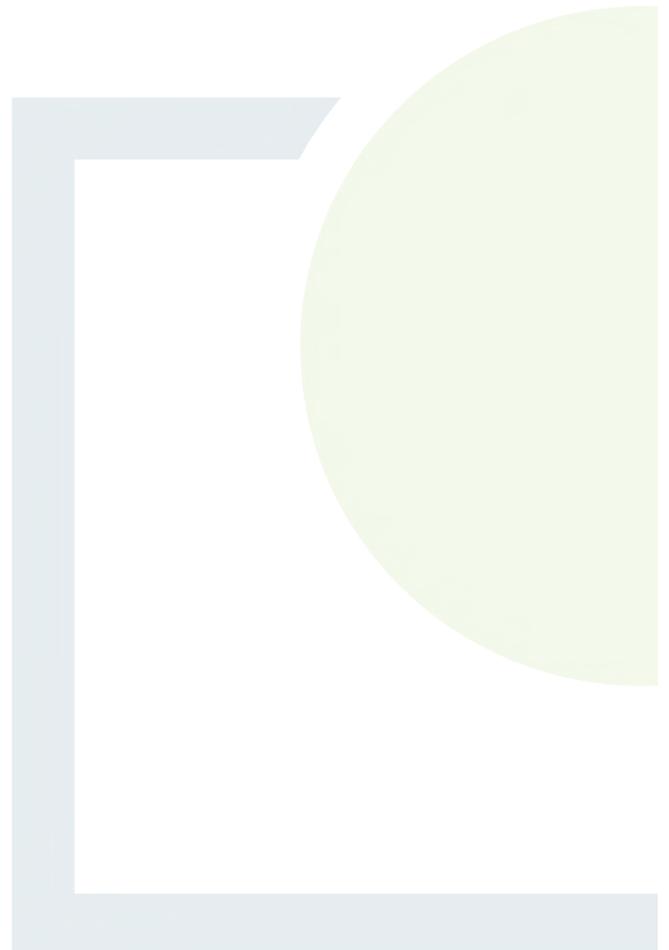




CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

APPENDIX 2

Response to Request for
Further Information Item 10:
Response to Third Party
Submissions and Observations





CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

COOM GREEN ENERGY PARK RESPONSE TO ITEM NO. 10 - THIRD PARTY SUBMISSIONS

ABP Reference ABP-308885

Prepared for: Coom Green Energy Park Limited



Date: March 2022

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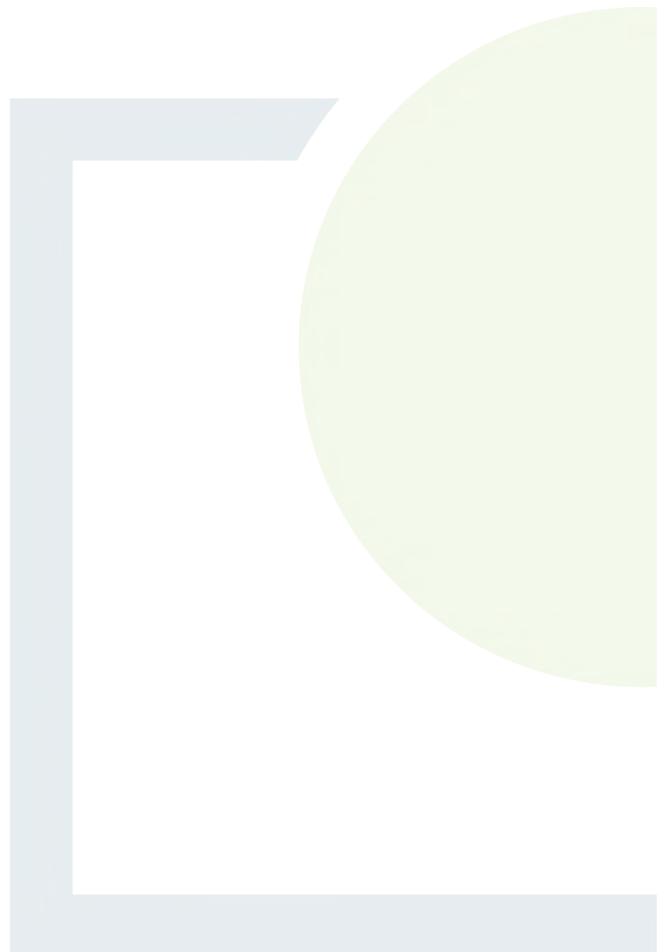


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1. INTRODUCTION

Fehily Timoney and Company (FT) , Core House, Pouladuff Road, Cork have been retained by Coom Green Energy Park Limited (a joint venture company between Orsted and Coillte) to respond to a request for further information by An Bord Pleanála in relation to Coom Green Energy Park. This report has been prepared to address Item no. 10 of the An Bord Pleanála request for further information.

Item no. 10 of the Request for Further Information states the following;

“Please respond to the matters raised in the submissions and observations received by the Board from members of the public and prescribed bodies and to the matters raised in the report received from the Planning Authority, where not specifically addressed in the matters raised in the further information above. Given the large number of observations received and the commonality of many issues you are advised to address the matters arising by topic.”

This report responds to the recurring topics and issues raised in third party observations and provides a brief context to these issues and outlines their response. This report addresses each concern indicated (e.g., Issue 1, 2, etc). Prior to responding to the core Third Party issues, a response will be given to each issue raised by the statutory and prescribed bodies and community groups who lodged a submission.



2. RESPONSE CONTEXT

The Applicant seeks to respond to the third party observations which were submitted to An Bord Pleanála regarding the proposed project. We respectfully request An Bord Pleanála (ABP) to review the documentation contained within the application in tandem with our considered response to all third party submissions.

Out of the 410 no. submissions, there are 10 no. distinct group template submissions, where 41 no. of the observations lodged relate to these template submissions. These submissions are a copy and paste type layout raising the same concerns and issues. It must be noted that the majority of the observations in the 10 no. templates share similar concerns.

Seven core issues will be discussed in detail, it is expected that these core issues will sufficiently address the issues in all of the submissions. These core issues are the umbrella topics which cover all aspects and concerns highlighted within the submissions. Prior to responding to the core Third Party issues, a response will be given to each issue raised by the statutory and prescribed bodies and community groups who lodged a submission.

Statutory Bodies

- An Taisce
- Cork County Council
- Development Applications Unit
- Inland Fisheries Ireland
- Irish Aviation Authority – Engineering Department
- Transport Infrastructure Ireland

Community Groups

- Nagle View Aware Group
- Irish Raptor Study Group – Ryan Wilson Parr

Community & Individual Core Issues

- Issue 1: Policy
- Issue 2: Consultation
- Issue 3: Noise
- Issue 4: Ecology
- Issue 5 : Visual Impact
- Issue 6: Human Health and wellbeing
- Issue 7: Battery Storage



3. STATUTORY BODIES

The submissions lodged by the 6 no. statutory bodies are outlined below. The main elements of these submissions relate to the issues outlined by the other third party submissions. The main concerns raised by each of the Statutory Bodies and Community Groups are addressed in detailed throughout this report.

It should be noted that a total of 7 no. statutory bodies made a submission. However, 6 no. of which are outlined in this report. The submission made by Irish Water has been omitted from this report as it consists solely of planning conditions in the interest of public health and to ensure adequate water/wastewater facilities, which have been appropriately addressed throughout the EIAR and this report.

Issues within these submissions include topics such as: Policy, Ecology, Consultation, Mitigation Measures, Land Soils and Geology, Hydrology, Watercourse Crossings, Aviation, Roads, Cable Route, EIAR, Visual Impact, Noise, Vibration, Archaeology & Cultural Heritage, Human Health, Battery Storage. Many of these issues are also mentioned within the core issues.

3.1 An Taisce

Issue 1: Policy

An Taisce state that **The Strategic development of appropriately located wind energy development is a national climate priority** and that the proposed development is not appropriately located.

Response:

The site selection process for the identification of this site is set out in Chapter 2 '*Need for the Development and Alternatives Considered*' of the EIAR. The site is located within an area designated for Wind Farm development in the current Cork County Council County Development Plan 2014-2020 and the Draft Cork County Development Plan 2022-2028 where the site is identified as being 'Open to Consideration' for wind farm development. The Cork County Development Plan 2014, Policy Objective ED 3-5 stipulates that commercial wind energy development is open to consideration in these areas where proposals can avoid adverse impacts on:

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

The site has gone through a rigorous site selection and design iteration process and the EIAR submitted with the application for consent demonstrates that the site is suitable for wind farm development and complies with Cork County Council County Development Policy ED 3-5.



Issue 2: Consultation

It needs to be established that the applicant has entered into appropriate engagement with local community.

Response:

Chapter 5 of the EIAR outlines the scoping and consultation carried out prior to submitting the application for consent. Significant consultation was undertaken by the Developer during the design process and prior to lodging the planning application. Project information was distributed by leaflet drop to houses within a 5km radius of the proposed development.

Furthermore, community information events and technical workshops were held to provide information about the project, to discuss the details of the project with the public and to inform the design of the project through feedback from the community.

A dedicated project website was set up which presented updates on the project and hosted a platform for the downloading of project information. The project website also included an email address to relay any queries and the phone number of the CLO. The website was utilised further for consultation during the COVID-19 pandemic restrictions in 2020, as detailed in Section 5.4.6 of the EIAR.

All dwellings within 2km of the proposed turbines were visited with the intention of meeting all households to inform them of the project and relay feedback to the development team in order to inform the design process of the project. This included follow up calls to community members who may have missed the initial visit.

Further door to door consultation took place in September 2018 where the community members were presented with a project information leaflet, a map of DI1 and contact information for the CLO. Follow up door to door visits were conducted in February and March 2019 in order to meet with any households within 2km of the development who had not yet been engaged with.

A final round of door to door community consultation took place in June, July and August 2019. All dwellings within 2km of the proposed development were visited and a printed map of DI2 and an updated project information leaflet was presented to each household. Each household was informed of further public information events and the expected timeline for a planning submission was also set out. Where respondents were not at home, a printed map of DI2 and a project information leaflet was left in each letterbox.

Three community information events were held in November and December 2018. These events took place at Glenville (28th November 2018), Mourneabbey (30th November 2018) and Whitechurch (5th December 2018). The objective of these workshops was to inform the local communities of the proposed development, to provide information pertaining to the proposed development and to seek feedback from the local community in terms of local knowledge in order to inform the design process and highlight issues that need to be addressed in the EIAR.

Two technical workshops were held in May 2019, one focused on noise and the second on Engineering to provide a more detailed overview of those topics. Two further community information events were held in October 2019 one in Mourneabbey Community Hall and the second at the holy family centre, Glenville. These public provided a broad overview of the project with stands and technical experts available to discuss Ecology, Engineering, Ecology, Noise and Landscape and Visual. A laptop was available to view the wind farm layout from a persons property utilising google earth along with Pano-pods to show panoramic images of selected locations.



Public consultation was facilitated over a 2-year period by having a dedicated Community Liaison Officer on the ground by way of door to door house calls and leaflet and letter drop to ensure locals were made aware of the details of the project and processes involved. A dedicated phone line and email address were provided with circulated materials so members of the public could directly contact the project team. This process was commenced as early as possible in order to inform the design of the project and to inform the EIA process. A dedicated website was also set up to allow for further open communication between the applicant and community throughout the iterative design process and run-up to the application submission. Details pertaining the consultation process and particulars can be found in Section 5.4 and 5.5 of the EIAR.

Public consultation is a key and important aspect of the project to the Applicant and this is demonstrated by the extensive engagement undertaken and numerous avenues for engagement that was available. A wide range of events were arranged for the public which facilitated discussion between the community and the Development team. Key local considerations were taken into account in designing the project and information relating to this is set out in Section 5.4 and 5.5 of the EIAR.

3.2 Cork County Council

Issue 1: Archaeological

Cork County Council's (CCC) planner's report expressed the concern in Section 2.6 that **there are a number of masonry road bridges over watercourses along the grid route, however it is noted that none of these bridges are listed in the RPS or NIAH in Glanakip.**

Response:

Whilst the grid connection does not form part of the application for consent, it is considered part of the project for the purposes of Environmental Impact Assessment (EIA). The grid route has been selected following a constraints based assessment of a number of alternative grid routes. Further information on the selection process and alternatives considered are described in Chapter 2 - Alternatives Considered of the EIAR submitted.

There are no recorded archaeological sites, designated architectural heritage structures or Architectural Conservation Areas (ACA) located along the grid route alignment. There is one recorded archaeological site located within the 100m wide study area corridor centred on the route and this comprises a levelled enclosure site (CO035-042----) in Glanakip townland, but this will not be impacted by the construction of the grid route.

The majority of the existing road crossings over the watercourses are shown on the 1st edition 6-inch maps and many of the bridges are likely to pre-date the 1840s. Detailed crossing methodologies for cable crossings at bridge locations are described in Chapters 3 of the EIAR and the CEMP in Appendix 3.1 of the EIAR.

These methodologies entail trenches within the bridge structure or where this is not viable directional drilling beneath or adjacent to the bridge structures will be undertaken. The methodologies proposed do not require any modifications to existing bridge structures or watercourse channels.



Issue 2: Flood Risk Assessment

The location of Turbine No. 3 and potentially Turbine No. 5 appear to fall within Flood Zone A and Flood Zone B. A full Flood Risk Assessment Report is required for these areas.

Response:

As part of the preparation of the Local Area Plan (LAP) 2017 and Draft Cork County Development Plan 2021, Cork County Council (CCC) has updated the flood zone mapping used in the '2011 Local Area Plans' to take account of the information that has become available from the National CFRAM programme (Catchment Flood Risk Assessment and Management), and other Flood Schemes undertaken by the OPW. The following is a quote from the "Draft Municipal District Local Area Plans, Map Browser".

"The indicative mapping is being made available as a resource, only to be used to identify potential flood risks at an early stage so that an appropriate response can be formulated."

The Planning System and Flood Risk Management (Department of the Environment, Heritage and Local Government, 2009) defines flood zones. Flood zones are geographical areas within which the likelihood of flooding is in a particular range and they are a key tool in flood risk management within the planning process. There are three types or levels of flood zones:

- Flood Zone A: where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);
- Flood Zone B: where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding) and
- Flood Zone C: where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

According to the LAP maps small part of the subject site is within Flood Zone A/B as shown on Figure 3.1 below. However, the proposed turbines and substations are located in Flood Zone C, in an area where the risk of flooding is low. Table 3.2 of The Planning System and Flood Risk Management defines appropriateness of a development in relation to the flood zone. According to this table, the proposed development is appropriate for this flood zone. Turbine T3 is 172m and T5 313m from the flood plain area as shown on Figure 1. The flood level for Flood Zone B is estimated to be 249mOD. The proposed turbine T3 is 257 moD and T5 is 260 mOD. The proposed turbines are at least 8m above flood levels.

Section 10.3.2 of the EIAR lists all historical flooding recorded by the OPW. The nearest flood incident has been recorded downstream in the main channel of the Bride River, just over 5.0 km south east of the closest turbine T17.

This incident is east of Glenville at Glashanabrack River on road R614 (Flood ID 5102). Approximately 3.0 km southwest of the existing Barrymore substation two flood events have been recorded; Rathcormack Co. Cork 30/01/2009 and Flooding in Rathcormack 24/08/2012 as shown on Figure 10-3 of the main EIAR.



The closest recurring flood incident to the grid route is Castelyons Kill Saint Annes approximately 1.5 km southeast of the existing 110 kV substation at Barrymore. According to flood mapping the grid route crosses the flood zone as shown on Figure 10-3. The increase in runoff due to grid cable installation will not occur because the finished surfaces are not changed. Therefore, no impact on the flood risk is expected.

In Section 10.5 Flood risk identification and assessment it was concluded that the freeboard elevation for 1%AEP event will reduce for 5mm at the location WC043 due to the proposed development (please refer to Figure 10.5 of the EIAR for the location). The freeboard height for the pre development scenario is 174 mm and for the post development scenario is 169 mm. The reduction of the freeboard level is not significant. Please note, the exercise did not take into account the mitigation proposed in the drainage design to mitigate the increase in surface runoff.

