Inland Fisheries Ireland.

Surveys of watercourses at and within a potential zone of influence of the Project and for 500 m downstream were undertaken on 8th and 9th September 2021. The surveys identified and mapped aquatic habitats, determined fisheries value and potential, and determined presence or suitability for Annex listed species or invasive alien species.

EIAR Chapter 6: Aquatic Ecology refers to the potential effects on Freshwater Pearl Mussel (*Margaritifera margaritifera*) (FPM) as a result of the Proposed Development. The known distribution of FPM in the Easkey catchment relative to the Wind Farm Site is shown in EIAR Figure 6.6 based on records provided by the NPWS (2021). The nearest records of FPM to the Proposed Development are on the Gowlan River approx. 3.5 km downstream of the Redline Boundary. The tributary stream feeding into the Gowlan River does not have suitable habitat for FPM and there is considered no potential habitat before the confluence with the Gowlan on account of the size of the tributary, the steep gradient and the aquatic habitats. While this population is not within a Special Area of Conservation, in view of their Annex II Listed status, their unfavourable conservation assessment (NPWS, 2013) and being listed as critically endangered in the Republic of Ireland (Moorkens 2006), they are considered of international importance.

Construction Phase Potential Effects

Fine sediment can affect adult FPM, as it interferes with filter feeding. It can also dramatically change the nature of a riverbed where juveniles require water movement through gravel beds to obtain oxygen. Even short-term sedimentation is likely to kill all juveniles present. In addition, nutrient-rich sediment may enter watercourses following harvesting, while the decomposition of harvest residue onsite can lead to the release of Phosphorus for several years after harvesting. Any impact on FPM as a result of construction phase activities (in the absence of mitigation measures) would be considered a medium-term significant negative at the national scale on account of the sensitive freshwater pearl mussel populations in the downstream Easkey catchment and the value of the lower reaches of the Owencam River, River Brusna watercourses for salmonids, and connectivity to the Killala Bay / Moy Estuary SAC/SPA. This is further detailed in EIAR Section 6.4.2.

Residual Effects of the Proposed Development

The approach to the Proposed Development design, the use of SuDS drainage and the suite of comprehensive measures to avoid, reduce or remedy all potential impacts on water quality (EIAR Section 6.5) will ensure that the receiving water bodies in the catchment of the Proposed Development do not suffer any deterioration in water quality, either during construction, operation, or decommissioning. The populations of FPM in the lower catchment of the Gowlan River and Easkey River will not be negatively affected by the Proposed Development.

4.9.2.6 Pine marten (Martes martes)

Concerns were raised that the effects of the Proposed Development on pine martens were not assessed as part of this application:

"No appropriate assessment done on the impact of this development on the Pine Martins resident in the area. An Board Pleanala needs to do one."

A terrestrial mammal survey was completed and details of such can be found in EIAR Chapter 5: Terrestrial Ecology. Evidence of pine martens was not found at the time of surveying.

4.9.2.7 Wetlands and peatland

Submissions raised concerns regarding wetland habitat, stating:

"The proposed development of the hydrogen plant raises concerns and issues with us as to the consequences on the wetlands, stream and River Brosna that runs through the lands."

"Failure to conduct environmental studies regarding sensitive nature of wetlands and peatland of land adjacent or nearby proposed development."

"It is submitted that locating wind turbines on bog lands is an inappropriate land use, as significant amounts of peat will presumably need to be removed. Peat is an important resource for sequestering carbon. This is completely unnecessary and unwarranted. Moreover removal of peat and filling the lands with concrete and steel lattice type structures can only be described as industrial vandalism of the landscape."

A full assessment of terrestrial habitats was carried out as part of the EIAR and details can be found in EIAR Chapter 5: Terrestrial Ecology. The extraction of water from underground aquifers has been taken into account and consequences of same on lands, environment, wildlife and peatlands has been detailed in EIAR Chapter 5: Terrestrial Ecology, EIAR Chapter 8: Soils and Geology and EIAR Chapter 9: Hydrology and Hydrogeology. The impacts to Landscape are assessed in Chapter 12.

In terms of peatland, the Wind Farm Site has been subject to historical and ongoing domestic peat cutting which has degraded the habitat and soils. These soils are unlikely to be functioning as a carbon sink due to the drainage systems in place and the removal of peat.

Chapter 2: Project Description states:
As part of the Proposed Development, an area of cutover bog, measuring approximately 15.23 ha, will be built upon. As the cutover bog is considered of Local Importance (higher value), compensation is being provided to off-set the habitat loss through the implementation of the Biodiversity Enhancement and Management Plan (BEMP). The BEMP is focused on the rehabilitation of an area of cutover lowland blanket bog habitat of 10.6 ha which adjoins the southwest corner of the Wind Farm Site. The BEMP has two objectives:

- To preserve and rehabilitate an area of lowland blanket bog which has been partly cutover and drained in the past (hereinafter known as the 'peatland restoration area') to compensate for the loss of cutover bog as a result of the Wind Farm.
- To provide enhanced habitat for peatland associated species such as red grouse, meadow pipit (both Red-listed), skylark, the common frog and the common lizard, which may be affected by the loss of some cutover bog habitat as a result of the Project.

The loss of cutover peatland is assessed in full in Chapter 8: Soils and Geology in EIAR.

4.9.3 The Use of Potassium Hydroxide

In relation to the Hydrogen Plant operation, a submission stated:
"Use Of Potassium Hydroxide is toxic to aquatic animals, thus use [of this] chemical in project (including transport in and usage in production) represents a clear risk to FWM in Easkey river and salmon in Moy fisheries area."

Potassium hydroxide and glycol are used only in the closed-loop electrolysis process and will not enter the wastewater stream. Accidental leakages have been assessed in EIAR Chapter 16: Major Accidents and Natural Disasters.

All chemicals including fuels, cleaning and anti-scaling products, potassium hydroxide sodium bisulphate will be contained within bunded containers of a minimum of 110% capacity of the largest container.

Effects on Freshwater Pearl Mussels have been addressed in Section 4.9.2.5.

4.9.4 Concerns regarding the Habitats Directive

Submissions relating to the Habitats Directive included:

"Ultimately excessive water loss could impact the Dooyeaghny, and Brusna river nearby and wildlife therein, protected under the Habitats Directive.' was raised as a concern in three separate observations."

"Impact Assessment / Appropriate Assessment: please establish its adequacy and whether this application in compliance with EU Directives including Directive 92/43/EEC"

"Rivers protected under the Habitats Directive. Dooyeaghny river was not tested to the same degree as other streams in the area for fish habitation namely Salmon Spawning."

"Any impacts it might have the Dooeighney river and Brosna river and these are protected under the habitat's directive"

"The lack of clarity in relation to water storage, water discharge amounts and effects on the groundwater may also [affect] my well which could possibly have negative impact on livestock and wildlife which are protected under the Habitats Directive."

"Natura Impact Assessment/Appropriate Assessment: please establish its adequacy and whether this application in compliance with EU Directives including Directive 92/43/ECC."

"We are also dissatisfied with the quality of the AA (Appropriate Assessment) under the EU Habitats Directive (92/43/EEC). We ask the board to examine the Natura Impact [Assessment] (NIA) more closely."

The Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) as amended has been complied with, as set out in Chapter 5 of the EIAR. Where relevant, linkages with the EU Habitats Directive classification system are given.

The value of habitats and flora has been measured against published selection criteria where available. Examples of relevant criteria include habitats listed on Annex 1 of the Habitats Directive as amended and flora species listed on the Flora (Protection) Order 2022 or on the Irish Red List (Curtis & McGough).

In assigning a level of value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. Reference has therefore been made to published lists and criteria where available. Examples of relevant lists and criteria include: species of European conservation importance (as listed on Annexes II, IV and V of the Habitats Directive (as amended) or Annex 1 of the Birds Directive (as amended)), Birds of Conservation Concern in Ireland, species protected under the Wildlife Acts as amended etc.

Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are designated under the EU Habitats Directive as amended and EU Birds Directive as amended respectively and are collectively known as 'European Sites'. The potential for significant effects on the integrity of European Sites is fully assessed in the Appropriate Assessment (AA) Screening Report and Natura Impact Statement (NIS) that accompanies this application.

4.9.5 Concerns related to European Sites

In relation to European Sites the following submissions were received:

"The Dooeighney river meanders quietly to the River Moy SAC, and is a spawning river for sea trout."

"The distance between the proposed site RLB and this designated and protected sensitive receptor is approximately a mere 3.56 km/2.21 miles. In addition, the elevation at the proposed site RLB is 50 m Ordnance Datum whilst at the SAC and sensitive receptor location is 15 m CD, this represents a considerable drop of 35 m between the 2 locations at a short distance."

"The starting point of the South_Corbally stream network is located 440 m to the west of the proposed hydrogen plant red line boundary (RLB). In addition to this, the Dooyeaghny/cloonloughan stream network is located directly adjacent to the southern section of the proposed hydrogen plant red line boundary. Both of these streams meet up approximately 1.4 km to the west of the site. From this point, this stream has direct hydrological connectivity with the proposed site RLB (2.4 km upstream) and the Kiliala Bay/Moy Estuary SAC (4.859 km downstream) (Total of 7.259 km between RL3 and the SAC)."

"Killala Bay/Moy Estuary SAC 000458 comprises 13 Qualifying Interest species and habitats. If there is a malfunction in the wastewater treatment system or an overloading of harmful contaminants (as will be stored onsite — stated in the EIAR) of the groundwater or adjacent river system, in an area that is categorised as having a High/Extreme groundwater vulnerability, then QI's such as Estuaries [1130], Narrow-mouthed Whorl Snail (Vertigo angustior) 110141, Sea Lamprey (Petromyzon marinus) [1095] and Harbor Seal (Phoca vitu/ina) (13651 are at a significant risk of a negative and adverse impact as a result of the proposed Hydrogen Plant proceeding. All of these species are water dependent."

"The river Moy fishery continues to decline and further inappropriate windfarm development will only add to the many other reasons for this decline. No further risks should be taken with the quality of the water in the River Moy SAC \ catchment area."

"NEP 10 To recognise the role of peatlands as carbon sinks to combat climate change and ensure that peatland areas, including those designated or proposed for designation (pNHA, NHA or SAC), are conserved for their ecological, climate regulation, archaeological, cultural and educational significance."

"Surely a detailed assessment is required to assess the affects on water quality and indeed the effects on the SAC in Killala Bay."

Potential affects have been identified, assessed and mitigation measures have been included in the NIS and EIAR that accompany the application. Connectivity, including hydrological connectivity to European sites has been identified and detailed in the NIS and the EIAR (EIAR Chapter 5: Terrestrial Ecology, EIAR Chapter 6: Aquatic Ecology, EIAR Chapter 9: Hydrology and Hydrogeology).

Details of mitigating measures are included within EIAR Chapter 5: Terrestrial Ecology, EIAR Chapter 6: Aquatic Ecology, EIAR Chapter 9: Hydrology and Hydrogeology, EIAR Chapter 17: Interactions of the Foregoing, EIAR Appendix 17.1 Schedule of Mitigation Measures and EIAR Appendix 2.1: Construction Environmental Management Plan.

With the implementation of mitigation through avoidance principles, pollution control measures, surface water drainage measures and other preventative measures which have been incorporated into the project design, and construction and operational phases, in order to minimise potential significant adverse impacts on water quality within the zone of influence of the Project, it can be concluded that the Project will not adversely affect the integrity of any European or National designated site.

4.9.6 Surveying of the Dooyeaghny River and the potential effects of the Proposed Development on aquatic ecology and fisheries

The following submissions were received:

"Rivers protected under the Habitats Directive Dooyeaghny river was not tested to the same degree as other streams in the area for fish habitation namely Salmon Spawning."

"Any impacts it might have the Dooeighney river and Brosna river and these are protected under the habitat's directive."

"The Dooyeaghny River flows closely to the proposed plant, and was assessed for its suitability for fish, in particular, salmon spawning and nursery habitat. For some reason, it was not tested to the same degree as other streams in the area, but this should have been done and included because the applicant has a discharge point directly into the Dooyeaghny river."

"The proposed development crosses a number of important fisheries waters; the Brusna River and its tributaries the Glenree River, the Owencam River and the Srafaungal River, the Gowlan River and the Dooyeaghny River also known as the Newtown River."

"The Brusna River and its tributaries provide important salmon, sea trout and brown trout spawning and nursery habitat. This catchment is under environmental pressure with salmon stocks in the catchment below their conservation limit, that is the number of adult salmon returning to spawn required for a sustainable fishery. The Brusna River forms part of the River Moy Special Area of Conservation which is designated for the protection of Atlantic salmon, white-clawed crayfish and lamprey species. The Glenree River and the Srafaungal River are failing to meet their ecological objectives of high ecological status and good ecological status respectively, as required under the Water Frameworks Directive. The Glenree River has been identified as at risk of not achieving high ecological status due to hydromorphology pressures which may include sediment/siltation pollution and alteration to the physical environment. No activity or development is to be granted permission in this catchment which may prevent or delay their ecological status objectives being achieved."

"The Dooyeaghny / Newtown River provides important spawning and nursery habitat for trout and salmon which support the River Moy Estuary fishery. The River Moy Estuary is an important sea trout fishery with a number of charter boats available for anglers. IFI is investing in a habitat enhancement program in the Dooyeaghny / Newtown River to improve salmonid spawning habitat and protect water quality. It is imperative that water quality in this catchment must be protected to support the success of this program."

"The fact that the Dooeighney River wasn't tested to the same degree as other watercourses in the area is also a source of concern as the applicant has a discharge point directly into the Dooeighney River 'the Dooeighney River which flows close to the Hydrogen plant site was not electrofished, but an assessment was made of its suitability for fish, in particular salmonid spawning and nursery habitat' Chapter 6 Aquatic Ecology page 5."

"My concern with this proposed development is the possibility of damage to the spawning beds for our sea trout and salmon in the rivers Brosna and Dooyeagny…

…The Dooyeagny river is another concern as it is a sea trout spawning river. Small but important too in the survival of these great fish. This is the proposed location to carry the wastewater from the proposed Hydrogen plant."

"Consultants failed to electro-fish this river. Due to silting (in their words) but Inland Fisheries Ireland have Electro-fished this river many times in the past. If this wastewater contains any toxic substance/s it could have a devastating effect on the sea trout reds and fry and once again, not one reference to sea trout in the Dooyeagny by Stillwater Consultants. This omission is also a worry, so again I must ask the question...WHY?"

"I am concerned that the Dooyeaghny River was not tested to the same degree as other streams in the area. I feel that this river should have been tested in light of the fact that the applicant has a discharge point directly into the Dooyeaghny river, prior to it running through my land. 'The Dooyeaghny River which flows close to the Hydrogen Plant site was not

electrofished, but an assessment was made of its suitability for fish, in particular salmonid spawning and nursery habitat.' Chapter 6 Aquatic Ecology page 4 'The Dooyeaghny River at the Hydrogen Plant site was unsuited for sampling due to the silty substrate and slack flow regime.' Chapter 6 Aquatic Ecology page 5"

"The Dooyeaghny River flows closely to the proposed plant, and it was not tested to the same degree as the streams in the area for fish habitation namely Salmon Spawning. This should have been done and included as the discharge point from the plant flows directly into the Dooyeaghny river. The possibility of effects to wildlife due to pollution from possible chemical discharge must be considered."

4.9.6.1 Surveying

Aquatic habitats over the lengths of the watercourses within the vicinity of the Wind Farm Site and Hydrogen Plant site were surveyed. Details of such can be found in EIAR Chapter 6: Aquatic Ecology.

A desktop study review was carried out of existing data and records for fish, protected aquatic species and habitats (including Annex II species and aquatic Annex I habitats), and invasive species listed under the Third Schedule of S.I No. 477 of 2011, European Communities (Birds and Natural Habitats) Regulations 2011) on watercourses at or hydrologically connected (i.e. downstream) to the Project on the National Biodiversity Data Centre (NBDC) and National Parks and Wildlife Service (NPWS) websites.

A sensitive species data request was made on 31st May 2021 to the NPWS for aquatic flora and fauna, including Freshwater Pearl Mussel, within 10 km grid squares G30 20, G40 20, G30 30 and G40 30. Consultations were also undertaken with Inland Fisheries Ireland in relation to existing data on fish stocks and in relation to concerns or requirements vis-a-vis the Project. A Licence application was submitted to Inland Fisheries Ireland (IFI) in relation to Electro-fishing surveys.

The locations of watercourses in the vicinity of the Wind Farm Site surveyed by electro-fishing are shown in EIAR Figure 6.5.

Survey station S1 is a small stream on the Owencam River is a tributary of the River Brusna within the Moy catchment. The electro-fishing survey covered an area of approx. 100 m^2 and yielded a total of 20 Trout (*Salmo trutta*) in the size range 4.6 to 12.8 cm, representing 0+ and 1+ fish (juvenile). This represents a reasonable high density of juvenile trout. No adult Trout or any other species was recorded.

Station S2 is a narrow linear modified channel within forestry plantation, located on a tributary stream of the Glenree River, a tributary of the River Brusna. The electro-fishing survey covered an area of approx. 70 m^2 and yielded a total of 5 Trout in the size range 4.7 to 9.6 cm, representing 0+ and 1+ fish (juvenile). This represents a low density of juvenile trout and reflects the modified nature of the channel and the extensive over-shadowing forestry cover. No adult Trout or any other species was recorded.

Station S3 is a small shallow drainage line in open bog on the western headwater tributary of Gowlan River in the Easkey Catchment. This site was not suitable for electro-fishing due to the heavy vegetation cover. The uniform depth, minimal flow and soft substrate would render it unsuitable as salmonid habitat.

The Dooyeaghny River flows close to the Hydrogen Plant site. It was not electro-fished, but an assessment was made of its suitability for fish, in particular salmonid spawning and nursery habitat. This has been included in Section 6.2.1.4 of the EIAR.

Surveys of watercourses at and within a potential zone of influence of the Project and for 500 m downstream were undertaken on 8th and 9th September 2021. The surveys identified and mapped aquatic habitats, determined fisheries value and potential, and determined presence or suitability for Annex listed species or invasive alien species. The aquatic habitat assessment conducted at all sites was based on the Environment Agency's 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003' (Environment Agency, 2003) and the Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000). All sites were assessed in terms of:

- Stream width, depth and other physical characteristics
- Substrate type, listing substrate fractions in order of dominance, i.e., bedrock, boulder, cobble, gravel, sand and silt.
- Flow type, listing percentage of riffle, glide and pool in the sampling area.
- In-stream macrophyte, bryophytes occurring and their percentage coverage of the stream bottom at the sampling sites.
- Riparian habitats and species composition

4.9.6.2 Potential Affects

During the construction phase, a setback buffer will be implemented in which no works will take place within 50 m of watercourses. The exception of this will be for three watercourse crossings on the access track network. Within the Hydrogen Plant Site, the Site is located c.70 m from the Dooyeaghny River at its closest point with the exception of the drainage outfall on the river.

During the operational phase, drainage from the Site will be directed via a vegetated swale to an outfall on the river. Without appropriate mitigation, there is a risk of sediment and other pollutants entering the Dooyeaghny River and impacting on local aquatic biota, as well as impacting on the Killala Bay / Moy Estuary SAC/SPA c. 4 km downstream. The installation of the drainage outfall to the Dooyeaghny River also poses a risk of concrete laitance and sediment release to the stream, which could impact on fish populations locally and downstream, including salmonid ova if undertaken within the fisheries closed season.

Source water will be treated as part of the hydrogen production process. The wastewater arising from this process will be treated through constructed wetlands and regulated discharge rates before being discharged to the Dooyeaghny River. This has been detailed in EIAR Chapter 2: Project Description and assessed in EIAR Chapter 9: Hydrology and Hydrogeology, Chapter 6: Aquatic Ecology and Chapter 16: Major Accidents and Natural Disasters.