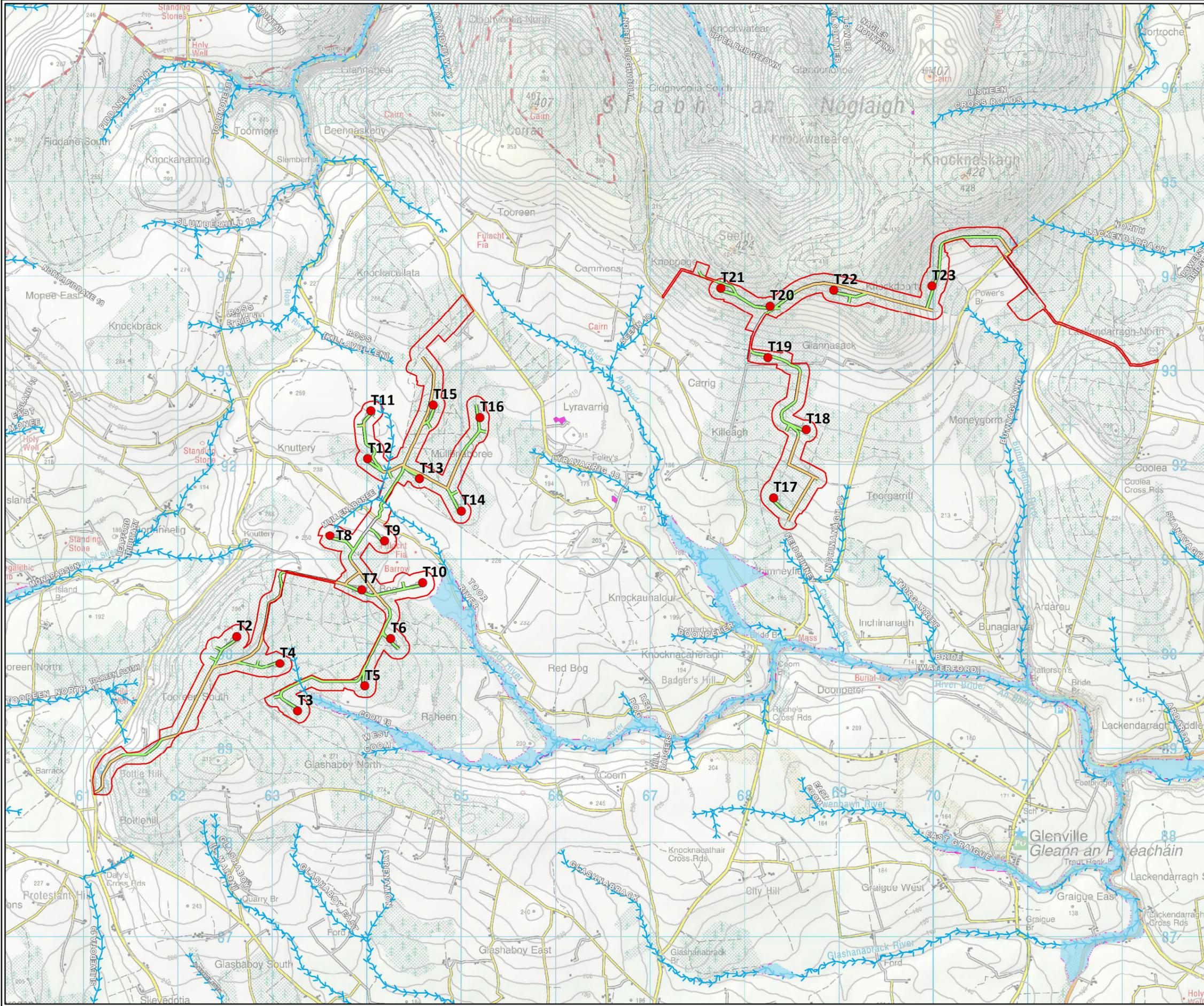
In Section 10.4.2 it was concluded that the increased surface water runoff due to development is negligible and that these flows are further reduced with the proposed drainage system. The increase in runoff due to the proposed development would be 0.234 m³/s (or 0.06%) without any mitigation measures being in place. The hardstanding areas and the access roads will be constructed from a permeable material to allow surface water infiltrate underground. The excess water will be drained to swales. These grassed swales will serve to detain flow and reduce the velocities of surface water flows. The swales will be 0.3 m deep with a bottom width of 0.5 m and side slope of 1 in 3. The swales will be constructed in accordance with CIRIA C698 Site Handbook for the Construction of SuDS.

Furthermore, where roadside drains are laid at slopes greater than 2%, check dams will be provided. This will reduce effective slope and runoff velocities and consequently the peak runoff.

In summary:

- No turbines or substations are located within Flood Zone A or B
- CCC is concerned that Turbines T3 and T5 are within a floodplain area. This is not the case, these turbines are at least 172m from the floodplain area. Please refer to Figure 3.1 below.
- The proposed development without mitigation measures will have a negligible impact on the flood risk downstream of the site. However, in the EIAR it was concluded that this can be mitigated with the proposed drainage design.
- Drainage design is based on SuDS. The proposed drainage will utilize swales to retain additional volumes. Swales are shallow, flat bottomed, vegetated open channels designed to convey, treat and attenuate surface water runoff. A swale can have check dams or berms installed across the flow path, that temporarily pond runoff to increase pollutant and infiltration and further decrease flow velocity. This is particularly useful for sites with steeper gradients.
- Access roads and hardstanding areas will be constructed from a permeable material to allow water to infiltrate underground.

Based on the above, it is concluded that a detailed flood risk assessment is not required.

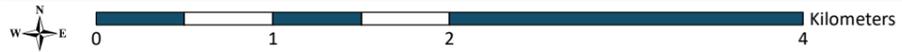


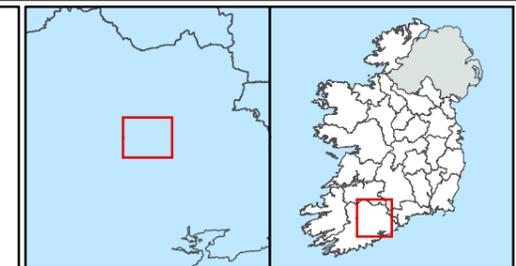
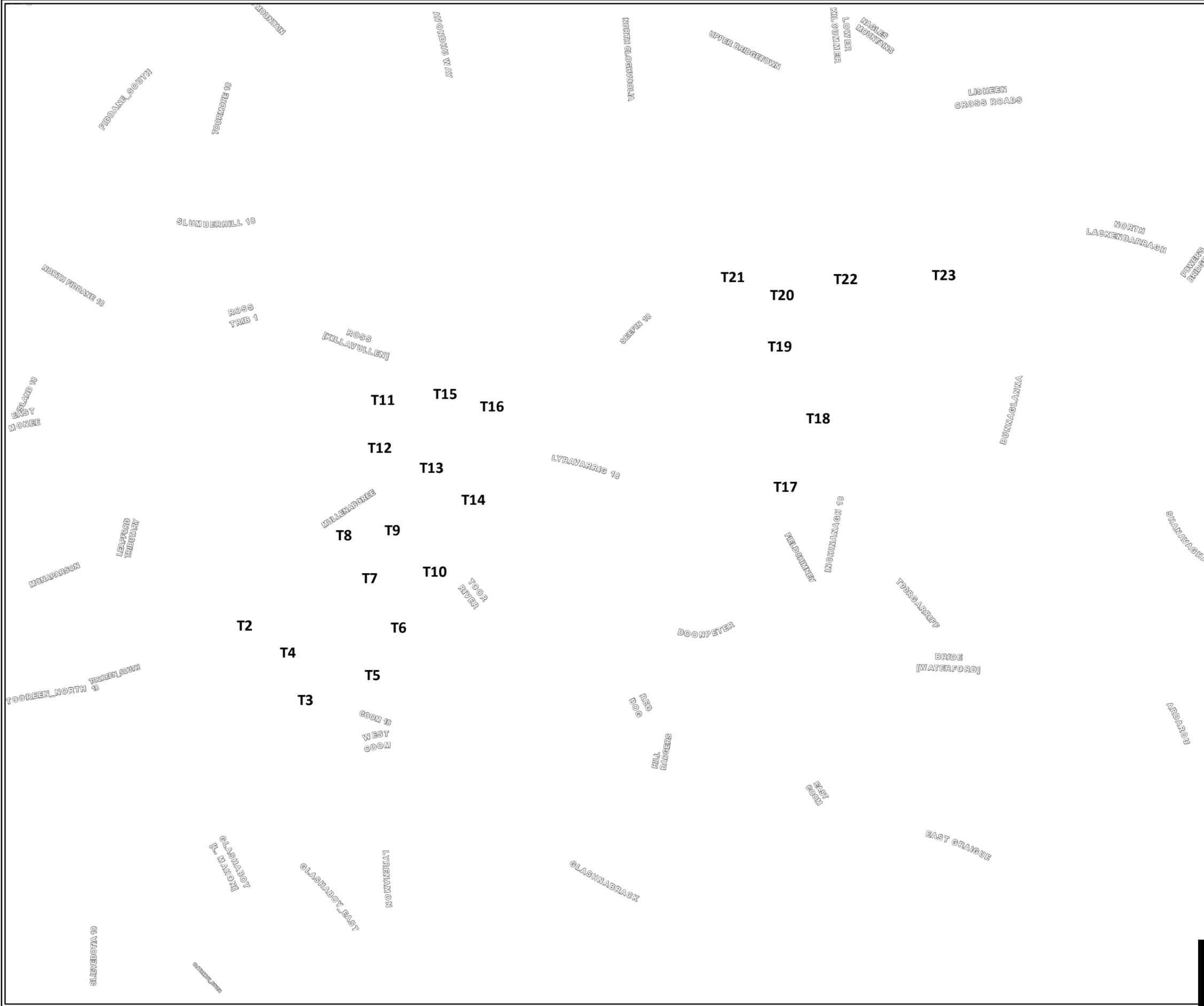
Legend

- Proposed Development Boundary
- Proposed Turbine Hardstanding Area
- Proposed Turbine Layout
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Contours (10m)
- Rivers
- LAP2017 Flooding - Zone A
- LAP2017 Flooding - Zone B

Turbine ID	X (ITM)	Y (ITM)	Zone A Distance (m)
T10	564550	590806	163
T3	563227	589449	167
T5	563936	589713	312
T4	563039	589951	470
T6	564212	590214	569
T14	564961	591567	613
T9	564146	591247	695
T7	563907	590734	725
T17	568267	591705	725
T2	562583	590234	1001
T13	564515	591909	1002
T8	563567	591306	1249
T12	563969	592119	1440
T18	568612	592430	1497
T16	565156	592556	1620
T15	564661	592686	1732
T11	564002	592625	1864
T19	568206	593193	1960
T21	567708	593928	2024
T20	568229	593738	2271
T22	568905	593906	2362
T23	569943	593950	2988

TITLE:	Proposed Site Layout, Drainage and Flood Zones		
PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	3.1		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:40000	REVISION:	0
DATE:	06/09/2021	PAGE SIZE:	A3



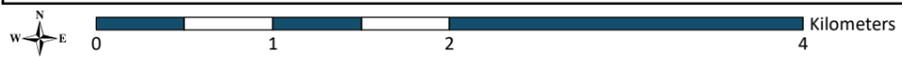


Legend

- Proposed Development Boundary
- Proposed Turbine Hardstanding Area
- Proposed Turbine Layout
- Existing Road
- Proposed Existing Road Upgrade
- Proposed New Road
- Contours (10m)
- Rivers
- LAP2017 Flooding - Zone A
- LAP2017 Flooding - Zone B

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T18	568612	592430	1497
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PROJECT:	Coom Green Energy Park, Co. Cork		
FIGURE NO:	-		
CLIENT:	Coom Green Energy Park Ltd.		
SCALE:	1:40000	REVISION:	0
DATE:	-		
SIZE:	A3		





Issue 3: Roads - Entrance

CCC highlight that the **Existing entrance is not to standard**; and that the **Applicant should submit revised sightlines for the Bottlehill Entrance**.

Response:

Revised drawings showing sightlines for the site access points including the Bottlehill Entrance have been prepared as part of this RFI response and can be found in Appendix 4 of the RFI Response Report. In addition, revised assessments of each of the proposed site access points were carried out as part of the response to ABP's request for further information and third party observations listed in this report. Please refer to Section 7 of the Main RFI Response Report and associated Appendix 4 for revised sightlines for the Bottlehill entrance.

Issue 4: Report of the Environment Officer

The report of the environment officer is included within the appendix of the Cork County Council Planning Report Submission. This report offers submissions and observations on various aspects of the proposed development specifically on Noise, Vibration and Air.

Noise and Vibration – Contour Map

A noise contour map detailing the study area relative to the proposed turbines. In addition the respective locations and distances of all noise sensitive receptors within 500m, 1000m, 1500m and 2000m of the turbines should be presented and quantified, with all occupied, unoccupied and permitted dwellings identified. Dwellings that have a specific interest in the project and are associated with it should also be highlighted. For the purpose of completion the number of receptors that were identified as farm buildings or unoccupied derelict buildings and were not considered as part of the impact assessment and not assessed against the derived daytime and night time noise levels should also be quantified and indicated.

Response:

A noise contour map with the updated area of receptors accompanies this report. This map can be found in Appendix 4. For further information refer to Section 3 (b) of the main RFI response report.

Noise and Vibration – Sensitive Receptors

The referenced noise sensitive receptors that each background noise monitoring location is considered to be representative of should be quantified and also shown on a suitably scaled map. A clear trail should be presented and evident between the selected background noise monitoring locations, the clusters of identified sensitive receptors they are deemed to be representative of and the dwellings within such clusters with the highest noise levels for each of the 18 selected noise monitoring locations.



Response:

Details of the noise monitoring locations are provided in Appendix 7 and a figure of noise monitoring locations is provided in Figure 7.2 of the EIAR.

The Institute of Acoustics Good Practice Guide Section 2.5 states in the context of selecting locations that proxy locations are considered appropriate if, *"it can reasonably be claimed, from inspection and observation, that there are no other suitable noise-sensitive locations, in the vicinity of any selected location and close to a dwelling, where background noise levels would be expected to be consistently lower than the levels at the selected position."*

This was adhered to for the survey, and as noted in the Appendix 7.1, in some instances access to the property of interest was denied and the nearest available property was selected. Generally, noise monitoring locations are chosen so they represent the nearest noise sensitive locations to the windfarm, in all directions. The issues that are considered in selecting monitoring locations are distance to roads, vegetation (forested areas) and whether properties are downwind of the proposed turbines.

At Coom particular attention was paid to noise sensitive locations located at the centre of the windfarm, or overlooking different parts of the proposed windfarm. These are the properties that determine the noise mitigation requirements for the scheme.

Noise and Vibration – Background Noise

- (a) *It is submitted as per Section 7.4.1 that in some cases, the prevailing background noise is higher at lower wind speeds and in keeping with Institute of Acoustics guidelines the lowest derived background noise level is adopted for all wind speeds where this derived minimum occurs. The possible reason why this may have occurred should be clarified by the applicant having regard to any inspections undertaken during the course of the monitoring and analysis of the data sets.*
- (b) *It should be clarified why there are no data entry results in respect of prevailing background night-time noise levels at monitoring location N17 at 3 m/s Ref. Table A7.1.8.*
- (c) *In respect of the comment under Appendix 7, Table A7.1.8, (Prevailing background noise during night-time periods), it is submitted as an example that at monitoring location N2, the lowest derived background noise level occurs at wind speed of 5m/s.). This may be a typo error and should be clarified as it does not appear to be consistent with the night time period data and curves submitted for monitoring location N2.*

Response:

- (a) The current best practice for derivation of the prevailing background noise level, as defined in IOA Good Practice Guide, is to determine the prevailing noise curve, using up to a 4th order polynomial. This occasionally results in the noise curve predicting a higher level for low windspeeds. The GPG states that "where a noise curve increases at lower wind speeds then levels should be fixed at the minima". This approach has been taken here. When choosing the best fit curve, professional judgement is used so that the curve represents the prevailing noise across all windspeeds- high, low and mid-range windspeeds. In reality the noise level decreases with windspeed and therefore fixing the curve at the minima is a conservative approach.



- (b) The Good Practice Guide requires a minimum number of data points to be considered adequate. More than 5 data points are needed for each windspeed. The measurement period was slightly less at N17 and so did not include the required data at 3m/s. The noise survey was undertaken at different times. Windspeeds were higher for one of these surveys, meaning that slightly less than the required amount of data was measured at lower windspeeds, as detailed in Appendix 7.1. In general, at low windspeeds the prevailing noise level would not be expected to change significantly. It is more important to get prevailing noise at the higher windspeeds as the noise level increases with higher windspeeds. In terms of noise criteria, the critical windspeed is in the mid-range of windspeeds, when the maximum noise level of the turbine is reached and the background noise has not increased greatly due to wind noise.
- (c) This is not an error. As discussed in (a) above, as the prevailing noise is fixed at the minima point and this occurs at 5m/s at N2. Professional judgement has been used to choose the best fit curve across all windspeeds. Often the mid-range of windspeeds is the critical range in terms of noise mitigation. Therefore in choosing the best fit curve, consideration is given to the mid-range of windspeeds. It is important not to overestimate the prevailing noise in the mid-range, as this could result in a higher noise limit within this critical range.

Noise and Vibration – Construction Noise

In relation to construction noise impact, It is noted as per Table 7.11 in respect of the grid connection works, that in some instances the maximum predicted levels may be above the applied and adopted noise limit of 65 dB LAeq 1 hr. It is submitted that these elevated noise levels will only occur for short durations at a limited number of dwellings.

Mitigation is proposed which includes the usage of a temporary barrier or screen in cases where the works are to occur over an extended period. In terms of clarification, the potential number and location of dwellings impacted should be confirmed.

Response:

The number of properties within certain distances of the grid connection route, is determined based on Eircode information. This information is not normally retained for data security reasons. However, the grid connection drawing is provided within the EIAR. From this drawing, the locations where there are properties close to the grid connection route are identified below, starting at the proposed western section substation at Knockacullata and moving eastwards to the existing Barrymore 110kV Substation.

Properties within 25m of the grid connection route are:

- Tooreen townland
- West of Carrig townland, where the grid connection turns north towards Turbine 21.
- Lackendarragh North,
- East of Cappagh Cross Roads
- South of Cullenagh townland.



Air – Particle Matter

In respect of Chapter 6, It should be noted that the accompanying tables namely Table 6.7 and Table 6.9 in respect of presented data for Particulate matter (PM10) and Carbon Monoxide (CO) are headed ‘Particular Matter (PM10) data Carlow Town and Carbon Monoxide Data for Carlow Town 2004-2005 respectively. This should be clarified.

Response:

As stated in Section 9a of the main RFI report, to clarify why Table 6.9 of the submitted EIAR refers to “Carbon Monoxide Data for Carlow Town 2004-2005”, a review of the information used in compiling the Carbon Monoxide data for the submitted EIAR has shown the caption provided for Table 6.9 to be incorrect, and labelled “Carbon Monoxide Data for Carlow Town 2004-2005” in error. The caption for Table 6.9 should read “Table 6-9: Carbon Monoxide Data for Cork Harbour 2007-2008”, as the ‘Parameter’ and ‘Measurement’ data contained within Table 6.9 is specific to Cork Harbour for the time period of 2007-2008, and not for the location and date included in the submitted EIAR.

Air – Dust

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

Response:

As part of the Air and Climate assessment, a review of existing air quality monitoring data undertaken by the Environmental Protection Agency (EPA) was reviewed and used to characterise the existing environment. Background dust monitoring has not been conducted in the vicinity of the proposed development. The use of EPA monitoring station data is considered appropriate for the proposed development considering the rural nature of the site location and the nature of the proposed works in terms of scale and duration. EPA monitoring station data is commonly used for the adequate environmental impact assessment of projects similar to Coom Green Energy Park.

The impact assessment methodology involved the review and assessment of the proposed project to identify the potential for air emissions during construction and decommissioning.

To assess the potential impacts of construction dust emissions, the NRA’s Assessment Criteria¹ for the impact of dust emissions from construction activities with standard mitigation in place was used.

With respect to dust nuisance/soiling impacts on receiving receptors that may have the potential to arise during both the construction phase and potentially during the decommissioning phase, mitigation measures have been proposed in Chapter 7 of the EIAR.

¹ National Roads Authority (NRA), 2011. Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes.



A Dust Management Plan has also been included in the CEMP which was submitted with the EIAR (Appendix 3.1 of the EIAR) which outlines the sources of dust during the works, identifies measures to minimise dust during the works and the complaints procedure for dust.

The applicant is willing to carry out pre-construction background dust monitoring in the vicinity of the proposed development to confirm the conditions predicted in the EIAR, should the Board be minded to impose this as a condition, prior to commencement of construction.

Issue 6: Traffic and Transportation

A number of concerns on traffic were raised in Cork County Council's submission and are addressed below.

Borrow Pits

CCC request that detailed investigations into borrow pit use is needed to establish accuracy of HGV movements.

Response:

Chapter 13 of the EIAR assesses the construction traffic and borrow pits associated with the proposed development. A conservative 24-month construction programme was assumed for construction traffic generation movement calculations as part of this assessment.

As outlined in Chapter 9 of the EIAR, a detailed assessment of existing ground conditions including site investigations were carried out at the proposed site to determine the suitability of borrow pit locations and use of same. These assessments informed assumptions on HGV movement calculations carried out as part of the traffic and transport impact assessment for the project.

Site walkovers and peat stability assessments were undertaken by an Engineering Geologist working for FT during June and July 2019 and August 2020 to determine baseline characteristics. Intrusive and non-intrusive site investigations were undertaken by Irish Drilling Ltd (IDL) and Minerex Environmental Ltd under the supervision of FT from June to October 2019 and during October and November 2020. Details of individual specialist staff who contributed to the EIAR including their qualifications and experience can be found in Appendix 1.1 of the EIAR.

Intrusive investigations were undertaken at the proposed borrow pit locations, at selected proposed turbine locations and at each of the 3 No. proposed HDD water crossing locations along the proposed grid connection route. The site investigations comprised the excavation of trial pits and percussive/rotary boreholes.

Daily Trips:

Breakdown of daily trips and show how HGV trips have been calculated.

Section 13.6.1 of Chapter 13 of the EIAR assesses the construction phase traffic impact associated with the proposed development. A conservative 24-month construction programme was assumed for construction traffic generation movement calculations as part of this assessment. The number of vehicles is then converted to the equivalent two-way trips, whereby every vehicle will generate two trips, one to and one from the site.



The total number of HGV trips anticipated for the Coom Green Energy Park construction phase is 22,836 for the entire development (including grid connection). Calculations of HGV and LGV movements associated with the construction of the development indicate an average daily increase on the road network of 44 HGV trips per day over a construction period of 24 months. Traffic volumes are described in Table 13-5 of the EIAR and are based on the construction sequence described in Chapter 3 in the EIAR.

As the wind farm will be built from two distinct sides, the traffic impacts are split to estimate the traffic generated at each location and turbine deliveries as HGV's shall approach the access points from the east and west separately along designated routes identified in Figures 13-5 and 13-6 of the EIAR.

It is estimated that the construction phase for the Bottlehill and Mullenaboree side of the development will lead to 15,434 additional HGV trips (two-way) over the duration of the construction works. This breaks down to HGV AADT of 30 over the duration of the construction phase. It is estimated that the Knockdoorty side of the development will lead to 7,360 additional HGV trips (two-way) over the duration of the construction works. Calculations of HGV and LGV movements associated with the construction of the development indicate an average daily increase of 14 HGV trips per day over a construction period of 24 months.

HGV movements were calculated based on material volume requirements for the project and daily trips were calculated based on a 5-day work week which represents a worst case with respect to AADT².

Construction Programme:

Figure 13-8 of the EIAR outlines that construction traffic amounts to 119 HGV average daily trips in months 8, 9, 10 & 11 with a peak of 140 HGV average daily trips in month 12. Details should be provided showing how these daily HGV trips have been calculated as the breakdown in Figure 13-7 is unclear.

Response:

Figure 13-7 presents HGV Trip Distribution for the project across the proposed construction programme, breaking out the total no. of HGV trips calculated for each key programme activity for each month. A copy of this figure is presented below.

² Assuming a 6 day working week for example would result in lower average daily trips over the duration of the project.

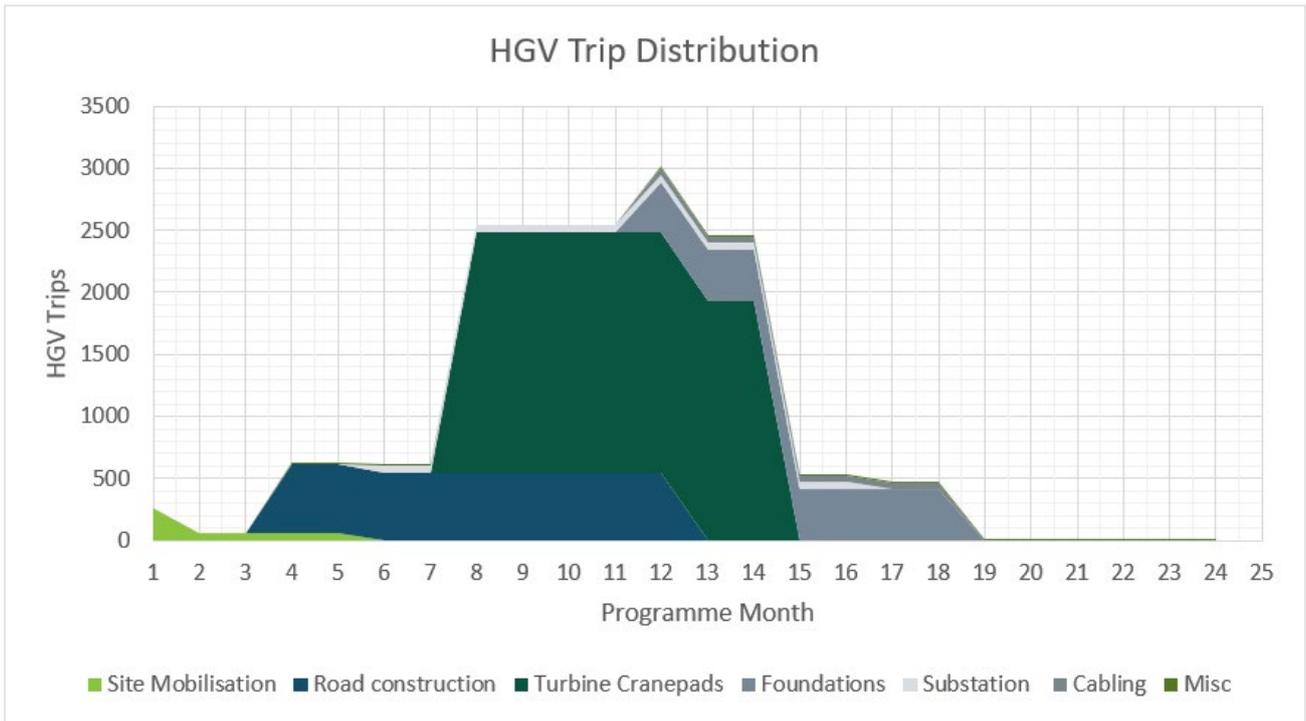


Figure 3-2: Copy of Figure 13-7 from Chapter 13 of the EIAR

The distribution of average daily trips for HGV's and LGV's for the overall project is presented in Figure 13-8 which is also presented below.

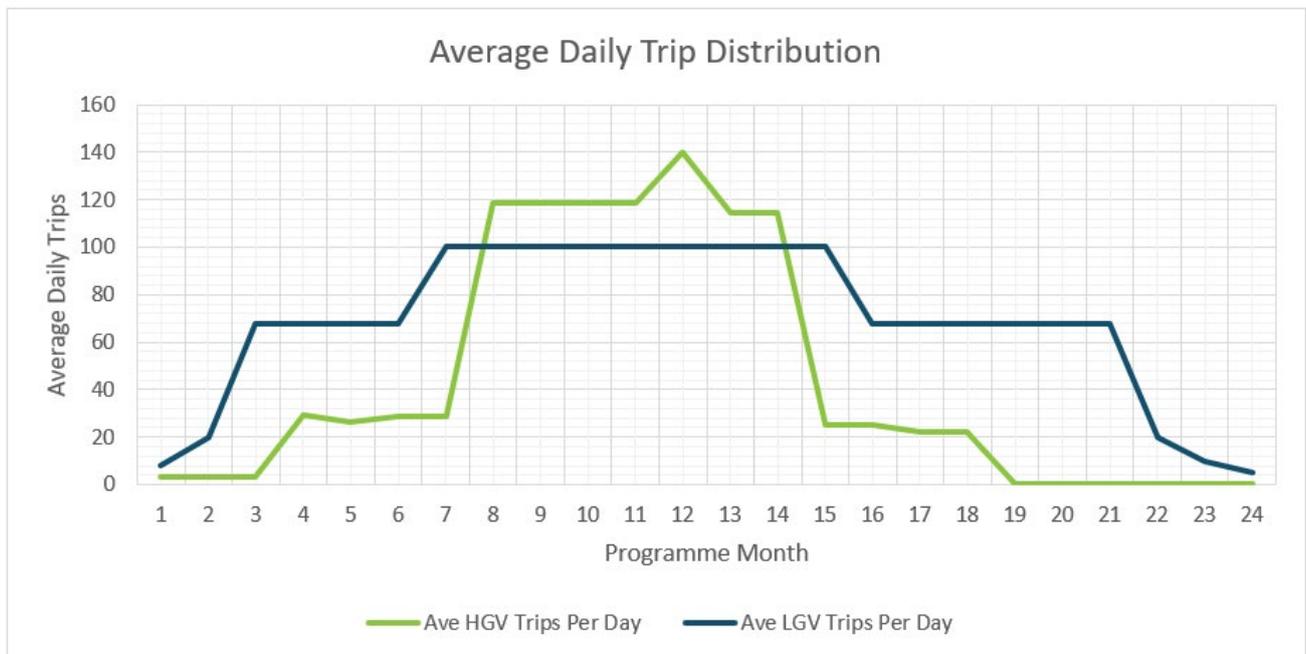


Figure 3-3: Copy of Figure 13-8 from Chapter 13 of the EIAR



As described above, HGV movements were calculated based on material volume requirements for the project and daily trips were calculated based on a 5-day work week. Material volumes and HGV movements are calculated based on the proposed project layout design and construction sequencing for each element of the project including:

- Mobilisation and setup;
- Construction of access tracks and hard standings including temporary compounds;
- Drainage construction;
- Turbine crane pads and lay down areas;
- Turbine foundation construction and turbine erection;
- Substation compounds, buildings and equipment;
- Electrical cabling and associated, ducting and trenching;
- Clearance felling;
- Met mast construction;
- Demobilisation.

Table 3-1 below details the calculated daily HGV and LGV trips for the 24 month construction programme. The calculations presented are a monthly breakdown of forecasted construction traffic based on the construction programme described in Chapter 3 of the EIAR.



Table 3-1: Proposed Construction Programme

Activity	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Ave HGV Trips per Month	65	65	65	626	561	620	620	2548	2548	2548	2548	3014	2463	2463	535	535	476	476	10	10	10	10	10	10
Ave HGV Trips Per Week	15	15	15	146	130	144	144	593	593	593	593	701	573	573	124	124	111	111	2	2	2	2	2	2
Ave HGV Trips Per Day	3	3	3	29	26	29	29	119	119	119	119	140	115	115	25	25	22	22	0	0	0	0	0	0
Ave LGV Trips Per Day	8	20	68	68	68	68	100	100	100	100	100	100	100	100	100	68	68	68	68	68	68	20	10	5
Combined ADT	11	23	71	97	94	97	129	219	219	219	219	240	215	215	125	93	90	90	68	68	68	20	10	5



Haul Routes -HGV Traffic:

Figure 13-5 only shows limited sections of possible haul routes.

Response:

The submitted Haul Routes figure (Figure 13-5) illustrated the location of local quarries in relation to the proposed CGEP construction entrances. The haul routes extended from the construction entrances to the nearest national road. The EIAR assumed that HGV's travelling from existing licensed quarries will take established routes to the nearest national and regional roads. When leaving the site, HGV's are confined to the haul routes shown in Figure 13-5 to minimise the impact on the local road network.

This figure has been revised following receipt of the above observation. The revised figure (Figure 3-3 shown below), shows additional routes extending from the national road network to quarry locations identified in the EIAR.



Import/Export Quantities

Limited detail on import and export quantities. Needs clarification.

Response:

In order to assess the impact of the additional construction related traffic on the existing road network it is first required to estimate the amount of construction traffic that will be generated (trip generation) as a result of the proposed project.

This assessment was done by estimating the amount of traffic, in the form of heavy goods vehicles (HGV) and light goods vehicles (LGV) that will be generated during the construction phase and then distributing it over the duration of the construction programme. In determining the number of 'trips' the estimated number of HGV vehicles was multiplied by a factor of 2 to account for a single trip 'in' and a corresponding single trip 'out'.

In the case of LGVs, the estimated number of vehicles was multiplied by 2.5 to account for some additional LGV movements e.g. some workers taking lunch breaks in the local area. The analysis allowed for a total number of trips per month to be calculated. This is translated to annual average trips per day (AADT).

As described above, HGV movements were calculated based on material volumes (import and export) for the project. Material volumes and HGV movements are calculated based on the proposed project layout design and construction sequencing for each element of the project including:

- Mobilisation and setup;
- Construction of access tracks and hard standings including temporary compounds;
- Drainage construction;
- Turbine crane pads and lay down areas;
- Turbine foundation construction and turbine erection;
- Substation compounds, buildings and equipment;
- Electrical cabling and associated, ducting and trenching;
- Clearance felling;
- Met mast construction;
- Demobilisation.

While the assessment considers the entire road network in proximity to the project for both direct and indirect impacts, it is necessary to identify roads that will be used for specific purposes during construction, operation and decommissioning of the project. The selection of these roads are based on the project requirements in the context of the following:

- Delivery of oversized turbine components to the wind farm site from the Port of Entry;
- Delivery of construction materials to the wind farm site such as the importation of aggregates from suitable quarries;
- Export of waste materials from the site to suitable licensed waste facilities;



- Cabling works along public roads;
- Export of felled trees to licensed sawmills.

Routes for the delivery of oversized turbine components to the wind farm site from the Port of Entry are shown in Figure 13-6 of the EIAR. Haul routes for the delivery and export of other materials are shown on Figure 13-5 of the EIAR.

Suitable granular fill material for the sub-base of access tracks and hard standings will be sourced from the borrow pits within the site with suitable class 6 structural fill imported from a licensed quarry as required to meet the requirements of the detailed design. Class 6F2 and clause 804 granular material for track base course and running surface will be imported from a licensed quarry.

Imported material deliveries by truck type for road construction, foundations, and cable route trench bedding material are detailed in Table 3-2 below:

Table 3-2: HGV Import/Export Movements

Activity	Total HGV Trips (Two Way)
Setup and mobilisation	260
Roads	4959
Turbine Crane Pads	13497
Foundations	2881
Substations	653
Cabling	380
Other	206

Issue 7: Traffic and Transportation Report

CCC outline concerns within the Report of Traffic and Transportation in the appendix of their submission. These concerns are outlined below and responded to individually for the purposes of clarity.

Response:

Times of Construction traffic:

CCC state that:

Figure 13-8 of the EIAR outlines that construction traffic amounts to a peak of 100 LGV average daily trips between month 7 and month 15. The nature/origin of the LGV traffic will be difficult to quantify but will most likely be in the AM peak hour approaching the sites and in the PM peak hour leaving the sites.



With 15 of the 22 wind turbines on the western part of the site it is fair to assume that between 65-70% of construction traffic will be affecting routes approaching this part of the site which could include the already over capacity N20. To offset the potential impact of this traffic, the following recommendations should be made;

- *start times on site should be before 8.00am and/or after 9.00am*
- *finish times on site should be before 4.30pm and/or after 5.30pm*

Response:

Section 13.6.1 of Chapter 13 of the EIAR states that negative or adverse effects on the receiving environment associated with the construction works on the main energy park site are considered to be short-term in duration and slight to moderate in significance without appropriate mitigation.

A detailed traffic management plan (TMP) has been submitted with the EIAR (Appendix 3.1 of the EIAR). This shall be developed further at construction stage by the main Contractor and in consultation with the roads authority and An Garda Síochána prior to commencing construction.

Issues like the timing of large deliveries to and from the proposed site shall be agreed between the developer and the roads authority in the final TMP prior to construction.

Transport of Wind Turbines:

Details for the construction of lay-bys and other mitigation measures for transport of wind turbines should be prepared in consultation with the Traffic and Transportation Sections of Cork County Council and Cork City Council. This should include but not be limited to the following junctions

- *N8/R635 junction*
- *N20/New Bottlehill Road Junction*



Response:

N8/R635 junction



Figure 3-5: N8/R635 Junction



Figure 3-6: N8/R635 Road Junction



The applicant considers the N8/R635 Road Junction suitable for transportation of wind turbines without the need for construction of additional lay-bys at this location.