A licence from the Environmental Protection Agency will be applied for where planning permission is granted.

In addition to the abovementioned surveys, a Natura Impact Statement was prepared as part of this planning application which assesses the potential effects of the Proposed Development on European Sites such as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) and concluded that the Proposed Development will not adversely affect the integrity of any of the European sites concerned.

4.9.7 Measures to be taken to protect Brusna River and River Moy SAC

The below submissions were received in relation to protection measures for the Brusna River and River Moy SAC:

"What measures will be put in place to protect Knockbrack Bridge and the Brusna River which flows into the River Moy SAC"

"Any impacts it might have on the Dooeighney river and Brosna river and these are protected under the habitat's directive."

"My concern with this proposed development is the possibility of damage to the spawning beds for our sea trout and salmon in the rivers Brosna and Dooyeagny."

"The proposed development of the hydrogen plant raises concerns and issues with us as to the consequences on the wetlands, stream and River Brosna that runs through the lands."

"The proposed development crosses a number of important fisheries waters; the Brusna River and its tributaries the Glenree River, the Owencam River and the Srafaungal River, the

Gowlan River and the Dooyeaghny River also known as the Newtown River. The Brusna River and its tributaries provide important salmon, sea trout and brown trout spawning and nursery habitat. This catchment is under environmental pressure with salmon stocks in the catchment below their conservation limit, that is the number of adult salmon returning to spawn required for a sustainable fishery. The Brusna River forms part of the River Moy Special Area of Conservation which is designated for the protection of Atlantic salmon, white-clawed crayfish and lamprey species…. No activity or development is to be granted permission in this catchment which may prevent or delay their ecological status objectives being achieved."

There will be localised widening of the L-5137-9, L-5136-0 and L-6612 roads in the townlands of Carraun and Knockbrack County Sligo, and Carha and Carrowleagh County Mayo to establish passing bays. All works associated with the permanent connection of the Wind Farm to the Hydrogen Plant comprising a 110 kV underground cable in permanent cable ducts from the proposed, permanent, on-site wind farm substation, in the townland of Carrowleagh Co. Mayo and onto the townlands of Carha Co. Mayo, Knockbrack Co. Sligo and terminating in the Hydrogen Plant Substation in the townland of Carraun, Co. Sligo have been assessed in the EIAR.

Measures have been included in the EIAR to mitigate any potential effects on the environment in these areas and can be found in specific chapters and/or summarised in the EIAR Chapter 17: Interactions of the Foregoing.

A Natura Impact Statement has been prepared as part of this application which fully assesses the potential effects of the Project on the River Moy SAC. Mitigation measures have also been included in Section 3.4 of the NIS.

4.10 LANDSCAPE AND VISUAL

One submission raised issues with regard to the Landscape and Visual Assessment. Firstly it takes issue with the atmospheric conditions of the baseline photography used for the preparation of the photomontages, which aided the visual impact assessment of the proposed Wind Farm.

By way of response, the photomontage photography was captured over the course of three separate days when good weather was forecast and is in generally clear conditions. However, it is noted that the weather / viewing conditions within the Ox Mountains was generally slightly less clear than for lower lying areas nearer the coast on those days.

Notwithstanding, the photography was considered appropriately clear to prepare realistic photomontages to aid the visual impact assessment. It should also be noted that the photomontages are but one aid to visual impact assessment, which is also supported by bare-ground wireframe images at each viewpoint location so that any obscuring by the likes of buildings or vegetation and/or less than optimal atmospheric conditions can be accounted for. In this respect, atmospheric conditions are never used to downplay the visual impact assessed and the assessment was undertaken by a landscape and visual specialist with considerable experience in assessing wind energy developments.

The same submissions also take issue with many of the photomontages being prepared from a 'low level' (presumably lowland setting) and that there are insufficient from high ground west of the River Moy. In response, it should be reiterated that representative viewpoints are selected from locations that represent the views of the population living within or visiting the study area with due emphasis placed on those within the local area of the proposed development and / or highly sensitive receptor locations. The selected viewpoints are considered a good representation of the local population, settlements and transport routes which tend to be concentrated in the lowland context of the study area. There are viewpoints selected from west of the River Moy, but at viewing distances well beyond 12 km and within a rolling landscape indicating limited visibility (on the ZTV map) it is considered that this area is more than adequately represented by viewpoints. It should also be noted that the elevated landscape of the Nephin range is well beyond the extent of 20 km radius study area.

The submission also considers that there are no proper photomontages of the proposed Hydrogen Plant. In response, the photomontage locations selected for the Hydrogen Plant assessment are from the nearest and most likely locations within the public realm to present views of the Proposed Development. It would be a challenge to find other locations that might give a clearer view and it is not in accordance with relevant guidance to select viewpoints within private lands.

Related to the above, the submission also questions why there are no photomontages showing the cumulative impact of the proposed Hydrogen Plant and the proposed Wind Farm. This is a good question and one which is answered in the LVIA submitted with the application. In short, it is because none of the viewpoints selected to represent the most likely views of the Hydrogen Plant afforded clear views of the proposed wind farm, and this was checked using 360 wirelines / photography. There may be some locations within the vicinity of the Hydrogen Plant that afford views of the Wind Farm, but they are unlikely to afford views of the Hydrogen Plant as well. The absence of cumulative views of both aspects of the Proposed Development is largely down to their physical separation distance as well as the vegetative screening that occurs within the intervening landscape.

With reference to relevant guidance, the submission also suggests that the use of UK based guidance is inappropriate given that the UK is no longer within the European Union. This is not considered to be a valid issue as the Guidelines for Landscape and Visual Impact Assessment (2013), which are jointly prepared by IEMA and the Landscape Institute (UK) have long been considered the most relevant guidance in Ireland and form the basis of best practice standards for LVIA in Ireland. The Irish equivalent from 2000 never advanced beyond draft form and this was likely because of the reliance by Irish landscape specialists, and others around the world, on the UK based guidance, which is considered fit for purpose. In the same manner, NatureScot guidance on the likes of cumulative impact assessment and visual representation of wind farms is also considered to be the industry standard in Ireland because it is the most comprehensive and up to date and is also relevant to the respective landscape contexts.

A submission takes issue with the preparation and presentation of the photomontages used for the visual impact assessment. Much of this relates to the use of panoramic photography, for which, the response is simply that they were prepared and presented in strict accordance with the Scottish Natural Heritage (now NatureScot) Visual representation of wind farms: Best Practice Guidelines (version 2.2 - 2017). These are very prescriptive guidelines that aim to avoid the use of graphics which might misrepresent the scale and nature of proposed wind farm visibility.

There is also issue taken with the selection of views where vegetation provides screening with a suggestion that views very nearby might afford clearer views. By way of response, this is one of the most common submissions relating to any LVIA. The landscape and visual specialist will always try to obtain the most exposed view of the proposed development, which also remains representative of the receptor it is intended for. It is not in the interests of a robust LVIA to do otherwise, because if it can be clearly illustrated that worst case views have not been used, it undermines the robustness of the LVIA. In this instance there are very few instances where vegetation provides screening that might not be the case in close proximity to the selected viewpoint whilst still remaining representative of the receptor in question. Furthermore, the visual assessment will often take account of intervening screening (using the wireframe image as a reference) if there is potential for alternative views that might be clearer in the vicinity or from adjacent private dwellings. It is noted that specific viewpoints where visual obscuring occurs are not identified in the submission.

Related to the above, the same submission raises concerns that there is inadequate assessment of the visual impact the turbines might have on various viewpoints. Aside from

reiterating that the project LVIA was prepared in accordance with relevant guidance and best practice, the submission is not specific enough to provide a fuller response.

One submission raises an issue that the proposed Wind Farm Substation and loop-in end masts are not presented in the photomontages. By way of response, this is because they would not appear in any of the selected photomontages and none were selected specifically for these ancillary elements, which is commonly the case. It is not imperative that photomontages be prepared showing every aspect of a proposed development and in this case appropriate emphasis was placed on the proposed Wind Farm and Hydrogen Plant being the visually most overt features. Emphasis is also placed on representing receptors in the public realm and these elements are discretely located with low potential to give rise to material visual impacts. Notwithstanding that the Wind Farm Substation and end masts do not appear in any of the selected photomontages, they are assessed within the LVIA in the context of Section 12.4.2.2 'Magnitude of Landscape Effect'.

A submission raises concerns in relation to the European Landscape Convention:
"It is considered that the destruction of agricultural land together with areas which constitute valuable habitat is contrary to the European Landscape Convention (ELC).2 This is an international convention which focuses on the protection, management and planning of all landscapes in Europe. The UK and Ireland ratified the convention and it became binding on 1st March 2007. The Irish Planning and Development Act, 2000, introduced requirements for preservation of the character of the landscape and made statutory provision for areas of special amenity and landscape conservation areas. We submit that this has not been complied with. We are very unsatisfied with the Landscape Character Assessment (LCA)."

Alternative use of agricultural land is by no means a contradiction to the European Landscape Convention. This convention does not seek to sterilise the landscape and freeze it in time as is implied by the submitter. It is, instead, a very high-level framework that seeks to have member states set in place policy frameworks that serve to protect and manage the landscape in a sustainable way. The provision of Special Protection Areas (SPA) and Special Areas of Conservation (SAC) are two such mechanisms that serve to protect sensitivity landscapes / habitat areas in Ireland, but none apply to the proposed development sites. The most relevant landscape specific policies relating to the LVIA Study Area are those contained within the Mayo and Sligo County Development Plans which also contain Landscape Character Assessments (LCA). These have been addressed throughout the project LVIA and it is unclear whether the submitter is unsatisfied with the County level LCAs and the lack of protection they provide or the interpretation of same within the project LVIA.

4.11 NOISE

Concerns were raised in submissions regarding noise levels, during construction, these included:

"It is submitted that significant issues will present themselves in terms of noise during the construction phase. Sources of noise which will be typical of this type of operation will include:-

a. Tonal bleeping from reversing loading shovels and excavators will also be problematic.

b. Truck movements generate a lot of noise "

Construction stage noise impacts were assessed in Chapter 11: Noise and Vibration. Construction by its nature is temporary activity. The predicted construction noise levels are well within the recommended construction noise guidelines for such activity. Loading shovels and excavators levelling the site will have white noise emission (broadband) fitted for reversing to Health & Safety Standards (there will be no tonality emissions from dump trucks, excavators or loading shovels on the Hydrogen Plant Site). The noise emissions from truck movement is primarily base on speed of movement-all trucks will be moving at low rev/low speed.

A submission raised concerns regarding vibrations from construction traffic impacting homes near the Hydrogen Plant. Noise and vibration was assessed in the EIAR, Chapter 11. There is no activity planned during construction or operation of the Hydrogen Plant that would give rise to ground vibration (or air overpressure) levels that would generate levels that would cause damage to houses. Trucks generate very low levels of ground vibration which are orders of magnitude below the threshold of damage to houses even at 5 m from the source.

A submission raised concerns regarding the night time noise of both the construction phase and tube trailers entering and leaving the Hydrogen Plant. No site investigations works have taken place during night time hours and there is no plan to carry out construction during the night time period. Construction times for the Wind Farm and Hydrogen Plant (as per the EIAR) are as follows: Monday to Friday: 07.00 to 19.00hrs, Saturday 08.00 to 13.00hrs with no work on Sunday, or Bank Holidays.

To clarify, there will also be no tube trailers leaving the site during night time hours. Chapter 2: Project Description, Section 2.8 states:

While production of green hydrogen is expected to be a 24 hour a day process, the Developer intends to restrict tube trailers from entering and leaving the premises between the hours of 19:00 and 07:00 as part of a wider traffic management plan.

Submissions raised concerns that any issues raised by the community during operation of the Hydrogen Plant will not be addressed by the Applicant including:
"It has been suggested that as the plant 'matures' problems such as noise can be rectified, the equipment for this process is expensive and will not be readily exchanged if it is found to create excess noise as it may also affect production."
"Any attempt to rectify noise pollution post construction would be a costly and drawn- out exercise for the residence."

The operation of the Hydrogen Plant is designed with key noise sources housed. The site manager (or person designated by site manager) will be responsible for addressing any noise complaints. To clarify, there will be a complaints procedure put in place to address any issues arising during construction and during operation. On going noise review during the operation period will continue throughout the operational phase.

Submissions also raised concerns over unknown equipment noise at the Hydrogen Plant and around the noise impacts of the Project on children and livestock. For example:
"No correct Hazard analysis has been carried out for noise levels for the hydrogen factory. Noise levels will depend on type equipment selected, for example type and brand of compressor, and this has not been determined as according to the preliminary hazard log this will take place as the plant 'matures' Appendix 16.1 (Executive Summary)."
"The electrolysis unit, brand of which has also not been identified, will also generate its own noise. Considering the proposed location of the development in a rural setting with a 'low background noise level' (See Appendix 11.5) the effect and consequence of such a large development would be significant. ISO 17.140.20 (3) (4) at a minimum should be applied here and was not.".
"*Appendix 11.5 are predicted noise levels only. In table 3.4 justification for choosing this site for location of the Hydrogen Plant is based on the sound levels meeting the EPA NG4 criteria for day evening and nighttime noise and it is claimed that there will be no effect on human health: Table 3.4. This has not been clearly demonstrated as no definitive conclusions as to the actual noise levels from the factory can be rightly determined as the equipment to be used in the process is unknown as of date of application."*

Chapter 11: Noise and Vibration in the EIAR assesses the noise impacts of the Hydrogen Plant. The assessment is based on noise levels of the main noise sources. It is common practice to procure new plant based on maximum noise levels of same. It is not necessary to name brands of equipment, however the noise levels are specified. The electrolysis units are inside the building and generate low levels of noise compared to a large compressor. Two

large ameliorated compressors are to be located outside the main building, but inside a dedicated housing envelope (one is standby). Plant such as large compressor, electrolysis units and fin fans are not unusual pieces of plant and are in many different types of plant across the country and at locations considerable closer to receptors, the noise impacts of these are well understood. Amelioration is provided for the fin fans- fan speed / timing belt speed determines the level of speed (lower speed with larger opening are some of the amelioration to deal with this- acoustic louvers can also be an option). There are number of mitigation measures to be incorporated into the design and operation of the Hydrogen Plant Site given in Section 11.27.4.4.

The predicted noise levels for construction and operation are orders of magnitude below the level at which negative health effects occurs. The Health and Safety Authority Regulation which states that for noise exposure levels likely to exceed 80 dBA (expressed as Lep,d 8 hour dBA) that there is the potential of risk of damage to hearing. All workers on site will be given guidance on how to comply with the 'First Action Level'. Exposure levels are based on continuous levels. Access to the Hydrogen Plant will be restricted to authorised personnel and security fencing will prevent egress by the public as is standard with hydrogen facilities in operation. There will therefore be no children close to the Hydrogen Plant Site. Furthermore, children are exposed to significantly higher levels living close to a National Primary Road. Livestock graze close to all major roads within the country without any adverse effects. The higher predicted noise from construction will be associated with levelling of the site which will be of duration of no more than 4 months equivalent.

The measured background noise levels were caried out with all data generated above a wind speed of 5 m/s and any periods of rainfall filtered out.

ISO 17.140.20 relates to Health and Safety and so will become an operational consideration in the Hydrogen Plant with regard to employees. The NG4 is the applicable standard to address potential environmental noise concerns.

Further a submission raised concerns about the noise assessment not considering noise from multiple sources:
"There will be more than 1 compressor in action at a time as the compression of hydrogen gas is a step wise process. Filling units at shipping area also require compressors. The figures given are for one piece of equipment and not multiples which there will be. An average dB range for 1 compressor is 80-90 dB (1). Also, there will be more than one fin fan running at a time. One fin fan will generate between 30-40 dB and its timing belt 90-110 dB (2)"

The noise assessment in Chapter 11 of the EIAR assumes all components are on all the time, with the number of units based on the site layout.

4.12 PLANNING CONSIDERATIONS

4.12.1 Zoning of The Land

Some submissions asserted that the zoning of the locations of the Wind Farm and Hydrogen Plant are not in accordance with their defined planning zoning. This included the assertion that the Hydrogen Plant is in a rural location and therefore development here was not suitable.

The Wind Farm Site is located in County Mayo, the Hydrogen Plant Site is located in County Sligo, adjacent to the County Mayo border. The current Mayo County Development Plan is the 2022-2028 (the MCDP) plan. The Wind Farm Site is designated in a 'Preferred' area for wind farms. The Wind Farm Site lies within a sub-category 'Tier 1 (Preferred Large Wind Farms)' indicating it is an area with the potential for large scale wind energy developments.
The proposed Hydrogen Plant Site is located in County Sligo. The Sligo County Development Plan 2017-2023 (SCDP) is the current development plan, it has been extended for 12 months until July 2024. The Hydrogen Plant is located in an area classified in the SCDP as "Normal Rural Landscape". This is defined as:
"Areas with natural features (e.g. topography, vegetation) which generally have the capacity to absorb a wide range of new development forms – these are largely farming areas and cover most of the County. At the same time, certain areas located within normal rural landscapes may have superior visual qualities, due to their specific topography, vegetation pattern, the presence of traditional farming or residential structures. These areas may have limited capacity for development or may be able to absorb new development only if it is designed to integrate seamlessly with the existing environment."

The Hydrogen Plant is proposed to be located in a farming area but with access to a National Secondary Road; N59. Chapter 12: Landscape and Visual Amenity assesses the impacts of this and considers that the proposed electrolyser building will present predominantly as a large storage building coloured agricultural green to match the typical tone of farm sheds in the locality. Despite being larger than most farm sheds, it is discreetly placed in its landscape setting and will not have an overt visual influence. Only a small section of the main building will be visible in close proximity from most angles and beyond 1 km it will not have a notable bearing on landscape character. It is therefore considered to be in line with the SCDP policy in relation landscape types.

It is also identified as a "Rural Area In Need of Regeneration" on the County Sligo Core Strategy Map on p19 on the Sligo CDP. These are described as structurally weak areas with a weaker economy and fewer settlements. Historically, they experienced persistent or significant population decline. Table 2.4 in the Planning Statement sets out the planning policies relevant to the Proposed Development in County Sligo and shows that the zoning of the site is in accordance with these policies.

The draft Sligo County Development 2024-2023 which is currently out for consultation amends the characterisation of the area to "Remote Rural Areas". These are areas in the west and south of County Sligo, located at a longer distance from Sligo Town, and have fewer settlements and a weaker economy. Younger people continue to move away for better job opportunities and older generations are not being fully replaced.

The Proposed Development meets the zoning objectives and aspirations of both the Mayo County Council and Sligo County Council in seeking to promote renewable energy developments in the counties.

4.12.2 New House Permission 20297

A submission highlights that planning permission 20297 is a new house with planning permission that has not yet been constructed:
"Planning permission has been granted on 20/12/2020 for a family dwelling which has not been highlighted or mentioned in the document."

This planning application was located during the planning searches for the Project and is identified as a house, and is 'HH6' on the house location map in Figure 1.3 of the EIAR. This map has been used in the technical chapters to assess the impacts of the Project on houses nearby. These assessments therefore included planning permission 20297 for a new dwelling.

The submission states that:
"*This Planning permission was sought and granted prior to this application being submitted and the applicant would have been unaware that the entrance and turning area for trucks for this application is in the adjoining field. The entrance along with the hydrogen plant will produce a significant amount of noise disturbance for this residence. At peak operational times there will be 26 trucks (52 total movements) each day as well as the building and operational noise from the plant itself. The fact that this residence is to be built here was not addressed in section 11.27.4.6 of the Road Traffic; Site Access section Appendix 11.5."*

Appendix 11.5 is an appendix to the noise chapter and addresses wind turbine noise; Predicted noise levels for 102.5 m hub height. This house is located 6.5 km from the closest turbine and was therefore not included in noise assessments in Appendix 11.5.