As outlined in the EIAR, a programme of deliveries will be submitted to the roads authority in advance of deliveries of turbine components to the site. The programme will include details of the dates and times of each component delivery along with the route to be taken. Turbine component deliveries will be carried out at night during off-peak times and will be done using a convoy and a specialist heavy haulage company. Turbine deliveries will be escorted by An Garda Síochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised. Any area affected by the works to facilitate turbine delivery will be fully reinstated to its original condition unless agreed otherwise. Consultation with the local residents and Cork County Council are included in the traffic management plan to manage turbine component deliveries. Cork City Council shall also be consulted prior to finalisation of the construction stage TMP and deliveries. Any temporary road works will be subject to a road opening license from the local authority.

The applicant has undertaken a swept path analysis of the TDR. In this analysis significant TDR nodes have been identified where temporary accommodation works are necessary for turbine component deliveries. Once all turbine components are delivered, the applicant has committed to restoring roads and road furnishings to an acceptable condition which will be agreed with the roads authority. As described in the TMP submitted in Appendix 3.1 of the EIAR, any area affected by the works to facilitate turbine delivery will be fully reinstated to its original condition unless agreed otherwise.

The applicant refers to the EIAR Figure Numbers: 13.6.1 to 13.6.15 inclusive and Drawing Numbers: P20-099-0400-0001 to P20-099-0400-0008 inclusive of the plan of the TDR, full swept path analysis, and accommodation works areas at TDR nodes.

N20/New Bottlehill Road Junction

The applicant considers the N20/New Bottlehill Road Junction suitable for transportation of wind turbines without the need for construction of additional lay-bys.

As outlined in the EIAR, a programme of deliveries will be submitted to the roads authority in advance of deliveries of turbine components to the site. The programme will include details of the dates and times of each component delivery along with the route to be taken. Turbine component deliveries will be carried out at night during off-peak times and will be done using a convoy and a specialist heavy haulage company. Turbine deliveries will be escorted by An Garda Síochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised. Any area affected by the works to facilitate turbine delivery will be fully reinstated to its original condition unless agreed otherwise with the local authority. Consultation with the local residents and Cork County Council are included in the traffic management plan to manage turbine component deliveries.

The applicant has undertaken a swept path analysis of the TDR. In this analysis significant TDR nodes have been identified where temporary accommodation works are necessary for turbine component deliveries. Once all turbine components are delivered, the applicant has committed to restoring roads and road furnishings to an acceptable condition which will be agreed with CCC.



Figure 3-7: N20/New Bottlehill Road Junction



Figure 3-8: N20 Southbound towards Bottlehill Junction



Passing bays will be strategically located within the site on the internal access tracks and designed to accommodate the largest expected HGV's. Each passing bay within the Wind Farm site is approximately 50m long by 4.5m wide, accommodating up to 5 no. of 10m standard rigid trucks.

At the site accesses (i.e. L-1219 and Park Avenue North) localised widening of the entrance bellmouths will supplement the internal passing bays and provide safe locations for vehicles to queue clear of the public road network.

Grid Connection Construction Traffic Details:

Full details of the construction traffic generated by the works associated with connection of the proposed development to the Electric Ireland Network (as shown in Figure 3 below) should be provided to the Traffic and Transportation Section of Cork County Council. This shall include timelines for construction and the cumulative impacts with overall construction program for the proposed development. Grid connection works should be planned to avoid conflicts with other major activities on the main construction site such as concrete foundation pours and large component deliveries.

Response:

As described in the EIAR, the Construction Traffic Management Plan shall be finalised in accordance with the TMP submitted with the EIAR (Appendix 3.1 of the EIAR) following the appointment of the contractor for the main construction works and the turbine supply contract.

As described in the TMP submitted with the EIAR, aggregate imported to the wind farm site from local quarries will be managed to ensure they do not conflict with the grid connection works. Grid connection works will be planned to avoid conflicts with other major activities on the main construction site such as concrete foundation pours and large component deliveries. Measures contained within the construction stage CEMP and TMP will ensure no conflicts occur between felling and construction operations.

Traffic Management Coordinator:

The EIAR outlines that a Traffic Management Coordinator will be appointed for the duration of the project and this person will be the main point of contact for all matters relating to traffic management on the project. This appointment should occur prior to the approval of permission by the Bord.

Response:

The EIAR states that a dedicated competent Traffic Management Coordinator will be appointed for the duration of the project and this person will be the main point of contact for all matters relating to traffic management on the project. This appointment shall be made following selection and appointment of the preferred balance of plant contractor for the construction of the project. As the project is subject to planning permission with a possible start date of several years in the future pending same, it is not appropriate to make a key appointment such as this prior to any approval of permission.



Traffic Management Plan:

The Traffic and Transportation Section of Cork County Council should have an active role in the preparation/review of the Traffic Management Plan (TMP). A detailed timeline for the preparation of a TMP should be provided to Cork County Council prior to the approval of permission by the Bord.

Response:

The TMP shall be prepared in consultation and agreement with the local authority and An Garda Síochána and therefore the Traffic and Transportation Section of Cork County Council shall have an active role in the preparation/review and agreement of the Traffic Management Plan (TMP).

As described in the TMP submitted with the EIAR, the Construction Traffic Management Plan shall be finalised following the appointment of the contractor for the main construction works and the turbine supply contract. As described in the TMP submitted with the EIAR, the plan can only be finalised with appropriate input from the contractor who will actually carry out and schedule the works. Furthermore, it is appropriate that the Project Supervisor Construction Stage (PSCS), when appointed, should have an active role in the preparation/review of the Traffic Management Plan.

Issue 8: Report of the Heritage Officer (Ecology)

Ecology – Foraging Habitat

Concerns that EIAR takes into consideration a 92m cleared zone around each turbine, which extends to 30.4ha in total, as potential foraging habitat that could offset the permanent habitat loss (31.95ha) as a result of the proposal.

Response:

The Conservation and Habitat Management Plan (CHMP) addresses this issue comprehensively. The development of the proposed CGEP provides habitat enhancement measures through the CHMP at alternative lands due to loss of potential foraging habitat within a 250 metre radius of each turbine, which totals an area of approximately 148.8ha.

The management prescriptions applied under the CHMP are based upon those used by the National Parks and Wildlife Service (NPWS) in the NPWS Farm Plan Scheme. These measures will benefit Hen Harrier in both the short and long term, and will ensure the supply of a substantial area of suitable foraging habitat for the local Hen Harrier population, over and above that potentially lost as a result of the proposed CGEP development.

The overall aim of the CHMP is to provide a net gain of foraging habitat for Hen Harrier for the lifetime of the proposed CGEP. The management prescriptions proposed are likely to enhance the existing biodiversity of the site for prey items and wildlife in general, which is an extremely important component of the CHMP if it is to be successful. The Plan will also promote a mosaic of vegetation types, which are optimal foraging habitat, and are likely to improve foraging success rates and, consequently, breeding success rates for the local Hen Harrier population, which is the ultimate target of the CHMP.



It is concluded that the proposed Conservation and Habitat Management Plan will provide full and effective additional foraging habitat for Hen Harrier, as part of the proposed development of the CGEP.

Ecology – Management Areas

Concerns that the proposal to offset the loss of habitat as a result of a windfarm through the creation of habitat and/or management of species elsewhere is not in accordance with recommended best practise (SNH 2018).

- Consider that the proposed Management Areas will offer significant additional foraging habitat above what currently exists.
- Concerns that the proposed Management sites are largely located outside the core foraging area i.e., 2km of occupied nesting territories, with one Management Area potentially being utilised or having been utilised as a nest site already.

Response:

The CHMP has been substantially reviewed to ensure that opportunities for Hen Harrier, and many other species of conservation concern (including the Red-listed Barn Owl, Kestrel and Meadow Pipit) are maximised. Areas of low biodiversity value, particularly agricultural grasslands, are identified for management.

The management measures, which go beyond the measures for Hen Harrier in the NPWS Farm Plan Scheme and the Green, Low-carbon Agri-environment Scheme (GLAS) will ensure maximum benefits to a range of species. Furthermore, the extent of the area proposed for management under the CHMP goes substantially beyond that where potential Hen Harrier foraging habitat may be impacted by the proposed CGEP.

This revised CHMP proposes six parcels of habitat to be managed for Hen Harrier for the lifetime of the proposed CGEP development. This CHMP has been very substantially revised, with only two Management Areas in this CHMP having been retained from the previous CHMP (dated December 2020). All managed habitats proposed within this document are currently sub-optimal for Hen Harrier foraging. This document seeks to provide confirmation on management prescriptions to provide optimal foraging habitats that goes beyond the 148.8 ha of habitat calculated as potentially lost to foraging Hen Harriers within the vicinity of the proposed CGEP, and provides a total of 160.75 ha of optimal, managed habitats for foraging Hen Harrier. This represents a Biodiversity Net Gain for Hen Harrier of 11.95ha, that will be managed for the lifetime of the proposed CGEP project.

All the identified Management Area in the CHMP is within the foraging range for Hen Harrier as an alternative to the areas where foraging habitat may be impacted. The majority of Hen Harriers forage within 5km of the nest (Arroyo *et al.*, 2006³), therefore all management areas selected are within 5km of recent or historic (since 2014) confirmed Hen Harrier nests.

³ Arroyo, B., Leckie, F. & Redpath, S. 2006. Habitat Use and Range Management on Priority Areas for Hen Harriers: Report to Scottish Natural Heritage. Banchory, Aberdeenshire: Centre for Ecology and Hydrology.



Ecology – Hen Harrier & Bats

Significant concerns in relation to the potential impacts and effects that the proposed development will have on populations of the hen harrier and bats. The Ecologist is of the opinion that a significant redesign would be required to offset the significant impact on Hen Harrier and Bats. Issues and concerns raised within this submission surrounding the Report of the Heritage Officer are outlined below and addressed individually for the purposes of clarity.

Response:

The CHMP is designed to minimise any possible impacts arising to Hen Harrier from the proposed CGEP project. The area of land that will be managed to benefit foraging Hen Harriers, and a range of other species of conservation concern, exceeds the land that may possibly be impacted by the project development. This represents a net gain for biodiversity arising from the CGEP project.

The CHMP (Including revisions) has been prepared for the benefit of wildlife, but specifically Hen Harrier. Similar CHMPs have been prepared for sites in counties Clare, Cork, Leitrim, Monaghan, Tipperary, Kerry and Limerick. It is important to note that in the case of these CHMPs, at the time when they were devised, they were accepted by the statutory authorities, consent was given for each wind farm, the wind farms were constructed and they are now being monitored for Hen Harrier breeding and foraging success. Successful examples of such CMPS management prescriptions/plans that were developed for wind farms proximal to CGEP (list not exhaustive):

- Ballyhouras Wind Farm, County Cork
- Knockawarriga Wind Farm, County Limerick
- Knockacummer Wind Farm, County Cork

The rationale of the CHMP is based on measures and prescription for management for the National Parks and Wildlife Service (NPWS) Farm Plan Scheme (FPS). These NPWS FPS measures have been developed through research on Hen Harrier in Ireland, and recording what designed and managed habitats for Hen Harrier have been seen to be readily accepted/used by Hen Harrier at various locations throughout Ireland. The Hen Harrier is afforded protection under Annex I of the EU Birds Directive and is known to occupy the environs of the CGEP site. The other species which will benefit from this CHMP will include Sparrowhawk, Kestrel, Barn Owl, Irish Hare and a range of other small mammal and bird species which form prey items for Hen Harrier.

In relation to bats, measures in the CHMP to protect and manage hedgerows and woody habitats (woodland and scrub) will benefit bats (amongst many other species of wildlife). In addition, detailed mitigation measures, following Best Practice guidance (SNH, 2021)⁴, have been proposed as an integral part of the proposed CGEP project. Note that the guidance for bats survey assessment and mitigation was updated in 2021 (the previous version from 2019 was used in the original application). Nevertheless, the proposed survey assessment and mitigation measures proposed for CGEP meet the requirements of the updated Best Practice guidance.

The proposed mitigation measures includes adoption of Best Practice measures, such as reduced use of lighting in and around the construction and operation site, including no lighting remaining on at night. Project-specific mitigation measures include the provision of bat buffers around the base of the turbines, where trees are removed within 50m of the rotor blade to reduce impacts associated with collision or barotrauma.

⁴ <https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation>



The EIAR also details the use of curtailment at turbines where specific risks to have been identified. Finally, monitoring is proposed to determine the efficacy of the mitigation measures proposed. The mitigation measures described above are all based upon best practice guidance (SNH, 2021) which notes that the proposed mitigation measures “have either been previously described in guidance relating to windfarms and bats, or have direct evidence supporting their efficacy at reducing impacts”.

Landscape and Visual Impact – Additional Local Views

In respect of additional viewpoints for assessment, the Cork County Council Planner’s report states;

Receptors 83, 84 and 85: The nearest viewpoint provided in the EIAR is viewpoint 12, however this viewpoint is located downhill to the south of the dwellings and is obscured by tree planting. These receptors have turbines 20, 22 and 23 to the north, turbine 19 to the west and turbine 18 to the south west. There are concerns about the collective visual impact of this cluster of turbines on these receptors. To enable a full assessment of the visual impact on these receptors, additional visuals should be requested from the applicant with the viewpoint located close to these dwellings.

Receptor 9: The nearest viewpoint is taken outside of receptor 8, however this is located downhill of receptor 9. Turbine 2 and Turbine 4 are located to the south of this property with Turbine 7 to the east and Turbine 8 to the north east. There are concerns about the collective visual impact of this cluster of turbines on this receptor. To enable a full assessment of the visual impact on this receptor, additional visuals should be requested from the applicant with the viewpoint located at the roadside boundary of receptor 9.

Receptors 36 & 37 were identified with respect to capture and assessment of an additional view and because these receptors were also picked up by An Bord Pleanála, the assessment of the relevant additional view (RFI2) is provided in response to the ABP submission in section 4.2.2 above. New views were also captured at the locations identified by Cork County Council and are assessed below. Receptors 83, 84 and 85 are represented by viewpoint RFI1 and receptor 9 is represented by RFI3.

Viewshed Reference Point		Direction of View	Distance to nearest turbine:	Number of turbine nacelles visible:
RFI1	Local Road at Tooreen South	SE	0.9km	2
Representative of:	<ul style="list-style-type: none"> Local Community Views 			
Receptor Sensitivity	Medium			
Existing View	<p>This viewpoint is very close to VP18 from the original assessment and includes the same dwelling in the foreground. Although there was a marginally greater degree of screening at the original VP18 this did not affect the assessment and it should also be noted that the original assessment stated; “The wireframe image indicates that several other turbines may also be intermittently visible along this section of road, but seldom at the same time and with a similar context to this representative view”. To the north of the foreground dwelling is a coniferous treeline that partially screens a denser conifer plantation beyond. To the south is a nearby forested hilltop. To reiterate the point from the original VP18 description, both the dwelling and the road take in vast panoramic views to the west, which is the reason for this scenic route designation.</p>			



Viewshed Reference Point		Direction of View	Distance to nearest turbine:	Number of turbine nacelles visible:
Visual Impact of Coom Wind Farm	Only the partial blade sets and hubs of the two nearest turbines – one to the northeast and the other to the south – will be visible from here due to screening by predominantly terrain but also vegetation. Although relatively close, these turbines will not appear overbearing in terms of scale and are located well away from the main direction of visual amenity to the west. For the same reasons as described above for the original VP18, the magnitude of visual impact is deemed to be Medium-low.			
Summary	Based on the assessment criteria and matrices outlined in section 14.1.1 of the project LVIA, the significance of visual impact is summarised below.			
	Visual Receptor Sensitivity	Visual Impact Magnitude	Significance of Visual Impact	
	Medium	Medium low	Moderate-slight	

Viewshed Reference Point		Direction of View	Distance to nearest turbine:	Number of turbine nacelles visible:
RFI3a	Local laneway at Toorgarrif	NW	1km	2
Representative of:	<ul style="list-style-type: none"> Local Community Views 			
Receptor Sensitivity	Medium-low			
Existing View	This is a heavily enclosed view from a local access road leading to a couple of private dwellings that lie near to the forested south facing slopes of the Nagle range. The view is more open in a northerly direction where a foreground of scrub gives way to a commercial conifer plantation on the crested ridge above.			
Visual Impact of Coom Wind Farm	Due to a combination of both terrain and vegetation screening, there will only be a partial view of two turbine blade sets above the forested ridge to the north. These turbine components present at a modest scale in a section of the view which does not relate to scenic amenity, particularly compared to broad downhill views in the opposite direction that are afforded from some locations in this area. For the reasons outlined above, the magnitude of visual impact is deemed to be Low.			
Summary	Based on the assessment criteria and matrices outlined in section 14.1.1 of the project LVIA, the significance of visual impact is summarised below.			
	Visual Receptor Sensitivity	Visual Impact Magnitude	Significance of Visual Impact	
	Medium-low	Low	Slight	



Viewshed Reference Point		Direction of View	Distance to nearest turbine:	Number of turbine nacelles visible:
RFI3b	Local Road at Moneygorm	W	1km	5
Representative of:	<ul style="list-style-type: none"> Local Community Views 			
Receptor Sensitivity	Medium-low			
Existing View	This viewpoint is close to VP12 from the original LVIA, being slightly uphill from it on the same section of road. There are two windows of visibility afforded from here on either side of a mature hedgerow that splits the view to the northwest. Downhill to the west is a contained view along the road corridor, which is flanked by roadside scrub and backed by hedgerow vegetation from a pastoral setting. Uphill to the north is a forested hilltop that rises just beyond a foreground field of improved grassland.			
Visual Impact of Coom Wind Farm	The partial blade sets of two of the proposed turbines will be visible in relatively close proximity on close alignment with the road for those travelling westward. A further four partial blade sets will be visible above the forested hilltop to the north and northwest in a distinctly different context. Whilst there is some ambiguity associated with the partial view of turbines in different aspects/ contexts of this vista, none are overbearing in terms of scale and they do not appear out of place in this productive rural setting. However, there will be a noticeable increase in the intensity and diversity of built development in this quiet upland area.			
	On balance of the factors outlined above the magnitude of visual impact is deemed to be Medium.			
Summary	Based on the assessment criteria and matrices outlined in section 14.1.1 of the project LVIA, the significance of visual impact is summarised below.			
	Visual Receptor Sensitivity	Visual Impact Magnitude	Significance of Visual Impact	
	Medium-low	Medium	Moderate-slight	

Rather than highlighting gaps in the visual impact assessment, the viewpoints assessed above tend to reinforce the visual impacts already assessed in relation to nearby viewpoints from the original LVIA. In that regard, they are a useful test, but it is also understandable why An Bord Pleanála chose not to seek these additional views.