To clarify the noise impacts of the Hydrogen Plant are assessed in Section 11.18 of Chapter 11: Noise and Vibration. Table 11.23 of the EIAR includes construction noise levels for HH6 which includes vehicles. Section 11.27.4 assesses the operational noise impacts of the Hydrogen Plant. Table 11.26 includes the operational noise impacts on HH6. Section 11.27.4.6 as referenced above states that:

"During operations, the maximum number of trucks to the Hydrogen Plant Site will be 26 per day which equates to 52 movements per day. Distributed over a 12-hour period (07.00-19.00hrs) this equates to 4.3 movements per hour. The average movement is taken as 5 trucks per hour. There are two receptors within 150 m of the access road HH11 and HH6. ***HH6*** *is at 30 m to the access road while HH11 is at 14 m."*

As can be seen above, HH6 (planning application 20297) has been included in this assessment.

The landowner and applicant of planning reference 20297 (HH6) has met with the Applicant and is supportive of the Project, he has not made any submissions in relation to the Firlough Wind Farm and Hydrogen Plant.

4.12.3 Hydrogen and the Sligo County Development Plan

One submission notes that hydrogen is not mentioned in the Sligo County Development Plan 2017-2023. This plan is currently under review and a new draft plan is expected. County Sligo also does not currently have a Renewable Energy Strategy. The current plan does contain policies in relation to climate change and renewable energy which are outlined in the Planning Statement submitted with the planning application, including:

- P-CAM-4 Facilitate and assist County Sligo's transition to a low-carbon economy and Society
- P-CAM-7 Promote and support the research and development of local renewable energy sources.
- P-CAM-8 Promote and support the use of renewable energy in all sectors.

The Draft Sligo County Development Plan 2024-2030 is currently out to public consultation. This plan has a much greater focus on climate change and renewable energy including the strategic policy:

- **SP-CA-1 Support the implementation of the government's climate action policy in accordance with the Climate Action and Low Carbon Development**

(Amendment) Act 2021, the national Climate Action Plan 2023, the National Adaptation Framework 2018 and all subsequent relevant updates.

The Climate Action Plan 2023 supports hydrogen, see the Planning Statement submitted with the EIAR. This includes two key targets:

- At least 2.1 TWh consumption of zero emission gas for industrial heating
- Up to 0.7 TWh of renewable gas to aid in the decarbonisation of residential heating

The Climate Action Plan 2023 notes that hydrogen has a significant role to play in scenarios for net zero emissions by 2050.

4.12.4 Consents

A number of observations raised concerns that the relevant Statutory consents were not in place for works required along the public road for the Grid Connection, Interconnector and works to the haul routes including for passing bays. All landowner consents for these works are in place. Works in the public road will be undertaken by a statutory undertaker having the right or interest to provide services in connection with the Proposed Development, in accordance with The Planning and Development Regulations 2001 (As Amended).

4.12.5 Project Splitting

An issue raised by several submissions related to Project Splitting and the requirements under EIA. For example, in relation to the grid connection and house demolition/rebuild:

"These elements are an integral part of this project and the fact that excluded means permission must be refused. Piecemeal planning applications are illegal. Otherwise how can the totality of the full and complete development and its impacts be understood. It means the EIA is incomplete."

"The issue of Grid Connection must also be considered having regard to the various other applications, which we have outlined in this document. Will there be necessary application to EirGrid to facilitate this aspect of each development? If so, this further emphasises our point even further that the impact of all of these developments should be considered en masse."

To clarify, EIAR Chapter 2: Project Description, Section 2.2 outlines what is included in the Proposed Development (those items currently under planning application) and additional elements for which development consent is not being sought at this time – those included in the Project.

The EIAR states that:

While the Project is primarily comprised of the Proposed Development the Project for the purpose of the EIA also includes the following elements for which development consent is not being sought at this time:

- Demolition of an existing dwelling and agricultural sheds D and E and the demolition of the remainder of shed B and construction of a new house and shed in the townland of Carraun.

All elements are considered in the EIAR, including the Grid Connection, Interconnector and the demolition and rebuilding of the house by the Hydrogen Plant entrance. Therefore, all of the elements of the Project together have been subject to Environmental Impact Assessment in line with the EIA Directive and the guidance supplied by the EPA. There is therefore no project splitting and the EIA is not "incomplete".

4.12.6 Compliance with EIA Directive and Habitats Directive

Submissions included the below in relation to the EIA and Habitats Directives:

"Environmental Impact Assessment: please establish its adequacy and whether this application in compliance with EU Directives including Directive 85/337/EEC."

"EIA Directive, the Habitats Directive and ECJ case law: We ask the planning authority/ An Bord Pleanála to satisfy itself that the planning application complies with EU law and specifically the EIA Directive and also with Article 6 of the Habitats Directive 92/43/EEC. Please establish whether the current application complies with Article S of the Habitats Directive 92/43/EEC. The following cases from the European Court of Justice (ECJI are relevant: -

- *Case C-258/11, Peter Sweetman and Others v An Bord Pleanála*
- *Case C-164/17, Edel Grace and Peter Sweetman v An Bord Pleanála*
- *Case C-323/17 People Over Wind and Peter Sweetman v Coillte Teoranta*
- *Case C-461/17 Brian Holohan and Others v An Bord Pleanála."*

European Union Directive 2011/92/EU ("the EIA Directive")[25] requires that, before consent is given for certain public and private projects, an assessment of the effects on the environment is undertaken by the relevant competent authority. The EIA Directive has been transposed into Irish legislation, for the purposes of this EIA Development, by the Planning and Development Act 2000, as amended ("the Planning Acts") and the Planning and Development Regulations 2001, as amended ("the Planning Regulations"). The EIA Directive

[25] The European Council Directive 2011/92/EU. Available online at https://eur-lex.europa.eu/eli/dir/2011/92/oj [Accessed 6th November 2019]

(2011/92/EU) was amended by the 2014 EIA Directive (2014/52/EU) [26]. The 2014 EIA Directive was transposed into Irish legislation by the European Union (Planning and Development) (EIA) Regulations 2018 (S.I. No. 296 of 2018) which in turn amended the Planning Acts and the Planning Regulations to reflect the requirements of the 2014 EIA Directive.

The EIAR submitted with the planning application was prepared in accordance with the EIA Directive as amended by the 2014 EIA Directive, as well as the national implementing legislation, in particular, the Planning Acts and the Planning Regulations as amended. The EIAR was prepared by Jennings O'Donovan & Partners Limited (JOD) on behalf of Mercury Renewables (Carrowleagh) Limited (The Developer) to accompany the application for planning permission for the Proposed Development. This EIAR takes into account the Project as a whole, and all direct and indirect effects, cumulative impacts and interactions, including the Proposed Development and all relevant ancillary and subsidiary elements of the overall Project.

In addition to the identification, description and assessment of the Proposed Development, the EIAR identifies, describes and assesses the Project as a whole, and any other existing and permitted developments as well as projects submitted for planning application. The EIAR also includes the conclusions of the competent and qualified experts as to the significance of any such environmental effects, to assist the competent authority to comply with Article 8a of the 2014 EIA Directive.

The planning application is also be accompanied by a Natura Impact Statement (NIS) as required under Article 6(3) of the EU Habitats Directive (92/43/EEC). This is an assessment of the likely or possible significant effects of the Proposed Development on sites designated as Natura 2000 conservation areas, also defined in Irish legislation as "European sites". This EIAR takes into account the content and findings of the NIS.

A submission also notes that a Strategic Environmental Assessment (SEA) has not been provided on the Proposed Development. This is correct, the SEA Directive (Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment), does not apply to the project. SEA is the application of the well-established principles of project EIA to **plans, policies and programmes**. As per the SEA Directive, plans, policies and programmes are defined as those:

[26] The European Council Directive 2014/52/EU. Available online at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0052 [Accessed 6th November 2019

"(a) which are subject to preparation and/or adoption by an authority at national, regional or local level or which are prepared by an authority for adoption, through a legislative procedure by Parliament or Government,

And

(b) which are required by legislative, regulatory or administrative provisions."

The SEA is further upstream than EIA. SEA is relevant to government level plans, policies and programmes, not individual projects. Therefore the Proposed Development is not subject to SEA.

4.13 OTHER CONCERNS

4.13.1 Land Use Change

Submissions raised concerns around land use change from agriculture to renewable energy production. One submission states:

"The destruction of vast tracts of agricultural land with holes, steel bars and blobs of concrete is unwarranted and inexcusable. More land; not less will be required to produce crops."

"Loss of finite Agricultural and bog Lands: There are significant sustainability issues. We are particularly concerned about the loss of agricultural land. Asserting that sheep can graze underneath them is at best a lame justification and doesn't stand up to scrutiny."

"Objectively examining the proposals; it is considered that the proposed development is very different from the current established land use in this area and is therefore inappropriate."

To clarify, no land used for crop production is included in the Project. The Hydrogen Plant is currently used for agricultural **horse** grazing. The impacts of the Project on agricultural land use are assessed in Chapter 13: Material Assets and Other Issues, starting in Section 13.4.2. which states:

The Hydrogen Plant Site is located on lands currently used for agriculture, namely horse grazing. The Hydrogen Plant Site covers an area of 6.5 ha. The construction of the Hydrogen Plant will result in loss of 6.5 ha of agricultural horse grazing land, a permanent change of land use from agriculture to renewable energy production. The landowner has alternative areas available for horse grazing to continue elsewhere within the landholding. This will have a permanent slight, negative impact on agriculture during the construction and operation phases.