Mapped locations and photomontages representing the above viewpoint locations can be found in Appendix 1.4 of Appendix 1 of this RFI response.

Issue 10: Battery Storage

CCC raises the concern that **the Applicant should be requested to provide a comprehensive fire safety assessment for the proposed battery energy storage system.**



Response:

In the extremely rare instance of a fire occurring within an individual container, the internal fire suppression technology will ensure the isolation of the fire within the fireproof container. Furthermore, in the unlikely event of a fire that needs to be extinguished, any water run-off or contaminates associated with fire retardant chemicals will be wholly contained within the specific container, and will be tankered off site by an authorised waste collector to a wastewater treatment plant. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007, will be employed to transport wastewater away from the site as described in Chapter 3 of the EIAR. The internal fire suppression technology is considered robust in nature and will act as the first response in the unlikely event of a fire incident.

A Fire Risk Control / Emergency Response Plan for the on-site BESS has been prepared which assesses the Battery Storage System in detail and outlines the fire safety protocol proposed for the proposed development.

The Emergency Response Plan will be provided to all local fire stations which details how to combat such incidents. Further information is provided in the Emergency Response Plan which accompanies this report.



3.3 Development Applications Unit

Issue 1: Ecology

The proposed wind-farm, access roads and electricity cable route are within the catchment of the Blackwater Ricer (Cork/Waterford) candidate Special Area of Conservation (cSAC no.2170)

Response:

The potential for significant effects from the CGEP project on the Blackwater River (Cork/Waterford) SAC could not be excluded at the screening stage and therefore a focused and detailed examination, analysis and evaluation was carried in the Natura Impact Statement of the implications of the project, alone and in combination with other plans and projects, on the integrity of the SAC in view of its conservation objectives. The NIS concluded that, once mitigation measures were included in the assessment, that there would be no likely significant effects arising from the proposed project on the SAC and no adverse effects on the integrity of the European site.

Issue 2: Ecology

A revised habitat management plan is required, otherwise a significant negative impact on hen harrier is likely.

Response:

A revised Conservation and Habitat Management Plan (CHMP) has been drafted and submitted as part of the RFI documentation. This CHMP is provided in Appendix 5 of the main RFI report.

Issue 3: Ecology

Water discharges in catchment of Munster Blackwater SAC: Further information is recommended on whether such a design is feasible for the drainage of access roads and other excavated areas.

Response:

As noted, the possible impacts of the CGEP project on the Qualifying Interests of the Blackwater River (Cork/Waterford) SAC were fully and comprehensively considered within the Natura Impact Statement (NIS). The NIS concluded that, once mitigation measures were included in the assessment, that there would be no likely significant effects arising from the proposed project on the SAC and no adverse effects on the integrity of the European site.

As described in Chapter 10 of the EIAR, By implementing the mitigation measures outlined in Section 10.7, there will be no deterioration in WFD classifications for the waterbodies described in Table 10-3 of the EIAR, which includes the Blackwater River (Cork/Waterford) SAC. The proposed development has no potential to cause a deterioration in status of any surface water or groundwater body and/or jeopardise the attainment of good surface water or groundwater status.



Issue 4: Ecology

The EIAR (8:217) records frequent use of off the proposed turbine locations by Leisler bats and indicates that a significant risk of mortality, due to collision and barotrauma, may exist before mitigation.

Response:

It is correct that there may be impact to Leisler's Bats arising from the proposed CGEP project in the absence of any mitigation measures. However, detailed mitigation measures, following Best Practice guidance (SNH, 2019), have been proposed as an integral part of the proposed CGEP project which has been further enforced by still being in compliance with the updated SNH 2021 guidance⁵ that has recently been published.

The proposed mitigation measures includes adoption of Best Practice measures, such as reduced use of lighting in and around the construction and operation site, including no lighting remaining on at night. Project-specific mitigation measures include the provision of bat buffers around the base of the turbines, where trees are removed within 50m of the rotor blade to reduce impacts associated with collision or barotrauma. The EIAR also details the use of curtailment at turbines where specific risks to Leisler's Bat have been identified. Finally, monitoring is proposed to determine the efficacy of the mitigation measures proposed. Using these best practice measures as outlined in Chapter 8 section, it is considered that impact of Lesler's Bats will be reduced to a level where population impacts do not arise for this species.

3.4 Inland Fisheries Ireland

Issue 1: Mitigation Measures

The effective employment of mitigation measures is essential to the long term protection of fisheries.

Response:

The Applicant fully agrees that the effective employment of the mitigation measures is essential to the long term protection of fisheries. Section 8.3.8 recognises that there is a lack of fisheries information for the Clyda River, to which the Monaperson River flows, but, as a tributary of the Blackwater, is known locally to support Atlantic salmon, brown trout, European eel, roach and dace of the Lamprey Habitat and Salmonid Habitat.

Each of the 13 no. streams and hydrological connections which surround the site are addressed individually in detail. The Habitats of the Salmonoid and Lamprey are assessed and the mitigation measures proposed have regard for and fully considered fisheries.

IFI have been consulted on site and as part of EIAR process. The site layout and design were carried out following rigorous assessment. Section 8.7.1.8.2 of the EIAR outlines the specific mitigation measures required to prevent any impact on fisheries during construction and Section 8.7.2 outlines specific mitigation measures to be deployed during the Operational Stage of the proposed development. The extensive list of proposed mitigation measures comprehensively ensure that there will be no significant impact on the fisheries

⁵ <https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation>



Issue 2: Lands Soils and Geology

Borrow Pit materials should be assessed in terms of their suitability in order to prevent surface water pollution.

Response:

The possible impact as a result of runoff from the borrow pit areas which could be silt laden and the risk of draining into nearby watercourses causing pollution has been comprehensively assessed in Chapter 10 of the EIAR in 10.4.2. This section outlines that during the construction period, the development has the potential to lead to impacts on hydrology and water quality unless appropriate mitigations are applied. These mitigation measures are stated within this section clearly and conclude that the effects of the increase in runoff has negligible magnitude on receiving waters because estimated increases in runoff are low compared to the flows of receiving waters.

Mitigation measures proposed to directly address the issue include:

- *The provision of stilling ponds to reduce concentration of suspended solids in the runoff from these areas.*
- *A minimum buffer of 50m from watercourses has been adopted, where possible, for all new site tracks that run parallel to a watercourse, with the existing tracks being widened in their existing locations.*
- *A water quality monitoring programme will be established to ensure that water quality is maintained throughout the construction phase.*

Updated design and construction guidelines for the borrow pits have been included in Section 1.3 of the accompanying RFI report.

Issue 3: Ecology

Employment of effective bio-security measures during the construction phase are an important mitigation against the spread of invasive species.

Response:

Correct; comprehensive mitigation measures to control the spread of invasive species have been detailed as an integral part of the proposed CGEP project. This includes deployment of Best Practice control and mitigation measures (e.g. Invasives.ie guidance⁶) to ensure compliance with Best Practice management and measures. Consultation with Inland Fisheries Ireland will continue throughout the construction and operation of the project to ensure all required measures are implemented.

⁶ <https://invasives.ie/>



Issue 4: Hydrology

Silt traps should be constructed at locations that will intercept run off and not constructed immediately adjacent to natural watercourses.

Response:

The silt traps are proposed at the outfalls from roadside swales to silting ponds. These silt traps will be regularly maintained throughout the construction phase of the proposed development. Both silt traps and check dams will be used to catch the sediments within the swales. The unsettled particles will run through a settlement pond and discharged diffusely. Silt traps will be provided in swales which will consist of geotextile staked across the swale at regular intervals. The geotextile will be weighed down on the upstream side with clean filter stone to provide further filtration and stability to the silt trap, as shown in Figure 4 to Figure 6 in the SWMP.

Silt traps will be also provided at outfalls from roadside swales to settlement ponds as stated in Section 10.7.1. of the EIAR.

An Environmental Clerk of Works (ECOW) will be appointed by the developer to ensure the effective operation and maintenance of drainage and other mitigation measures during the construction process. The operations management of the subject development will include regular monitoring of the drainage system and maintenance as required. The developer will ensure that erosion control, namely silt-traps, silt fencing, swales, stilling ponds and diffuse outflow areas are regularly maintained during the construction phase.

For further information on the placement of silt traps please refer to Section 2.2 of the main RFI response report.

Issue 5: Watercourse Crossing

There should be no interference or alterations to watercourses without prior consultation with IFI. Any new structure must ensure the free passage of migratory fish species.

Response:

Contained within Chapter 10 of the EIAR, section 10.2.5 details consultations carried out on site with a representative from Inland Fisheries Ireland (IFI) regarding hydrology and water quality. During this on site consultation, inspections took place of water crossing points, both on the public road and within the development site associated with the proposed grid connection cable route and the proposed internal access road network. Crossing points were inspected, and preferred design solutions and construction methodologies were agreed for both the examined crossing points and generally throughout the site. An agreement was reached with the IFI that a new watercourse crossing structure would comprise either a bottomless culvert or boxed culvert, both of which will ensure that there will be no significant interferences with watercourses. There shall be no interference or alterations to watercourses without prior consultation with IFI. Any new structure will ensure the free passage of migratory fish species.



3.5 Irish Aviation Authority (IAA)

Issue 1: Aviation (Aerodrome Department)

Agree an aeronautical obstacle warning light scheme for the wind farm development.

Response:

An aeronautical obstacle warning light scheme for the wind farm development will be agreed with IAA prior to construction.

Issue 2: Aviation (Aerodrome Department)

Provide as constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location.

Response:

As Constructed Coordinates will be provided to the Irish Aviation Authority in WGS84 format (degrees, minutes and seconds) along with ground and tip height elevations of each wind turbine, following construction of the proposed development.

Issue 3: Aviation (Aerodrome Department)

Notify the Authority of the intention to commence crane operations with at least 30 days prior notification of their erection.

Response:

The developer will notify the Authority of the intention to commence crane operations with at least 30 days prior notification of their erection.

Issue 4: Aviation (Engineering Department)

The Wind Farm is within Cork ILS 16 (LOC 16) coverage area and might have an impact on ILS 16 flight check profiles. FCSL are required to complete a flight checker assessment.

Response:

Refer to item 6(a) of the Main RFI Report for information regarding Cork ILS 16.



3.6 TII

Issue 1: Cable Route

Limited details provided in relation to M8 crossing. TII recommends that the planning authority should be satisfied that this matter is addressed satisfactorily before any decision is made.

Response:

The M8 Motorway is appropriately addressed within Chapter 13 of the EIAR and within Section 7c of the main RFI Response Report

A detailed assessment of the proposed HDD path under the M8 Motorway is examined within Section 7c of the RFI Report. Detailed drawings of the HDD should be read in conjunction with the HDD description and methodology. The drawings can be viewed in Appendix 4 of the main RFI report.

A detailed assessment of the M8 and its contribution and relevance in terms of the TDR is assessed and examined within this Chapter. The widening of junction 14 of the M8 and other verges is also examined in the temporary accommodation works of section 13.4.5.

With regard to the cable construction affecting services, the applicant will agree in writing with the Planning Authority as to the location of trenches on roads to ensure that no damage will be caused to storm water drains, water mains or any other services and that the exact location of cables within the road shall be agreed in writing prior to construction with the Planning Authority.

The residual and cumulative effects regarding the proposed development cable route and grid connection with the M8 motorway have been concluded to have no significant impact or potential effect.



4. COMMUNITY GROUPS

The submissions and observations lodged by the 2 no. community Groups are outlined below. The main elements of these submissions relate to those raised by the other third party submissions. There are also other community Groups which made submissions relating to the proposed development. These include Burnfort National School Parents Association and Mourneabbey Community Group. These community Groups are not included in this section as their concerns are directly addressed in Section 5 of this report. Issues raised within these submissions include topics such as: Policy, Ecology, Consultation, Mitigation Measures, Geology, Hydrology, EIAR, Visual Impact, Noise, Vibration, Archaeology & Cultural Heritage, Human Health and Battery Storage. Many of these issues are also mentioned within the core issues.

4.1 Nagle View Turbine Aware

Issue 1: Consultation

Aarhus convention sets out requirement for public consultation. Code of Practice for Wind Energy Development in Ireland Guidelines for Community Engagement sets out requirement for adequate consultation. This has "failed abysmally". There is a lack of consultation in rural communities, very much business as usual. NVTA Consultation record sheet notes that some houses were consulted within 2km, not all. no houses consulted with outside 2km. points out that broadband is not reliable in rural communities and that the developer has overly relied on digital communication.

Response:

Compliance with the Aarhus Convention requires that the structure, presentation and the nontechnical summary of the EIAR, as well as the arrangements for public access, all facilitate the dissemination of the information contained in the EIAR.

Chapter 5 of the EIAR 'Scoping, Consultation & Key Issues detail the number of community consultation events and number of public meetings that took place during the design process. In addition to this there were newsletter drops and door to door consultation. During the Covid-19 pandemic a virtual exhibition was launched to allow further consultation with the community.

Public consultation was facilitated over a 2-year period by having a dedicated Community Liaison Officer on the ground by way of door to door house calls and leaflet and letter drop to ensure locals were made aware of the details of the project and processes involved. A dedicated phone line and email address were provided with circulated materials so members of the public could directly contact the project team. This process was commenced as early as possible in order to inform the design of the project and to inform the EIA process. A dedicated website was also set up to allow for further open communication between the applicant and community throughout the iterative design process and run-up to the application submission.

The Applicant ensured that Public Consultation was extensively undertaken and offered many avenues for engagement. The wide range of opportunities available for the public to communicate their concerns with the project to the Development team. Key local considerations were taken into account in designing the project and information relating to this is clearly set out in Section 5.4 and 5.5 of the EIAR.



Please refer to Section 3.1 issue 2 of this report and section 5.4 and 5.5 of the EIAR for further information regarding the public consultation process.

Issue 2: EIAR

The site was not adequately assessed and that a four-day site walk was not sufficient to investigate 443.3 ha of the area of the proposed development. There are a number of other rivers and streams, and springs, within the site which have not be assessed or addressed in the EIAR.

Response:

The proposed infrastructure construction area covers a relatively small percentage of the total area of the proposed development site. Therefore, four full days were sufficient for site walkovers to identify hydrological features relevant to the proposed development and design of same.

It should be noted that the ecology team and also geotechnical team carried out detailed site walkovers and inspections separately. Findings from visits were shared between project teams during the EIAR project. NVRTA stated that a number of streams and rivers were not assessed. This is not the case. All watercourses in proximity to the footprint of the proposed project infrastructure were inspected. The potential impact on mapped blue line rivers as identified on OPW mapping has been mitigated by avoidance through design where a 50m buffer zone was applied. The submission appears to refer to manmade forestry drains and small road or agricultural drains as streams and rivers throughout the submission. In such cases where small drains are located in proximity to proposed wind farm infrastructure, details have been provided to address the culverting and re-routing of same in accordance with the proposed drainage design for the project.

As described in Section 10.6 of the EIAR, it is not expected that overland flows will be obstructed to any great extent by the drainage layout, however, where required, interceptor drains will collect overland flows on the upslope side of the access tracks and hardstanding areas. The overland flow will then discharge diffusely on the downslope side over vegetated areas within the site boundary.

Existing forest track drainage is extensive throughout the site and shall be maintained wherever possible and upgraded as required to meet the requirements of the proposed CGEP drainage design. SuDS design approach shall ensure that existing drainage patterns shall be maintained throughout the site.

Further details are provided in the Surface Water Management Plan (SWMP) submitted with the EIAR. Please see Appendix 1 of the CEMP.

Issue 3: Policy

Cork County Development shows proposed project is unsuitable for site as the area is located within close proximity to protected areas such as SPA's, SAC's, NHA's.

Response:

The Natura Impact Statement comprehensively assessed all relevant SPA's and SAC's.



It is also important to note that the site is designated in the Cork County Development Plan as an area 'Open to Consideration' for wind farm development. Chapter 8 'Biodiversity' of the EIAR also addressed potential impacts on any relevant NHA's and Chapter 10 'Hydrology & Water Quality' comprehensively addresses the potential impact of the development on water quality.

Issue 4: Ecology

There is concerns that the site has not been adequately assessed. The proposed project would contravene with Convention on Biological Diversity; As the EIAR does not adhere to promotion of the protection of eco systems. This is a result of limited ecological surveying being carried out, an incomplete Natura Impact Statement.

Response:

A full suite of ecological surveys has been undertaken, following Best Practice guidance, for the assessment of impacts arising from onshore wind farm developments (e.g. SNH, 2017; SNH, 2019). Where potential impacts have been identified, specific, bespoke mitigation measures have been developed to address such impacts.

The Natura Impact Statement, which has been revised and updated, is a complete assessment of possible impacts to Natura 2000 sites arising from the proposed CGEP within an identified Zone of Influence around the project area. Best Practice guidance (e.g. DoEHLG, 2010; OPR, 2021), as well as recent EU Case Law, has been used to ensure that the NIS meets all requirements of national and EU legislation.

The query refer to the NIS, compensation cannot be considered

Issue 5: Visual Impact

The EIAR is relatively silent on the guidance within the wind energy guidelines relating to visual impacts even though the maps prepared show the sites close proximity to an area of High Landscape Value.