In terms of the established land use, Section 13.4.1 of the Material Assets chapter highlights that there is an existing permission for a wind farm at the Wind Farm site:

The Wind Farm Site has an Existing Permission (An Bord Pleanála reference PL.16.241592, Mayo County Council Planning Reference 11/495) for the erection of 21 no. turbines with 85

m hub height and rotor blades of 35.5 m in length with a total power output capacity of 48.3 megawatts, new site roads, upgrading existing tracks, hard standing area, electrical control building, 2 no. anemometry masts, installation of underground cabling, temporary works and ancillary works.

The Wind Farm Site is also adjacent to a neighbouring Wind Farm the Carrowleagh Wind Farm adjacent to the east and the Carrowleagh Wind Farm Extension which is adjacent to the north-east. Wind energy is a long-standing established use in the area.

Some submissions have also raised concerns around peat cutting and turbary rights, some suggesting that they have not been consulted where their turbary plots are potentially impacted. For example:
"My bog is very close to T6 but I was not consulted about the proposed development on the bog."

To clarify, the Applicant has consents in place for all areas of the Wind Farm Site under the footprint of the Proposed Development. The author of this submission attended the Public Information Day and discussed their concerns with the team regarding their rights to cut peat on the plot adjacent to T6. They were informed that our works will not affect their turbary rights whatsoever and that access will be maintained for them at all times.

Another submission asserts that:
"No assessment has been done on the impact the wind farm will have on the 620 turbary plots in the windfarm site."
Sligo Co. Co. have also asserted that; "*The proposed wind farm will result in the loss of peatland (within Co Mayo) currently used by Co. Sligo residents."*

Section 13.4.2 of the EIAR assesses the impacts of land use change at the Wind Farm Site, this includes the potential impact to turbary/peat cutting. It states:
All 13 no. wind turbines and the associated site infrastructure are located on cutover areas of former turbary plots. The total land-take of the Wind Farm Site, including the site access roads, hardstands and turbine foundations is approximately 27.55 hectares. This area will change from cutover, former turbary plots (with permission to build a wind farm) to renewable energy. The Wind Farm Site is 445 hectares therefore the land take is 6.2% of the Wind Farm Site. Agreements are in place with plot holders for all areas impacted and communication channels are already open with plot holders and will remain open throughout the lifetime of the Proposed Development. Access to plots will be carefully managed to enable safe access

throughout the construction and decommissioning phases. The construction and decommissioning phases will be timed wherever possible to avoid peak peat cutting phases over the summer months. During the operation phase turbary on plots outside the Proposed Development footprint can continue as normal. The proposed Wind Farm Site access roads and upgrades to existing roads will improve access for active turbary practices throughout the Wind Farm Site. Overall, this will have a long-term slight, negative impact on turbary use during the construction, operation and decommissioning phases.

To clarify, peat cutting will cease on the plots in the control of the Applicant, under the footprint of the Proposed Development, i.e. under the turbines, access tracks etc and habitat restoration area. Peat cutting outside of these plots is not under the control of the Applicant and can continue until such time as Government policy on the subject changes.

4.13.2 Light Pollution

Concerns have been raised regarding the impacts of light pollution caused by the Hydrogen Plant, for example:

"No appropriate assessment has been done on the light pollution that will be caused by this."

Chapter 2: Project Description of the EIAR describes the lighting at the Hydrogen Plant, it states:

A lighting plan for the Hydrogen Plant will be designed in compliance with current lighting standards, in the detailed design phase. The Developer has begun engaging with Mayo Dark Skies and will look to incorporate suggested lighting proposals during the detailed design phase in order to reduce excess light pollution. For example, the use of down lighting, energy efficient lighting, movement sensors, selecting area sensitive tones, minimizing lux levels to required standards, unoccupied zones to be unlit to limit excess illumination of the surrounding area.

4.13.3 Covid Restrictions/Regulations

A submission suggests the Applicant did not follow Covid restrictions:

"From reading the details of the file it would appear that some of the supporting work done in the area may have been done during the various covid lockdowns and may have involved travel to the area at a time of very restrictive regulations. It is absolutely imperative the An Board Pleanála satisfy itself 100% that no travel to the area occurred \ no interaction with the local community occurred or no work was done on site which was not 100% in compliance with the law. If this is not the case planning permission must be refused as it is not possible to use illegally obtained information in a planning application."

The Applicant would like to clarify that all Covid restrictions and regulations were taken seriously and complied with.

4.13.4 Sustainable Development

A number of third party submissions have asserted that the Proposed Development is not sustainable development. In response the Applicant would like to draw attention to Section 3.3 of the Planning Statement submitted with the planning application which is outlined below: Sustainable Development is development which meets the needs of the present without compromising the ability of future generations to meet their own needs[27]. There are three pillars to sustainable development which are economic, social and environmental. The Proposed Development could not be a better example of sustainable development, enshrined in the National Planning Framework. The Proposed Development meets each of the three pillars of sustainable development as outlined in **Table 4.2**.

Table 4.2: How the Proposed Development Interacts with the three pillars of sustainable development

Economic Role	The Proposed Development would represent a strategically significant investment in the locality. The Proposed Development provides the opportunity to reinforce and grow the existing local renewable energy industry knowledge and skills base, providing the stability and diversity to the rural economy that can stimulate further development by attracting new business to the region due to the improved supply of electricity and provision of green hydrogen, enabling diversification. The Proposed Development will have a positive economic impact with several Irish firms commissioned to work on the design, environmental assessment and planning.
Social Role	The influence of the Proposed Development to the de-carbonisation of the Irish electricity network and the provision of green hydrogen as a zero emissions fuel will contribute positively to issues of strategic social importance. It will assist in mitigating climate change and improve air quality while enhancing energy security, including helping to stabilise and reduce energy costs. The Proposed Development will also create jobs, economic development and rural diversification.

[27] Our Common Purpose: Bruntland Report, 1987

Environmental Role	Overall, the EIAR sets out that the environmental impacts arising from the Proposed Development can be satisfactorily mitigated. The findings demonstrate that the environment can accommodate the Proposed Development without giving rise to significant environmental impacts in line with the Sligo and Mayo County Development Plan objectives as well as regional, national and international policy. An area of degraded cutover bog, measuring approximately 15.23 ha, will be built upon at the Wind Farm Site, the Developer has chosen to off-set this low value habitat loss and generally improve the biodiversity of the local area through the implementation of the Biodiversity Enhancement and Management Plan (BEMP). The BEMP is focused on the rehabilitation of an area of cutover, drained lowland blanket bog habitat of 9.8 ha which adjoins the southwest corner of the Wind Farm Site. This aims to provide enhanced habitat for peatland associated species such as red grouse, meadow pipit (both Red-listed), skylark, the common frog and the common lizard. The NIS concludes on the best available scientific evidence that it can be demonstrated objectively that no elements of the Proposed Development will result in a significant adverse effect on the integrity or on the Qualifying Interests/Special Conservation Interests of any relevant European site, either on their own or in-combination with other plans or projects, in light of their conservation objectives. Over 40 years, the Proposed Development would displace between 1.6 and 2.5 million tonnes of CO_2. This would help to mitigate climate change and the impacts to ecosystem globally.

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. The UN Sustainable Development Goals are the blueprint to achieve a better and more sustainable future for all. They address the global challenges we face, including poverty, inequality, climate change, environmental degradation, peace and justice. Learn more and take action.

The Proposed Development positively contributes to the following UN Sustainable Development Goals:

By producing renewable energy, the Proposed Development contributes to the displacement of fossil fuels, which pollute the air, this improves air quality, which is closely linked to good health and well-being. See Chapter 10: Air and Climate for details.

The Proposed Development would produce two versatile renewable energy sources locally, this improves Ireland's energy security and helps to stabilize and reduce energy costs for households and businesses.

The Proposed Development is a renewable energy enterprise, investing up to €200 million into the northwest Region. It will provide renewable electricity and green hydrogen in the vicinity of the IWAK Strategic Development Zone and Economic Growth Clusters and an area the European Commission considers "lagging" in terms of economic development. This could attract new enterprise to the county, bringing jobs and economic growth. This is examined in more detail in Chapter 4: Population and Human Health.

The Proposed Development would be one of the first of a kind in Ireland, where renewable energy is converted to green hydrogen to provide a clean and low-cost fuel that can be utilised for transportation, heating systems and industrial processes, areas which have been difficult to decarbonise with electrification. Green hydrogen, produced domestically can help to reduce the costs of decarbonising these industries. Part of the Wind Farm Substation and Grid Connection will become assets of the national grid under the management of EirGrid and assist in improving energy infrastructure in the region.

The renewable energy that the Proposed Development will generate will help support Ireland's low carbon transition and reduce anthropogenic greenhouse gases. Green hydrogen, produced using renewable electricity is an alternative, renewable fuel that could help to develop a sustainable transport sector and home heating sector in Ireland.

In the North Mayo region, the full renewable energy generation potential of the area cannot be realised due to physical shortcomings and restrictions in the electricity network. The Hydrogen Plant would provide a viable off-take and route to market for renewable energy that otherwise would have been lost due to these constraints.

By generating renewable energy and displacing fossil fuels the Proposed Development helps to reduce carbon emissions and other greenhouse gases and mitigate climate change, supporting Ireland's transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050.

4.13.5 Livestock

Concerns were raised in third party submissions as to the potential impact the turbines could have on livestock. No conclusive evidence is available to suggest that wind farms cause an impact to livestock. Livestock and wind farms are known to co-exist in many locations without any signs of impact.

4.13.6 Clarification Project Description

A submission notes that the topics outlined in the below Table 4.3 "are lacking", the table highlights the location of the details relating to these topics.

Table 4.3: Location of topics noted as "lacking" in the EIAR

Topic	Location of Details
Groundwater abstraction and ancillary works.	Section 2.6.6.3
Rain and storm water harvesting and ancillary works	Section 2.6.6.3 Specific design of equipment at detailed design stage

Topic	Location of Details
Source water storage and ancillary works.	Section 2.6.6.4 and Drawing No. 6129-PL-804
Process source water treatment and ancillary works.	Section 2.6.6.4
Welfare foul sewage systems including septic tanks and ancillary works.	Section 2.6.6.5
Discharge points and ancillary works.	Section 2.6.6.6
Environmental and process systems monitoring, long-term and real time data and systems management, environmental assessment and interpretation.	Section 2.7.10

Prior to Commencement, detailed designs will be submitted to the Local Authority for their approval. A detailed Environmental Management Plan (EMP) will be finalised and agreed with Sligo County Council and Mayo County Council on completion of detailed design and appointment of Civil Works Contractor. The Final EMP will address all planning conditions, should An Bord Pleanála grant planning permission.

4.13.7 SF6 Gas

A submission states that:

"*SF6 Gas is 23,500 times more warming than carbon dioxide (C02). Sulfur hexafluoride or sulphur hexafluoride is an extremely potent and persistent greenhouse gas that is primarily utilized as an electrical insulator and arc suppressant. The European Commission has proposed that SF6, a fluorinated greenhouse gases with a potency 25,000 times that of carbon dioxide, be banned from new electrical equipment as of 2031, as part of a broader tightening of limits on F-gases."*

The Hydrogen Plant does not require SF6 gas. Some substations are Gas Insulated Substations (GIS), however the Hydrogen Plant Substation and Wind Farm Substation are Air Insulated Substations (AIS) and therefore do not require gas.

4.13.8 Material Volume requirements

Several submissions would like clarification on the volumes of materials required for the construction of the Project. For example:

"From a very high level assessment, we were unable to easily find quantities of aggregate. steel or amounts of concrete in any of the works be it bases, culverts, manholes, etc. It would be essential that the applicants provide a table of figures for the amounts of aggregate required to construct the network of access roads."

Section 2.6.20 of Chapter 2: Project description outlines the key Infrastructure Metrics for the Project. Section 15.5.1 in Chapter 15: Traffic and Transport, outlines the volume of materials needed for the Project. The below is key information that has been extracted from this section:

- It is estimated that 840 m^3 of structural concrete and 60 m^3 of blinding concrete will be required for each Turbine Foundation and that an additional 1,435 m^3 will be required for the substation buildings and plinths, Hydrogen Plant foundation and other miscellaneous works. This gives a total volume of concrete of 13,136 m^3.
- It is estimated that 90t of reinforcing steel will be required for each Turbine Foundation and that an additional 285t will be required for both substations, Hydrogen Plant foundation and miscellaneous works. These total 1,455 t.
- For the proposed area of new Wind Farm Site access roads some 3,929 m^3 of imported crushed stone will be required. Where existing access track will be upgraded 8,684 m^3 of imported crushed stone will be required.
- For the total Turbine Hardstand area some 4,680 m^3 of imported stone will be required for the finishing layer and 13,000 m^3 for the subbase of the Turbine Hardstand area. These total 17,680 m^3. Depending on the soil/rock profile, imported crushed stone (engineering fill) may be required under Turbine Foundations as upfill. Excavations will be generally shallow (c. 2.5 – 2.85 m depth for Turbine Foundations). Allowing 1 m per foundation, then 6,640 m^3 is required.
- For the Wind Farm Substation and Hydrogen Plant Substation, rock will be imported for the build-up layers. The volume of imported stone required is 5,338 m^3.

One submission states:
"We question where the aggregates are to be sourced for the construction of the proposed project? This is most important as it tends to be left to 3rd parties/private sector, which is extremely problematic."

Chapter 13, Section 13.8 assesses the impact of the Project on Quarries. This section states: The base course materials, including sand and stone for construction of the Development will come from licensed quarries in the locality such as:

- Killala Rock

- Frank Harrington
- Maloney Quarries
- Molloy Concrete ltd.

These quarries will also be the source of crushed stone and concrete for widening works to the Turbine Delivery Route, Construction Haul Routes, Turbine Foundations, the Hydrogen Plant foundations, and for Grid Connection and Interconnector works. The locations of these quarries in relation to the Proposed Development can be seen in **Figure 15.5**.

The construction of the Proposed Development will impact on natural resources such as aggregates which will be sourced from the quarries in proximity to the Development. A total volume of crushed stone materials from quarries required for the Proposed Development is 50,277 m^3.

To clarify, only authorised quarries will be used to source stone materials.

4.13.9 Decommissioning

Submissions raise concerns regarding the decommissioning of the Project. Decommissioning is covered in detail in S2.9 of Chapter 2: Project Description. One submission is concerned re life cycle of wind turbine components, these will be recycled, Section 2.9 states:

"*The towers, blades and all components will then be removed from the Wind Farm Site and reused, recycled, or disposed of in a suitably licenced facility. The wind turbine transformers will also be removed from the Wind Farm Site. There is potential to reuse wind turbine components, while others can be recycled*."

The same submission highlights concern regarding what happens to the turbine bases. To clarify, as with many other wind farm developments, the foundations and hardstands will be left in situ. Following dismantling and removal of wind turbines, any excavated material, will be re-instated and foundations that protrude above ground level will be backfilled with soil. Underground reinforced concrete remaining in-situ. The Wind Farm Site access roads and drainage will be left in situ for future use. Section 2.9 of the EIAR states that:

Prior to the decommissioning work, a comprehensive plan will be drawn up and submitted to An Bord Pleanála for written agreement. The plan will take account of the findings of this EIAR and the contemporary best practice at that time, to manage and control the component removal and ground reinstatement.

In terms of decommissioning the Hydrogen Plant, Section 2.9 of Chapter 2: Project Description states:

It is the intention that the Hydrogen Plant will continue operations indefinitely. The source of electricity for the Hydrogen Plant would change upon the decommissioning of the Wind Farm and be changed to one of the following options:

- Subject to planning consents, the repowering of Firlough Wind Farm.
- Reinforced electricity network with a corporate Power Purchase Agreement with a green electricity producer.
- Connection to an offshore wind power generator off the west coast.

If these alternatives are not viable then the process equipment would be decommissioned; all plant, machinery and equipment will be emptied and dismantled to be sold or recycled or, where these are not possible, disposed of through a licensed waste contractor. If required, all machinery will be cleaned prior to removal and all necessary measures implemented to prevent the release of contaminants. All waste will be removed from the facility and recycled wherever possible, disposal operations will be controlled by licensed waste contractors. The buildings and infrastructure would be retained and repurposed.

4.13.10 Construction Hours and Disturbance at Night

There were a number of submissions that raised concerns about night-time construction and site investigations noise. Chapter 2: Project Description, Section 2.7.5 states the below in relation to construction hours:

Working hours for construction will be from 07:00 to 19:00 on weekdays, with reduced working hours at weekends, from 08:00 to 13:00 on a Saturday. It should be noted that during the turbine erection phase, operations will need to take place outside those hours with concrete pours commencing at 06:00, to facilitate turbine foundation construction and so that lifting operations are completed safely. Hours of working for turbine foundation construction will be agreed with Mayo County Council prior to the commencement of turbine foundation construction.

To clarify there will be no night time construction noise. There has been no night time noise in relation to site investigations or monitoring and this will continue throughout construction and operation.

4.13.11 Tourism

Submissions raised concerns regarding amenity and tourism including:

"*Irelands Wild Atlantic Way has been rolled out in recent years in an effort to encourage tourism. We believe that the current proposals are contrary to tourism objectives."*
"Activities such as walking, cycling, kayaking, boating, bird-watching, fishing, and water sports are central to the Wild Atlantic Way, along with the chance for visitors to engage with local communities, their culture, crafts and local food."
"This development will adversely affect tourism in the area and the enjoyment of the Western way Foxford Way \ Sligo Way. Walkers want to enjoy unspoilt nature not to look at industrial sites. No appropriate assessment has been done in this area."
"Heritage/ Tourism: Furthermore it is considered that the pursuit of the wind turbines / solar installations in a an area of the country that holds itself out for its built and natural heritage runs contrary to Ireland's objectives in promoting tourism together with its reliance on the hospitality industry. Ireland's heritage sites provide an important amenity and are of enormous touristic potential. It is therefore submitted that the proposed development would present an incongruous built form that would detract from the character and setting of the cultural heritage of the area."

Amenity and tourism is assessed in Chapter 4: Population and Human Health. Section 4.3.5.1 sets out the baseline for the area surrounding the Project including walking, cycling, water sports, fishing, nature based tourism, boating etc and the Wild Atlantic Way. The section states:
Based on the findings of the collective assessments, and the low level of tourism in Study Area One, it was considered that the Proposed Development will not give rise to any significant effects. Overall effects of the Proposed Development with regards to tourism are considered to be short-term, slight, not significant, negative during both the construction and decommissioning phases and a long-term, slight, not significant positive impact during operation.

The impact of the Proposed Development on cultural heritage is assessed in Chapter 14, this includes assessment of the indirect impact on landscape setting of cultural sites. This is discussed further in Section 4.8 of this response.

4.13.12 Existing underground infrastructure

A submission suggests that construction of the under-ground cabling required for the Interconnector and Grid Connection will disrupt existing water supply pipes and under ground cabling. Chapter 13: Material Assets includes an assessment of existing utilities in Section 13.9 which states that:

At the detailed design stage, roads will be surveyed in detail to ensure safe installation and avoidance of existing assets.

There will be no impact on existing utilities.

4.13.13 Population data

While the below is not a material consideration, the Applicant would like to address the concern raised regarding the population assessment.

"Why did Mercury Renewables count the population in the area without including the people of Inishcrone? Inishcrone is closer than Templeboy."

"Developer has created an artificial land area to depress population densities in the area of the development of the area."