Response:

The EIAR directly addresses the Guidelines for Wind Farms according to the DoEHLG Wind Energy Development Guidelines 2006. Landscape and Visual Policy Context and Designations are addressed in section 15.3.4 of Chapter 15 in the EIAR. This outlines the relevant policies which complement the guidelines set out nationally and further highlights the ways in which the proposed development complies with these guidelines and policies. The Revised Draft Wind Energy Guidelines (2019) were also considered in this section of the EIAR.

Site is close to an area identified as 'Normally Discouraged' for wind farms

The fact that the site is contained close to an area identified as both a High Value Landscape (HVL), which also corresponds with the area identified as 'Not Normally Permissible' (NNP) for wind energy development was a key consideration in the iterative design process for the proposed wind farm from the beginning. The original turbine layout included turbines right up to the boundary of the HVL / NNP landscape area (the ridge of the Nagles range).



However, given that the obvious protection being sought by the ridgeline boundary between the more and less sensitive designations and the integrity of the Blackwater Valley, Macro Works, as landscape and visual consultant recommended moving the Glannasack turbine cluster further downhill to the south and away from the ridgeline. To determine how far the turbines needed to move in order to avoid potentially significant impacts, Reverse ZTV maps were produced from the designated scenic routes contained within the Blackwater Valley as well as early stage wireframe montages from select locations. Whilst the final design does result in some minor visibility of turbines above the Nagles ridge from within the Blackwater Valley, such views do not occur from highly sensitive receptors or designated scenic routes.

The approach to protecting the Blackwater landscape and visual designations was discussed with Cork County Council Planners who concurred with the design process and the fact that the ridgetop boundary between higher and lower sensitivity landscapes did not necessarily protect the Blackwater if turbines were sited right up to it. This design development / consultation process is reflected in the Cork County Council Planner's Report where it is noted on page 65 that;

"... earlier iterations of the design of the wind farm included turbines on the northern ridges would have been visible from the Blackwater Valley, these were removed following an assessment including preplanning discussions with Cork County Council of their unacceptable visual impact on that High Value Landscape and scenic routes. The submitted visuals show that the proposed siting and design of the development has successfully addressed this issue with regards to the Blackwater Valley".

Visual quality of the landscape and the degree to which impacts are highly visible over wider areas.

One of the first points raised in the submission under this heading is that Figure 15.7 is not accurate in terms of the placement of the arrow indicating the site location with the suggestion being that it is attempting to highlight a greater separation distance between the wind farm and the High Value Landscape zoning. Firstly, it should be noted that this very broad scale mapping (i.e., the entire county with a large arrow that spans most of the county on half of an A4 page) is contained within the baseline section of the report and does not form part of the assessment or is in any way relied on as a basis for the assessment. It is a high level and approximate indication of the site location relative to HVL zoning. In this regard it correctly shows the site just to the south of the Blackwater HVL zoning. It is a single arrow covering both parts of the site and thus it depicts an approximate epicenter for the development. For a more accurate smaller scale map showing the proposed turbines relative to the Landscape Character Areas (from which the HVL zoning is derived) refer to Figure 15.5 of the EIAR. Any variation in the identification of the site relative to planning maps is minor and immaterial to the assessment contained in Chapter 15.

The submission goes on to reiterate the close proximity of certain turbines to the HVL / NNP boundary that traces the Nagles ridge to the north, however, it is not just the lateral displacement of the turbines from that ridge that should be considered. As stated in the response, the turbines were moved southwards away from the ridge and downhill to the south using spatial data to determine the appropriate extent. This process was undertaken in consultation with Cork County Council who have agreed (in their Planner's report) that their own landscape designations have been satisfactorily protected by the design brought to planning. This is considered to override what was stated by previous planners in relation to a different scheme under different planning designations and Wind Energy Guidance nearly two decades ago.

The NVTA submission rightfully notes that the Wind Energy Guidelines 2006 state that; *"Where possible, the perception from more sensitive viewpoints, of turbines blade sets cutting against the horizon should be avoided"*. An excerpt from VP4 within the Blackwater Valley is then included illustrating three blade sets cutting against the Nagles ridgeline.



Firstly, it should be noted that VP4 is not from a designated scenic route and has only been assigned a 'Medium' sensitivity in the visual impact assessment. Furthermore, it is over 7km from the nearest of the proposed turbines and the potentially irritating effects of turbine blade sets rotating on a skyline ridge tend to diminish with viewing distance. Finally, the design rationale with respect to limiting effects on the Blackwater (in consultation with Cork County Council) was not to eliminate visibility, but to restrict it from designated scenic routes and from other areas insofar as possible. From experience, when balancing the design guidance from the WEDG (2006), against local landscape planning objectives, it is often necessary to use a compromised design solution. In this instance the WEDG design guidance would favour a more fully revealed ridgetop array with stronger aesthetic legibility than a partially revealed one.

However, the HVL zoning and the nature of views from the Blackwater Valley (relatively distant from the opposite side of the river) suggested a compromised solution of minimizing the visual exposure of turbines, particularly from scenic designations.

The NVTA submission takes issue with the fact that the project LVIA considers guidance from two of the landscape Types identified in the WEDG 2006 rather than just using one ('Hilly and Flat Farmland' as well as 'Transitional Marginal' land). This is a case of misinterpreting the sentiment of the relevant text. As is commonly the case, the site and central study area traverse landscapes of different character and best practice (confirmed by the author of the Guidelines – MosArt Ltd) is to apply the guidance such that "the entire visual unit is taken into consideration", which might involve two or more landscape types. In the hybrid landscape type example used in the WEDG and cited in the submission it states; "*It will be necessary to decide whether the moorland ridge or the farmland might more strongly influence the approach*". However, this excerpt refers to applying a 'design approach' for a particular wind farm and not that it is imperative to select one particular landscape type from the WEDG against which a development should be assessed. In essence the guidelines are saying that the most relevant landscape aspects of the particular site and its surrounds should determine the design approach used and this might involve the influence of more than one landscape type.

The NVTA submission, having incorrectly assumed the need to assign a single landscape type from the WEDG 2006, makes the argument for this being the 'Hilly and Flat Farmland' type as this is comparatively restrictive in terms of the extent of wind energy development and the height of turbines. The submission states "*it is clear that the vast majority of the lands surrounding the site and the area in particular around T2 to T15, as well as the entire area to the south of the site, conform to the designation hilly and flat farmland and not transitional marginal land*". There is no disputing that the receiving landscape is strongly influenced by "*hilly and Flat Farmland*", but the fact that the entire development is actually contained on forested slopes and hilltops also indicates a strong influence from the 'Transitional Marginal' landscape type as well. This only serves to highlight why the guidance for both landscape types should be considered in the design and assessment of the wind farm. Furthermore, it is necessary to consider the scale and nature of that hilly and flat farmland and transitional marginal land as this can vary widely throughout the country. In this instance both landscape types are characterised by broad scale landform and land uses patterns that can assimilate a larger scale of development than might be appropriate in a rural drumlin landscape for example (i.e., also subject of the Hilly and Flat Farmland landscape type).

The NVTA submission goes on to illustrate the ways in which the proposed development does not conform rigidly with the design guidance for 'hilly and flat farmland'. Notwithstanding that it is inappropriate to consider just the guidance relating to the landscape type, it is important to consider that the WEDG is not written in a prescriptive manner. Instead, it suggests appropriate design response in certain instances, often providing options depending on whether a site is located on a ridge or lower slopes etc. The NVTA submission has attempted to apply flexible guidance in an overly rigid manner and to a single landscape type, which does not wholly reflect the receiving landscape type.



Cork County Council also considered the WEDG 2006 in their appraisal of the project and stated the following on page 63 of their submission;

“The draft guidelines detail six character types and provide guidance on appropriate design and siting for such landscapes. Chapter 15 of the EIAR determines that the proposed turbines are located on Transitional Marginal Landscapes with the surrounding landscape especially to the south and southwest falling within the landscape category of Hill and Flat farmland. The Planning Authority concur with this determination”.

Whilst Cork County Council have a specific issue with the stacking of four turbines in perspective from VP6 on a designated scenic route, because this conflicts with general WEDG aesthetic guidance they have generally noted on page 65 of their submission;

“All viewpoints submitted have been assessed in the context of the guidelines and while due to the nature of a wind farm development there is an impact on the landscape with the exception of the above (VP6 issue), the irregular spacing, clustering, location in relation to the topography of the land and location largely confined to a single landscape type are largely in accordance with the guidance set out within the Draft Revised Wind Energy Guidelines.”

Residential amenity particularly in respect of visual impact

The NVTA submission begins this section by refuting the number of dwellings within particular distance bands as identified in the EIAR. Whilst specific dwelling numbers are relevant to other environmental factors (i.e. noise) this does not relate to figures include in Chapter 15, which instead undertakes representative rather than property specific visual assessment, the perceived numerical discrepancies will not be addressed herein. In terms of appropriate setback distances from nearest dwellings, the submission suggests that other factors beyond the 4X tip height setback distance from the draft revised WEDG 2019 should also be undertaken. However, the justification for that further consideration actually cites a section of the guidance that clearly diverges from the issue of setback where it states:

“It is also important to note that determining setback is but one component requiring consideration in determining the appropriateness of a particular project to a given area that must also take account of wider considerations outlined elsewhere in the Guidelines and the contents of this Chapter.”

The submission then returns once again to the guidance for “Hilly and Flat Farmland” landscape type (already addressed at 4.4.3 above), which does not specifically address residential setback and certainly does not contravene the WEDG’s own residential setback guidance. It should be reiterated that at a separation distance of 755m from the nearest dwelling, the proposed wind farm exceeds the required 4X setback for 169m tall turbines (676m) by a generous distance.

The NVTA submission slightly misconstrues a general statement from Chapter 15 where it states that “open views represented in the local community category are not necessarily typical views from the central study area because they are selected as worst case views in terms of visual exposure”. This statement is intended to highlight that views from many parts of the central study area are screened by vegetation (see RSA results Section 15.4.3 of the EIAR), but these are typically not used in the assessment, which seeks open (unscreened) views insofar as possible. The submission appears to have interpreted this statement as relating wholly to viewing distance and highlights several instances where closer views of the development could have been obtained.



Whilst it is certainly in the interest of a robust LVIA to have a selection of close views for assessment and there are seven between 600m and 1000m, it is also important to note that this is a representative assessment that does not rely on viewpoints at every possible location. It should also be noted that Cork County Council identified several residential receptors / clusters where they felt additional viewpoint assessment were required for a more robust LVIA. An Bord Pleanála in their own RFI items agreed with the need for one of these locations and as a part of this overall RFI response, all have been captured and assessed herein (see section 3.2 of this Third Party Response Report, section 4.2 of the RFI Response Report and VP location map below).

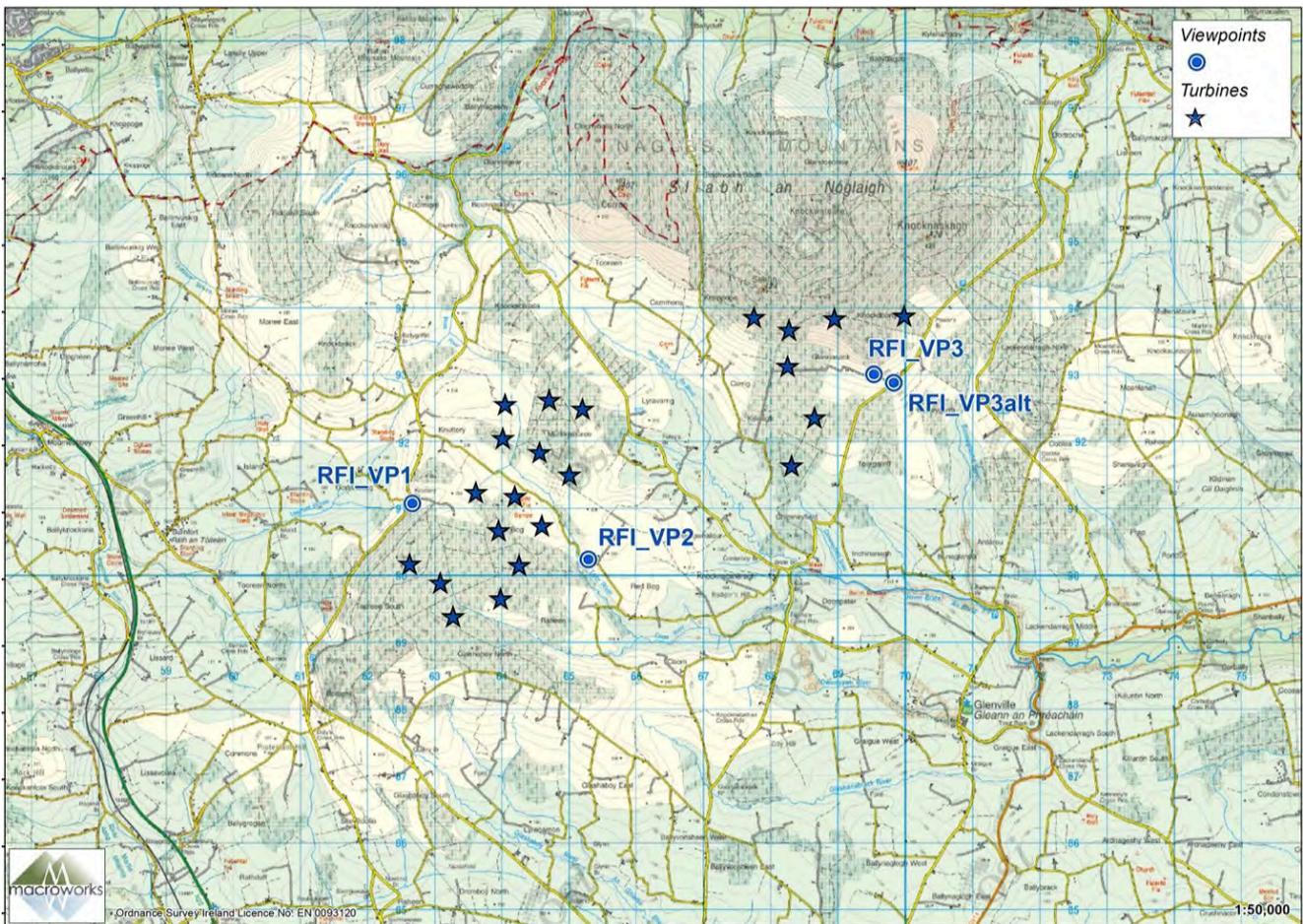


Figure 4-1: RFI Viewpoint locations

The NVTA submission highlights that many of the turbines are located at a higher level than the surrounding dwellings and provides a comparative table of turbine blade tip heights vs dwelling floor levels with the concluding comment that “in some cases the tip of the blade is in excess of 300m above the floor level of neighbouring houses”.

Whilst these elevational figures may be factually correct, they do not represent the manner in which LVIA is undertaken and lack spatial context such as the distance and landscape context that separates the turbine from the receptor. These are all things that are accounted for in the spatially current photomontages, which are used for the visual impact assessment. Notwithstanding, it is accepted that in some instances an uphill view of a relatively close turbine can make it feel more overbearing than a view of a similar distance turbine at the same ground level or lower. However, there will always be an appreciation that relative ground level is contributing to the effect and it is not the equivalent of a 300m tall turbine.



Such effects also dissipate quickly with viewing distance and greater appreciation of the intervening landscape context. Again, the photomontages and visual impact assessment account for such effects

Issue 6A: Noise

The EIAR an assessment was made against draft 2019 guidelines, 17 of 18 properties checked failed to meet guidelines. The application is heavily reliant on mitigation measures in order to be compliant with acceptable noise limits.

Response:

During the construction phase of the project there will be some effect on nearby noise sensitive properties due to noise emissions from site traffic and other activities. However, given that the construction phase of the development is temporary in nature and the distances between the main construction works and nearby noise sensitive properties, it is expected that the various noise sources will not be excessively intrusive. The predicted impact is assessed as being a temporary slight negative impact and therefore no adverse health impacts are predicted. The best practice noise assessment techniques were applied as well as the limits outlined in the 2006 WEDG 's.

The predicted noise levels from onsite activity from the proposed development are generally below the noise limits in BS 5228-1. Nonetheless, several mitigation measures will be employed to minimise any potential impacts from the proposed development.

The noise impact for construction works traffic will be mitigated by generally restricting movements along access routes to the standard working hours and exclude Sundays.

Other mitigation measures during the operational phase of the proposed development are individually discussed in detail throughout Chapter 7 of the EIAR. The issue in the quantity and not quality of mitigations is not relevant. Each measure is comprehensive and effective in reducing noise emissions. The quantity of mitigation measures is similar to that of other wind farm developments and not an uncommon feature in the EIA of such developments.

With mitigation measures, operational wind farm noise levels meet the derived noise limits at all noise sensitive locations surrounding the wind farm which is not considered to be a significant impact.

Issue 6B: Noise

The NVTa submission includes questions regarding some of the technicalities of the Noise Impact Assessment (NIA), which are detailed within a report by Mr Dick Bowdler (referred to here as the Bowdler Report)

Use of Wind Shields

The Bowdler Report notes that the exact type of wind shield used for each of the baseline monitoring locations is not detailed within the NIA.

Details of the wind shields are provided in Appendix 7.1 of the EIAR where the specification of the monitoring equipment are set out in detail including the uses of wind shields. Having examined the specification of the wind shield units we can confirm that they meet the requirements of the IOA Good Practice Guidelines 2013.



Measurement of Wind Speed

The Bowdler Report notes that the location of the LiDAR is not detailed and questions whether the use of only one wind measurement location is appropriate. Detail of how to measure wind speed and direction is given in section 2.6 of the IOA GPG, which states:

“On sites with multiple turbines, the wind monitoring location should be selected to be reasonably representative of the range of wind speeds considered to be experienced at the wind farm site.”

The LiDAR was installed at approximate grid coordinates (52.05985N; -8.53018W), which we would consider to be reasonably representative of the proposed development site. We would note that the GPG does not prescribe the number of monitoring positions required, nor suggest that multiple locations should be assessed.