Figure 4.1 in Chapter 4 of the EIAR shows "Study Area 1". To make inferences about the population and other statistics in the vicinity of the Wind Farm Site and Hydrogen Plant Site, Electoral Divisions (ED) in Study Area One were analysed. The Electoral Divisions within 2 km of the Red Line were included. The Wind Farm Site lies within Kilgarvan ED, Co Mayo, the Hydrogen Plant Site lies within the ED of Castleconnor West, Co. Sligo. The neighbouring EDs of Castleconnor East, Ardnaree North, Mullagheruse and Breencorragh have been included in Study Area One as these are within 2 km of the red line. South Inishcrone is located within the ED of Castleconnor West, this has therefore been included in the population count. North Inishcrone is located in the ED of Kilglass which is over 2 km from the red line and over 5 km from the Hydrogen Plant, this ED was not included in the Study Area.

4.13.14 Director of An Bord Pleanála

A submission highlights that a Director of An Bord Pleanála has in the past worked with the Applicant. This is correct. We are confident that An Bord Pleanála has appropriate governance structures to avoid any actual conflict or perceived conflict to arise in the assessment of this application.

4.13.15 GDPR

Some submissions outline that they are unhappy that their houses are mapped on the assessments or that details of predicted occupancy rates have been used for the QRA assessment. The EIA Directive requires that the impact of Projects on the local population and community is assessed. It was therefore necessary to make assumptions on dwelling occupancy and map properties in order to measure distances and assess impacts in line with the EIA Directive.

4.13.16 Public Health and Wind Farms

Concerns were raised in numerous third party submissions in relation to impacts to human health from wind farm/turbines. Chapter 4: Population and Human Health includes Section 4.3.8.2 which summarises health impact studies relating to wind farms and human health. It states that:

While there are anecdotal reports of negative health effects on people who live near operational wind farms there is no peer reviewed scientific research in support of these views. Several peer reviewed scientific research publications are outlined in this section.

Frontiers in Public Health published a study[28] in 2014 on wind turbines and human health. This review summarised and analysed the science in relation to this issue specifically in terms of noise (including audible noise, low-frequency noise, and infrasound), EMF, and shadow flicker. The study noted that:

Based on the findings and scientific merit of the research conducted to date, it is our opinion that the weight of evidence suggests that when sited properly, wind turbines are not related to adverse health effects. This claim is supported (and made) by findings from a number of government health and medical agencies and legal decisions.

The National Health and Medical Research Council, Australia's leading medical research body, concluded that there is no reliable or consistent evidence that wind farms directly cause human health problems as part of their Systematic Review of the Human Health Effects of Wind Farms published in December 2013[29]. The review was commissioned to determine whether there is a direct association between exposure to wind farms and negative effects on human health or whether the association is casual, by chance or bias.

Objectors to wind farms often refer to wind turbine syndrome as a condition that can be caused by living in close proximity to wind farms. The symptoms allegedly include sleep deprivation, anxiety, nausea and vertigo. It has been rejected by the wind industry as there is no scientific backing to these claims. The National Health and Medical Research Council review began in 2012 and included a literature and background review of all available evidence on the exposure to the physical emissions produced by wind turbines. These emissions were noise, shadow flicker and electromagnetic radiation produced by wind turbines. The review concludes that the evidence considered does not support any direct association between wind farms and human health problems and that confounding bias could be possible explanations for any reported association.

[28] L. D. Knopper, *et al*. (2014) *Wind turbines and human health*.
[29] National Health and Medical Research Council. (2015). Systematic review of the human health effects of wind farms https://www.nhmrc.gov.au/sites/default/files/documents/reports/systematic-review-wind-farms-eh54.pdf Accessed 06/12/2022

4.13.17 Signatures of people concerned about the Proposed Development/s

It is noted that one of the submissions includes a list of 785 names who, it is stated, have allegedly signed their name in agreement that they are 'concerned' about the Proposed Development. The details are not clear on exactly what people have "agreed", nor are any signatures included in the submission. Only names and dates/times (all dated within a week between the 25th of August and 31st August 2023) are included.

While we are conscious that the Board is well aware that they should not be concerned with the number of persons for or against a project but are instead concerned with the merits of points raised in submissions in the context of the proper planning and sustainable development of the area, we do wish to draw the Board's attention to the fact that there are several names on this list who the Applicant has been engaged with throughout the design and planning stages and who have clearly indicated to us that they have no objections to the Project. A number have asserted that they did not give their consent to be included in any list against the Project. This throws doubt on to the legitimacy and authenticity of this list. See Appendix A for signed letters attesting to no consent having being given to be included in any list or in submissions made under their names.

The location and relevancy of the persons in the list are also not included. This throws further doubt on to whether these names should be given any material consideration as stakeholders who are affected by the proposal.

4.13.17.1 Other Submissions

The letter in Appendix B from Mr John McAndrew relates to a submission from his uncle, Mr Liam Scott. The contents of Mr McAndrew's letter is self-explanatory. There are also a number of submissions that are a template of the same letter and which make the same incorrect assertions in relation to traffic movements. The Board should draw it's own conclusions when considering these template submissions. Furthermore, several of the typed submissions contain a manuscript addition, all in similar handwriting, requesting an oral hearing. Again, the Board should draw its own conclusions as to why the oral hearing request was not part of the typed submissions.

4.14 CONCLUSION

The Proposed Development will contribute to supplying the demand for renewable energy, which in the context of the pressing climate emergency is an urgent Irish national priority that must be given significant weight considering the wealth of supporting national and international policy.

Having regard to the energy targets set out in The Climate Action Plan 2023, The Climate Action Act, local and regional planning policy and the National Hydrogen Strategy presented and assessed within this response, it is imperative that renewable energy developments which are acceptable in planning policy terms, such as the Proposed Development, are given consent.

The development process adopted by the Applicant has represented a best practice approach to a renewable energy scheme design, minimising the potential impact through multiple design iterations and modifications to minimise the impact on the receiving environment, and ensuring compliance with the suite of planning policies and objectives of the International, National and Regional Policies. Environmental Impacts have been considered within the EIAR and through the process of assessment, embedded mitigation, and additional proposed mitigation outlined in the EIAR, NIS, CEMP and Habitat Enhancement Plan it has been shown that the Proposed Development can be constructed and operated without significant effects arising, demonstrating the acceptability of the proposal.

Having regard to the objections raised, the Applicant respectfully submits that these objections were addressed in the planning application submission.

Planning permission should be granted for this development for all the reasons set out above.

APPENDIX A

Signed Letters Attesting to no Consent being given

Aiden Anderson
Iceford Stables
Ardvalley
Ballina
Co Mayo

10 October 2023

An Bord Pleanála,
64 Marlborough Street,
Dublin 1,
D01 V902.

Dear Sirs,

Re: Proposed windfarm and Hydrogen Plant ref ABP-317560-23

I understand that Kieran Cummins, Consultant, from Trammon, Rathmolyon, Enfield, County Meath, has made a submission to An Bord Pleanála against the above project on behalf of Mayo/Sligo Energy Concern Group c/o Aileen Donagher McGowan, Chairperson, Carraun, Corballa, Co Sligo.

Contained within this submission is a list of names with a date and a time alongside each name. My name appears on page 14. No-one else in this area has the same name as myself.

I wish to bring it to the Board's attention that I have not been approached by any group to object against this project. I also confirm that I did not give my permission for my name to be added to any list which appears to be against this project.

Yours faithfully,

Aiden Anderson

Aiden Anderson.

Michael and Ursula Moyles,
Fenian Row,
Ballina,
Co. Mayo

An Bord Pleanála,
64 Marlborough Street,
Dublin 1,
D01 V902.

11th October 2023.

Dear Sirs,

Proposed Windfarm and Hydrogen Plant Development ref ABP-317560-23

Our names are within a list which is attached to a submission from Kieran Cummins who is against this windfarm and hydrogen proposal.

Please take this letter as confirmation that at no time did either of us give permission for our names to be used in this manner.

Furthermore, we are not against this proposal.

Yours sincerely,

Michael and Ursula Moyles.

Sean Padden,
Carrowreagh,
Bonniconlon,
Co. Mayo.

10 October 2023

An Bord Pleanála,
64 Marlborough Street,
Dublin 1,
D01 V902.

Dear Sirs/Madam,

Re: Proposed windfarm and Green Hydrogen Plant ref ABP-317560-23

My name has been included in a list of names attached to a submission by Mr Kieran Cummins who represents the Mayo/Sligo Energy Concern Group. Mr Cummins is against this project.

I confirm to An Bord Pleanála that I am not against this project. I was coerced into logging onto the mygreen.ie website and adding my name to an on-line petition.

Signed, Sean Padden.

Sean Padden.

APPENDIX B

Letter from Mr John McAndrew on behalf of his uncle, Mr Liam Scott

John McAndrew
Stonebrook Farm,
Whitestream
Bonniconlon
Co. Mayo
F26 TVH9

25th October 2023

An Bord Pleanála,
64 Marlborough Street,
Dublin 1,
D01 V902.

Dear Sirs,

Proposed windfarm development including 13 no. wind turbines in Bunnyconnellan, Co. Mayo and hydrogen plant in Castleconnor, Co. Sligo.

Mr Liam Scott has made a submission to An Bord Pleanála dated 31st August 2023 against the above development. I am a nephew of Mr Scott and I would like to bring a number of points to the Board's attention.

Liam Scott's submission states he was not made aware of the proposed development by Mercury Renewables. This is completely untrue. Because of my uncle's age, Mercury contacted me in order that I assist in communicating Mercury's proposals to my uncle. Mercury have provided Liam and myself with various newsletters as they were published that gave us information about the project.

Both Liam and I were invited to attend one of the Public Open Days held by Mercury. Liam Scott declined the invitation, but I attended the Bonniconlon Open Day which I found to be very informative.

Following the Open Days, both Liam and I were invited by Mercury to attend a smaller meeting specifically for adjacent landowners. This was held on 25th May 2023. Once again Liam chose not to attend but I did attend as his representative.

At all times I have communicated details of the development to my uncle Liam Scott.

Liam has informed me that the submission to the Board dated 31st August 2023 in his name was prepared by a small group of people who are against the project.

Liam has also informed me that the small group of people met Liam at the gate of his property and forced/coerced Liam into making the submission that they had prepared for him.

Yours faithfully,

John McAndrew

John McAndrew.