Use of WEDG 2006 Noise limits

The Bowdler Report questions the method used of setting noise limits in accordance with the WEDG 2006. It states, at 6.5, *“Apart from at some very high wind speeds at some locations, none of the day time noise limits in the table depend on background noise level. There must be something wrong with an assessment that starts off relying on the background noise level – to the extent it is measured at 18 locations – and ends up by not using any of the background noise levels in the assessment other than some which are irrelevant at high wind speeds.”*

This comment implies that setting of limits in accordance with WEDG is not working (because the background noise levels are not used to set limits at many wind speeds), however, we would argue that this is exactly what is intended by the WEDG, which states *“... in very quiet areas, **the use of a margin of 5dB(A) above background noise at nearby noise sensitive properties is not necessary to offer a reasonable degree of protection** and may unduly restrict wind energy developments which should be recognised as having wider national and global benefits. **Instead, in low noise environments where background noise is less than 30 dB(A), it is recommended that the daytime level of the LA90, 10min of the wind energy development noise be limited to an absolute level within the range of 35-40 dB(A).**”* Emphasis added

The principal of WEDG is to start from a position of setting a fixed noise limit (generally 45 dB(A)), however, a limit of background noise level + 5 dB can be used in higher noise environments. In this regards the WEDG states; *“In general, a lower fixed limit of 45 dB(A)10min or a maximum increase of 5dB(A) above background noise at nearby noise sensitive locations is considered appropriate to provide protection to wind energy development neighbours.”*

As detailed above, when the existing noise environment is very quiet then a lower fixed level limit can be used, to be set between 35 dB (A) and 40 dB (A). In this case a lower fixed limit of 37.5 dB (A) has been used, which Mr Bowdler’s report agrees is an appropriate level to use (Section 6.8).

Impact Assessment by Absolute Level

The Bowdler Report presents an alternative assessment of turbine noise against ‘Lden’ guideline levels, as detailed in the World Health Organization (WHO) document ‘Environmental Noise Guidelines for the European Region’ (2018), hereafter referred to as ‘The Guidelines’.

The Guidelines main purpose, as set out on page xiii is: *“to provide recommendations for protecting human health from exposure to environmental noise originating from various sources: transportation (road traffic, railway and aircraft) noise, wind turbine noise and leisure noise.”*



The Guidelines make recommendations in relation to each of the noise sources considered and each recommendation is rated as either ‘strong’ or ‘conditional,’ which are defined as follows:

“A strong recommendation can be adopted as policy in most situations. The guideline is based on the confidence that the desirable effects of adherence to the recommendation outweigh the undesirable consequences. The quality of evidence for a net benefit – combined with information about the values, preferences and resources – inform this recommendation, which should be implemented in most circumstances.

A conditional recommendation requires a policy-making process with substantial debate and involvement of various stakeholders. There is less certainty of its efficacy owing to lower quality of evidence of a net benefit, opposing values and preferences of individuals and populations affected or the high resource implications of the recommendation, meaning there may be circumstances or settings in which it will not apply.”

The strength of recommendation was determined following a two-step procedure. Initially the strength of the recommendation was set as strong or conditional based on a qualitative assessment of the quality of the evidence, this was then either adopted or confirmed having due consideration to contextual parameters that might have a contributory role. There were seven additional contextual parameters, which were assessed qualitatively. The Guidelines provided three strong recommendations for each of the transportation noise sources (road traffic, railway and aircraft), one strong and two conditional recommendations for leisure noise and two conditional recommendations for wind turbine noise. Accordingly, the recommendations for Wind Turbine Noise should not be given the same weight as other recommendations detailed within the document.

The recommendations included for wind turbine noise (presented on page xvii of the Guidelines) are reproduced here as Table 4-1. It should be noted that the metrics used for quantifying noise levels throughout the Guidelines are Lden and Lnight, which are different from those used in WDG 2006 and ETSU-R-97.

Table 4-1: WHO Environmental Noise Guideline Recommendations for Wind Turbine Noise

Recommendation	Strength
For average noise exposure, the GDG conditionally recommends reducing noise levels produced by wind turbines below 45 dB Lden, as wind turbine noise above this level is associated with adverse health effects.	Conditional
No recommendation is made for average night noise exposure Lnight of wind turbines. The quality of evidence of night-time exposure to wind turbine noise is too low to allow a recommendation.	n/a
To reduce health effects, the GDG conditionally recommends that policymakers implement suitable measures to reduce noise exposure from wind turbines in the population exposed to levels above the guideline values for average noise exposure. No evidence is available, however, to facilitate the recommendation of one particular type of intervention over another.	Conditional



The Lden metric is an annual (day-evening-night) weighted sound pressure level. The metric, which considers annual exposure to noise, effectively gives additional weight to noise occurring during the evening and further weight to noise occurring at night. The Lden metric is commonly used for assessment of transportation noise and in strategic mapping exercises but there is no guidance in Ireland (or indeed in the Guidelines) to outline how a wind farm noise Lden could be predicted or measured. There are very considerable practical difficulties involved with the use of Lden for wind farm noise and accordingly, it is very rarely used for wind turbine noise assessment.

When considering the recommendations in the Guidelines it is important to consider them in the context of the entire document and there are a number of important points which are set out here.

- The recommendations in the Guidelines are based on a 10% absolute risk of High Annoyance in the population. Table 36 of the Guidelines details that this is based on a review of four studies. Table 37 identified that six studies were available that considered sleep disturbance but they did not reveal consistent results about the effects of wind turbine noise on sleep. Consequently, the Guidelines do not make a recommendation to Lnight. No other studies were identified in the Guidelines that were sufficient to allow for the consideration of any other health effects.
- The recommendations are 'conditional,' and such recommendations: *"requires a policy-making process with substantial debate and involvement of various stakeholders"*.
- Table 42 of the Guidelines, *"provides a comprehensive summary of the different dimensions for the assessment of the strength of the wind turbine recommendations."* Within the table it states: *"Evidence for a relevant absolute risk of annoyance at 45 dB Lden was rated low quality. No statistically significant evidence was available for sleep disturbance related to exposure from wind turbine noise at night."*
- Table 42 also sets out additional context in relation to the balance of benefits versus harms and burdens, stating: *"Further work is required to assess fully the benefits and harms of exposure to environmental noise from wind turbines and to clarify whether the potential benefits associated with reducing exposure to environmental noise for individuals living in the vicinity of wind turbines outweigh the impact on the development of renewable energy policies in the WHO European Region."*
- As noted previously, the Lden metric is not currently used in Ireland for the prediction, measurement or assessment of wind turbine noise and this is also highlighted in Table 42 of the Guidelines, which states (in relation to additional considerations or uncertainties) that: *"There are serious issues with noise exposure assessment related to wind turbines."* This is consistent with earlier text in the Guidelines (on page 84), which notes that: *"Based on all these factors, it may be concluded that the acoustical description of wind turbine noise by means of Lden or Lnight may be a poor characterization of wind turbine noise and may limit the ability to observe associations between wind turbine noise and health outcomes."*

Whilst the Guidelines provide a useful overview of the information available relating to health effects at the time of the WHO review, the recommendations need to be considered in the context of the entire document and the Guidelines note that the quality of evidence upon which the recommendations are based is low quality. This is reflected in the fact that the recommendation is conditional, and the Guidelines note that the recommendation should be subject to a policy-making process with substantial debate and involvement of various stakeholders.

In relation to wind turbine noise assessment, no formal changes have been made to the 2006 WEDG. Similarly, the UK continues to rely on ETSU-R-97 and the IOA GPG as an appropriate method of assessment.



It is also noted that the Institute of Acoustics has not made any changes to the good practice guidance set out in the IOA GPG to incorporate the 2018 WHO guidelines.

With due regards to the above, assessment of operational wind turbine noise against the levels presented in the 2018 WHO document is not considered to be appropriate or necessary.

Impact Assessment by Relative Level

The Bowdler Report presents a further alternative assessment of turbine noise, this time against BS 4142:2014. This standard is routinely used to assess the impact of industrial and commercial noise on residential receptors and compares a Rating Noise level (the predicted or measured level plus any corrections to account for noise character) against the background sound levels. It is not, however, an appropriate assessment method for evaluating wind turbine noise and a number of pages are given over to this within the ETSU-R-97 document, under the heading; *'Problems with interpretation and the literal application of BS 4142'*.

It is acknowledged that the ETSU document refers to an older version of BS 4142 than the version currently in use, however, with reference to the most recent release, BS 4142:2014+A1:2019, the following should be noted;

- The Standard is intended for the assessment of noise at low wind speeds, however turbine noise increases proportionately with wind speed and it is at wind speeds above the range of those considered in BS 4142 that a wind farm noise assessment is centered around.
- There is no method to set noise level limits in BS 4142, the standard simply provides a mechanism to determine whether there may be an adverse noise impact for noise generating developments or noise sensitive developments that fit within the scope of the standard; and,
- BS 4142 itself states at 1.3; *"The standard is not intended to be applied to the rating and assessment of sound from: a, b, c, ... h) other sources falling within the scopes of other standards and guidance."* In this case wind turbines fall *'within the scope of other standards and guidance'*, namely ETSU-R-97 The Assessment and Rating of Noise from Wind Farms.

Accordingly, no further consideration of the presented BS 4142 assessment is considered necessary

Issue 7: Vibration

Developer failed to meet obligations in not providing detailed information on not providing construction aspect of development.

Response:

The Applicant has provided detailed information surrounding the noise and vibration levels during the construction aspect of the proposed development in section 7.2 of the EIAR. Vibration from operational wind turbines is low and will not result in perceptible levels at nearby sensitive receptors nor will the levels of vibration result in any structural damage.

During construction vibration is generated by construction activities such as rock breaking and passing heavy goods vehicles.



The threshold of human perception of vibration is in the range of 0.14mm/s to 0.3mm/s, described as “might just be perceptible”. The guideline values for damage to buildings from vibration are 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above.

This clearly states that the vibrations predicted during construction might just be perceptible and therefore not significant.

Issue 8: Hydrology

This development will adversely affect the “Good” water quality status which has been achieved in all of the surrounding watercourses pursuant if the Water Framework Directive and will negatively impact private wells which all residents in the locality rely on for water supply to domestic homes and farms. Groundwater vulnerability listed between high and extreme for area. The Site has not been adequately surveyed and the relevant hydrological and topographic assessed There are inaccuracies stating 62.8 trees to be felled in one section and 61 in another.

Response:

In Section 10.7 of the EIAR, a list of the proposed mitigation is provided to protect the receiving environment and to prevent deterioration of the water quality status. Regardless of their current quality, surface waters will be treated the same in terms of the level of protection and mitigation measures employed (there will be no negative change in status). Strict mitigation measures in relation to maintaining a high quality of surface water runoff from the development will ensure that the status of surface waterbodies in the vicinity of the site will be maintained regardless of their existing status. The proposed drainage system design and sediment control measures at the site conform to best practice. The proposed development has no potential to cause a deterioration in status of any surface water or groundwater body and/or jeopardise the attainment of good surface water or groundwater status.

Appropriate drainage proposed for the project includes collector drains and interceptor drains (cut-off) drains. A detailed description of the proposed drainage for the project is provided in Section 10.6 of the EIAR. This section details the proposed drainage for the existing access tracks, for new tracks, for the substation and other segments of the proposed wind farm. The appropriate drainage design is the primary mitigation measure for the subject development which incorporates silt protection control measures and reduces the rate of surface water runoff from the proposed development.

The surface runoff from the construction area will run through settlement ponds to reduce concentration of suspended solids in the runoff from these areas before discharging overland. There will be no direct discharges of water from the construction area to any waterbody within or adjacent to the site.

It should be noted that Cork County Council’s Senior Executive Scientist made a statement that he is satisfied with the submitted detailed proposals to protect water quality during the construction and operational stages of the proposed development. Please refer to Section 5.2.29 of the CCC’s submission report.



Issue 9: Sensitivity of Receptors

NVTA stated that the proposed development will have a significant negative impact on the designated special areas of conservation, and it will directly impact on the water quality and ecological status of those rivers.

Response:

The applicant assessed the impact on the designated special areas of conversation in Section 8 of the EAIR report. The potential impacts on water quality are provided in Section 10.4 and the proposed mitigation measures are listed in Section 10.7. It was concluded that the impact on water quality for all stages of the project will not have a significant negative effect on the receiving environment following the implementation of proposed mitigation measures.

Appropriate drainage proposed for the project includes collector drains and interceptor drains (cut-off) drains. A detailed description of the proposed drainage for the project is provided in Section 10.6 of the EIAR. This section details the proposed drainage for the existing access tracks, for new tracks, for substation and other segments of the proposed wind farm. An appropriate drainage design is the primary mitigation measure for the subject development which will incorporate silt protection control measures and reduce the rate of surface water runoff from the proposed development. An appropriate drainage design has been prepared for CGEP as part of the EIAR design process and shown on planning application drawings.

The surface runoff from the construction area will run through settlement ponds to reduce concentration of suspended solids in the runoff from these areas before discharging overland. There will be no direct discharges of water from the construction area to any waterbody within or adjacent to the site.

For the above primary reasons, there are no significant effects identified arising from the proposed development that would adversely affect the Qualifying Interests or conservation objectives of Natura 2000 sites within the project Zone of Influence with regard to the favourable conservation condition of the features of Qualifying Interest for which the Natura 2000 site has been selected.

The provisions of Article 6 of the 'Habitats' Directive 92/43/EC (2000) defines integrity as the 'coherence of the sites ecological structure and function, across its whole area, or the habitats, complex of habitats and/or population of species for which the site is classified'. It is clear that, given the application of prescribed protective measures for the avoidance of impacts and the implementation of the required mitigation measures, the proposed development will not give rise to adverse effects on the integrity of any of the identified Natura 2000 sites evaluated herein. Furthermore, with the mitigation measures described, the proposed development will not negatively impact on the water quality and ecological status of those rivers within the catchment of the CGEP project.

Issue 10: Hydrology Features

NVTA stated that the increase in the runoff should reflect high end future scenario (HEFS) to allow climate change expectations and that the peak in the runoff used wrong growth curves. They also stated that a shorter storm duration should have been used in the assessment.



Response:

The increase in the runoff was calculated using Rational equation. This equation is based on a rainfall depth for a given storm duration and return period. The rational equation does not use growth curves to determine a particular flow for a given return period.

The peak runoff occurs when the whole catchment contributes to the runoff. This time is defined as 'time of concentration', and it is equal to storm duration. As part of the EIAR, time of concentration was calculated to be 180 minutes. Therefore, storm duration also must be 180 minutes.

Short storm events are used to determine a maximum flow when designing drainage infrastructure which is not the same as calculating the peak runoff for small catchments.

The rainfall depth (storm intensity) was increased from 10% to 20% to allow for potential climate change effects.

The estimated increase in runoff due to development is provided in Table 10-7, Section 10.4.2 of the EIAR and has been used to ensure assessment of worst case.

Issue 11: Hydrology Features - Inability to Mitigate for Negative Impacts

NVTA stated that the applicant admitted in Section 10.4.2 that during the construction period, the development has the potential to impact on hydrology and water quality and that mitigation measures are excessive and wholly inadequate, and if any single measure fail, it would have a disastrous impact on the water quality of the area.

Response:

If no mitigation measures are applied, the proposed development could have a significant negative impact on the receiving water. This is stated in conclusion of the EIAR.

The proposed mitigation measures are in line with the best practice, listed in Section 10.2.1.2 of the EIAR, and are not excessive or unusual in the context of modern standard construction practices. If one of the mitigation measure fails, there will be other measures already in place to ensure that there will be no negative impact on hydrology and water quality.

In addition, in the Surface Water Management Plan (SWMP) an 'Emergency Silt Control and Spillage Response Procedure' is provided to address any unforeseen emergency events. Details pertaining to the management and maintenance of the proposed drainage system throughout the construction and operational phase of the proposed project are included in the CEMP and SWMP. This includes the following:

- inspection and maintenance of swales;
- inspecting cross-drains for any blockages;
- inspecting settlement ponds and outfalls;
- inspecting the stream crossings and piped crossings for obstructions;
- inspecting the progress of the re-establishment of vegetation;
- implementing appropriate remedial measures as required after the above inspections.



NVTA also stated that the proposed mitigation measures are listed over seven pages, implying that there are dozens of measures required to protect the environment. This is not the case. The proposed mitigation measures are broken down for each stage of the project, and each stage of the project is further assessed for each segment (e.g., grid connection, stream crossings, wind farm site, turbine delivery route).

For example, the proposed mitigation measures for horizontal directional drilling (HDD) and construction of new watercourse crossing infrastructure are separated, even though most measures could be applied for both activities. This approach ensures the correct solution and appropriate mitigation measures are clearly outlined for each construction activity.

Issue 12: Archaeology and Cultural Heritage

The Applicant has failed to meet the objectives of the EIA directive and 2006 guidelines in that it has failed to assess the impact of the proposed wind energy development on the archaeological heritage of the site.

Response:

The Applicant has fully complied to and adhered with the EIA Directives and national policies. The potential impact of the proposed development in relation to Archaeological Heritage is assessed comprehensively in Chapter 14.

The presence of turbines may affect the quality and amenity of surrounding archaeological sites due to visual prominence. This may impact on tourism related to cultural heritage. Mitigation by design has avoided impact on sensitive archaeological and cultural heritage sites in proximity to the development. Furthermore, an assessment of significant sites is included in Chapter 14 Archaeology, Architectural and Cultural Heritage. No significant impact was identified.

Issue 13: Impact on Recreation and impact of Shadow flicker.

Site of proposed development is a popular walking/hiking/running, the proposed works will impact such amenities and cause shadow flicker which in turn will result in sleep disturbance and discomfort. There are also concerns relating to the devaluation of property.

Response:

All potential and possible issues pertaining to recreation, amenity and tourism and to leisure activities such as walking/hiking/running relating to the subject lands and development during its operational phase are discussed in 11.6.3 of the EIAR. Here, reference is made to studies used to form the *Wind Energy Development Guidelines for Planning Authorities* (2006). This document states that Wind Energy developments are not incompatible with tourism and leisure interests such as walking/hiking/running, and once energy developments are not insensitively sited, they do not impact on tourism potential and state that tourism and wind-energy can in fact happily co-exist. Furthermore, and after further study since 2006, the *Draft Revised Wind Energy Development Guidelines* (2019), consolidates the earlier finding from the 2006 *Wind Energy Development Guidelines for Planning Authorities*, and maintains that wind energy and tourism can co-exist.



With regard to tourism and the impact of the proposed development section 11.6.3 outlines various studies and surveys taken both locally and internationally which conclude that Wind Energy development does not negatively impact tourism and local amenities.

Coom Green Energy Park will implement a zero shadow flicker policy as advocated in the Draft Revised Wind Energy Development Guidelines (2019), therefore following a short period to facilitate shutdown, there will be no shadow flicker created at sensitive receptors.

Following implementation of mitigation measures described in Section 12.5 of the EIAR, the residual impact as a result of shadow flicker will be imperceptible. Accordingly, it is considered that there will be no residual impact as a result of shadow flicker. Concerns relating to sleep disturbance and discomfort are addressed in Section 5.3 Issues 1 and 3 as well as Section 5.6 issue 2 of this report.

With regard to the concerns relating to the devaluation of property, please refer to Section 5.6 Issue 4 of this report.

Issue 14: Protected Views and Scenic Routes

Concerns with proposed developments impact on protected views and scenic routes. NVTSA note there are 2 no. scenic routes within close proximity to the proposed development. Namely Scenic Routes S11 and S12.

Response:

The NVTSA submission attempts to highlight a ‘significant failure on the part of the applicant’ not to acknowledge that part of the scenic route S11 passes through an area of ‘High Value Landscape’. However, this ‘apparent’ discrepancy relates to another misinterpretation / partial interpretation of the Chapter 15 text. Twice within the chapter it is highlighted that the “relevant sections” of scenic route S11 (i.e., those with open views of the proposed turbines) are not contained within the High Value Landscape zoning. It is not stated at any point in the chapter that the entirety of scenic route is outside of the HVL zoning as substantial portions to the northwest and north of the site are clearly within it. This is not a case of oversight or omission, it is simply the case that those HVL sections of S11 do not afford any substantial visibility of the proposed turbines.

The NVTSA submission goes on to reference again, the Cork County Council Planner’s and An Bord Pleanála Inspector’s comments in relation to the previously refused wind farm application near the Glannasack turbine cluster. As already discussed above in section 4.4.3 the current Cork County Council comments are considered to override what was stated by previous planners in relation to a different scheme under different planning designations and Wind Energy Guidance nearly two decades ago. In relation to impacts on scenic view S12, this latest Cork County Council report states;

“Due to the fact that the proposed development lies to the east of this scenic route on higher ground, which is buffered by forestry cover, it is considered that the views of the rolling landscape from S12 will not be impacted by the proposed development”;



Whilst the Cork County Council Planner's report does take issue with the visual stacking of four turbines within the Bottle Hill cluster as seen from VP6 (representing scenic route S11), it states;

"In Chapter 5 of the County Development Plan the views being protected for S11 are detailed as being views of the Nagle mountains"; and ...

"Views of the Nagle Mountains are shown in VP6ii and 7i shown at Figures 10 and 11 below. It is considered that the spacing of the turbines, their location following the topography of the land and tree cover reduces their impact on views back into the Nagle Mountains from S11".

Issue 15: Battery Storage

The Developer has provided no information in relation to battery size and adherent to international standards.

Response:

Refer to Section 1.2 of the main RFI response report for a detailed description of the battery energy storage system (BESS).

4.2 Irish Raptor Study Group – Ryan Wilson Parr

Issue: 1: Ecology

The Wind Farm Development will displace a nationally significant and important breeding Hen Harrier population. The Mitigation and Land Management plans in relation to Hen Harrier is flawed.

Response:

Hen Harrier monitoring has formed a substantial element associated with the Ecology chapter of the EIAR for the proposed CGEP. Although Hen Harriers formerly bred in the area around CGEP, no breeding was recorded in the area during 2021. Nevertheless, it remains possible that Hen Harriers were present but undetected during 2021, so monitoring will continue during 2022.

Furthermore, although some potential Hen Harrier foraging habitats may be impacted by the proposed project, additional land (identified in a Conservation and Habitat Management Plan for Hen Harriers) will be brought into suitable condition for foraging Hen Harriers. The area of land brought under this management exceeds that area of habitat that may potentially be lost to foraging birds, therefore representing a net gain for Hen Harriers as well as a range of other species of conservation concern.

In addition, a full assessment of the possible impact of this project on Hen Harrier breeding in the area has concluded that no likely significant effects to this species will arise from the proposed project. This includes an assessment of collision risk, which determined a likely collision incidence of one Hen Harrier in 138 years (as a likely maxima), which would be substantially longer than the lifetime of the windfarm.



Issue 2: Ecology

Natura Impact Statement is incomplete.

Section 2.4.3.1.5 of the Natura Impact Statement – Hen Harrier stated: “Based on a precautionary approach wintering hen harrier could include individuals from populations outside the local area, including individuals from distant SPA’s”

Despite this clear admission of possible links and effects to Special Protection Area’s, no assessment in the Natura Impact Statement has been presented.

Response:

It is important that the statement within the NIS is placed in context. The full statement indicated above reads:

Based on a precautionary approach wintering Hen Harrier could include individuals from populations outside the local area, including individuals from distant SPA’s. No impacts are identified in the EIAR to wintering Hen Harrier and no disturbance will arise to any wintering Hen Harrier roosts due to the project. It is considered therefore that no significant adverse effects are likely to SCI Hen Harrier associated with SPA’s.

Precautionary mitigation is outlined in the EIAR including habitat enhancement measures to minimise risks to local populations of breeding and wintering Hen Harrier that use the locality of the proposed windfarm development.

Despite extensive surveying during the autumn and wintering period, when juvenile and adult Hen Harrier may disperse away from breeding or natal areas, there is no established link to other SPAs.

Issue 3: Ecology

The methodology used for the Vantage Point Flight Activity Survey in the EIAR- Avifauna is not set out clearly in the EIAR: Lack of simple or clearly presented summary information on the total number of hours of survey effort undertaken at each bespoke Vantage Point within the Site boundary and 2km buffer of the proposed wind farm.

Response:

The methodology used for the Vantage Point Flight Activity Survey is stated in the EIAR in section 8.5.2.3.3 and 8.5.3.3.1 (SNH, 2017). There was no deviation for the standard methodology as indicated in the Best Practice Guidance (SNH, 2017). Over these 3.5 years of data collection (March 2016 to September 2019), the VPs changed to reflect modifications to the location of turbines on the site. This iterative approach to wind farm design was partly based upon re-locating turbines to avoid intensive areas of Hen Harrier activity. The identification of VPs was similarly designed to maximise coverage of the turbine layout, with all VPs subject to viewshed analysis. Note that Best Practice Guidance for evaluating flight risk for birds at onshore wind farms (SNH, 2017) requires two full years of data collection and only the most recent two years of the 3.5 years of data at CGEP were used.



Furthermore, the requirement for surveys period (hours of surveys at each VP) was at least met for each VP in each season of survey work being undertaken.

A full breakdown of all the hours of surveys undertaken at each Vantage Point is included in Appendix 8-A of the EIAR and is summarised in the Collision Risk Model (see Appendix 1.2 of that report) where these data are being used to determine collision risk. Dates and timings for all surveys are presented, showing that the full suite of Vantage Point surveys were undertaken across a range of survey times. It is important to note that pre-dawn and post-dusk surveys are required where wildfowl (particularly geese or swans) are identified as important ecological receptors at specific sites. These were not identified as critical receptors at the proposed CGEP area (there are no important sites for wintering wildfowl with any likely Zone of Influence at CGEP). VP surveys were therefore undertaken during daylight hours (including periods covering both dawn and dusk) and were undertaken when raptors are considered to be most active, and thereby ensuring that the Vantage Point Flight Activity Survey is representative of times when Hen Harriers and other raptor species are likely to be on the wing.

Issue 4: Ecology

Collision Risk Model for Hen Harrier is based on misrepresented data. The Impact Assessment on Goshawk and Merlin is inadequate, given the historical context, timing, and duration of certain observations of Goshawk and Merlin. There is sufficient evidence to warrant further survey to locate a possible nest in the vicinity.

Response:

The Collision Risk Model is based upon data collected following Best Practice guidance (SNH, 2017). Dates and timings for all surveys are presented, showing that the full suite of Vantage Point surveys were undertaken across a range of survey times. It is important to note that pre-dawn and post-dusk surveys are required where wildfowl (particularly geese or swans) are identified as important ecological receptors at specific sites. These were not identified as important receptors at the proposed CGEP area. VP surveys were therefore undertaken during daylight hours (including periods covering both dawn and dusk) were undertaken when raptors are considered to be most active, and thereby ensuring that the Vantage Point Flight Activity Survey is representative of times when Hen Harriers and other raptor species are likely to be on the wing.

The EIAR clearly indicates that Goshawk and Merlin surveys, following established Best Practice Survey methods, were undertaken. Additional surveys in the 2021 breeding season have similarly concluded that no breeding Merlin or Goshawk were found in the locality.

Issue 5: Ecology

The Conservation and Habitat Management Plan provides no performance based measure of mitigation or enhancement success

Response:

Monitoring is integral to the success of the CHMP, and is included within section 8 of that document.



In brief, areas of Hen Harrier foraging habitat (i.e. wet grassland, hedgerows, scrubby earth banks and wet heath) will be accurately mapped and will be monitored annually, for the lifetime of the proposed CGEP, to guarantee that the areas associated with the CHMP have not reduced in area and that the grazing regime that is in place is improving (for Hen Harrier) the current state of these habitats (i.e. neither poaching nor overgrowth of open areas is occurring). As well as mapping, this monitoring will be recorded by means of fixed-point photography.

Additional, annual bird monitoring will take place throughout the construction period and operational phase of the proposed CGEP development to monitor nesting activity and confirm usage of the six enhancement areas by Hen Harrier, throughout the breeding season.

Issue 6: EIAR

The IRSG on the strongest possible terms refutes and rejects the statements in EIAR section 8.8.3.

Response:

Section 8.8.3 summarizes the concluding remarks regarding the mitigation measures and potential risks with the hen harrier and other bird species.

Strongly refuting and rejecting a section in the EIAR which clearly outlines that displacement and or disturbance impacts are considered unlikely; residual impacts to all avifauna species are considered to be imperceptible with mitigation detailed; no residual impacts are predicted from the construction, operation and decommissioning phases of the GCR; and no measurable residual impacts are likely upon the implementation of the mitigation measures outlined throughout the EIAR.

This section clearly states and irrefutably highlights the non-significant risks and impact the proposed development has upon the avifauna species within the surrounding landscape. The IRSG's rejection of this section is irrelevant and not based on any substantive matter or grounding.



5. COMMUNITY AND INDIVIDUAL CORE ISSUES

This section deals with the remaining submissions of Communities and Individuals. In assessing the submissions made by individuals and other local community groups, we found many submissions shared similar concerns. Therefore, the main areas and issues have been categorised into 7 no. distinct core issues. Many other issues which relate to Consultation, Traffic & Transport, Water Quality / Hydrology, Construction Works and Location have been considered and responded to in the above sections.

Concerns surrounding the location and size of the proposed turbines have already been considered in the accompanying RFI report and appendices.

Specific concerns relating to outstanding items raised in the Third Party submissions are responded to below. Some of the Core issues outlined below have relevant subsections where specific concerns are directly addressed.

Concerns raised by certain community groups have also been included within this section, such groups are that of Burnfort National School Parents Association and Mourneabbey Community Group. These submissions have been included in this section due to their similarity in issues raised with other individual Third Party submissions.

This layout allows all of the issues raised within the Third Party submissions to be responded to accordingly. Every submission was reviewed and it is ensured that all concerns have been accounted for and answered.

5.1 Policy

Issue 1

The Wind Energy Guidelines 2006 are out of date and unfit for the purpose of the proposed development. There are also concerns that the project is being rushed before new guidelines are adopted.

Response:

The proposed development has been designed in compliance with the Wind Energy Development Guidelines (2006). We note that the Draft Revised Wind Energy Development Guidelines (2019) is currently at draft stage and has not yet been issued by the Minister for Housing, Local Government and Heritage. Notwithstanding, the design and assessment of the CGEP project has had regard to the draft guidelines and has provided for key elements as set out in the guidelines. For example the project has implemented a minimum set back of 4 times tip height from turbines to any residential property and commits to zero shadow flicker policy. According to the Climate Action Plan 2021, the new guidelines will not be in place until Q1 2023. Therefore it is submitted that this application which has been in the planning system for over a year is not being rushed through.

However if the new Guidelines were to be in place prior to a decision on this application, the proposed development can demonstrate compliance with said guidelines.



5.2 Consultation

Issue 1: Lack of Consultation

Concerns surrounding a lack proof consultation with local community.

Response

This issue has been previously addressed in section 3.1 Issue 2 of this report.

The developer considers public consultation to be an important aspect of the project and facilitated engagement throughout the project by having a dedicated Community Liaison Officer on the ground by way of door to door house calls and leaflet and letter drop to ensure locals were made aware of the details of the project and processes involved. A dedicated phone line and email address were provided with circulated materials so members of the public could directly contact the project team. This process was commenced as early as possible in order to inform the design of the project and to inform the EIA process. A dedicated website was also set up to allow for further open communication between the applicant and community throughout the iterative design process and run-up to the application submission.

There were a wide range of public engagement events available for the public to communicate their concerns with the project to the Development team. Key local considerations were taken into account in designing the project and information relating to this is set out in Section 5.4 and 5.5 of the EIAR. Further details on the public consultation can be found in Section 3.1 Issue 2 of this report.

Issue 2: Community Benefit Fund

The fund will be given to families not affected directly by project. Requests have been made that if planning is granted funds are provided only to people within 2km of the project.

Response:

Any community benefit fund will be distributed in accordance with best practice guidance and governance of such a fund as set out in the Renewable Energy Support Scheme (RESS) Community Benefit Fund Good Practice Principles.

The Community Benefit Fund has been proposed as part of the proposed development and its dissemination to households is contingent on a) a grant of planning permission for the proposed wind farm; b) the construction and operation of the permitted wind farm; and c) a finalisation of what the community benefit fund will entail. The proceeds of this fund will be provided to residents within a relevant proximity of the site specifically those impacted visually by the operational phases of the Wind Farm.

Following consultation with the local community, the developer took on board the feedback it received from local residents and provided a list of community benefits. The Community Benefit Package was outlined in Chapters 2 and 10 of the EIAR submitted with the planning application.



Changes in community development were ongoing during this process, but one of the items of importance regarding community support was the new Renewable Energy Support Scheme (RESS). This scheme includes a commitment from the government to ensure significantly increased funding for local communities where projects are developed under this scheme by providing a significant long-term economic benefit to the community in the area and this approach is supported by CGEP.

5.3 Noise

Approximately 270 submissions have been raised in relation to noise, the majority of which relate to concerns regarding Low Frequency Noise (LFN), although other issues have been raised including:

- health effects of noise;
- amplitude modulation;
- some technicalities relating to the noise assessment methodology; and,
- the method of assessment used to determine significance of effects as presented in the noise chapter.

This section seeks to provide an overarching response to the common themes found across the range of comments.

Dr. Martin Hogan from Corporate Health Ireland and Jim Singleton, MIOA of TNEI Services have been retained to review and respond to the following issued and concerns raised. Their responses are outlined below.

Issue 1: Low Frequency Noise (and infrasound)

With regards to concerns about levels of low frequency noise that may be emitted from the turbines leading to loss of sleep, health complications and effects on livestock.

Response

Experts from TNEI have been retained to review the above request and their responses are outlined below.

The term infrasound can be defined as the frequency range below 20 Hz, while low frequency noise (LFN) is typically in the frequency range 20 – 200 Hz⁷. An average young healthy adult has an audible range from 20 Hz to 20,000 Hz, although the sensitivity of the ear varies with frequency and is most sensitive to sounds with frequencies between 500 Hz and 4,000 Hz. Accordingly, the average human can hear LFN but cannot hear infrasound.

Wind turbines do produce low frequency sounds⁸, but our threshold of hearing at such low frequencies is relatively high i.e. low frequency sounds need to have a high level of amplitude before they are audible. Therefore LFN will usually go unnoticed.

⁷ *Low frequency noise and annoyance* . HG, Leventhall. s.l. : Noise & Health Journal, 2004, Vol. 6.

⁸ *Do wind turbines produce significant low frequency sound levels? Conference paper 11th International Meeting on Low Frequency Noise and Vibration and its Control* . Berg, G.P. van den. Maastricht The Netherlands : s.n., 2004.



Infrasound from wind turbines is often at levels below that of the infrasound generated by other local noise sources, for example, from the wind around buildings and other obstacles.

Many of the submissions express concern with regards to the potential for LFN and / or infrasound generated by the proposed wind turbines and some papers are presented, for example in *Submission 08 (Professor Alun Evans)*, which discuss the potential for adverse health impacts attributable to exposure to certain levels of LFN. However, levels of LFN and infrasound have been found to be particularly low from wind turbines and this is backed up by a large body of work, some of which is detailed here:

In 2004, the former UK Department for Trade and Industry (DTI) commissioned The Hayes McKenzie Partnership to report on claims that infrasound or LFN emitted by wind turbine generators (WTGs) were causing health effects. Of the 126 wind farms operating in the UK at that time, five had reported LFN problems, therefore, such complaints are an exception, rather than a general problem that exists for all wind farms. Hayes McKenzie investigated the effects of infrasound and LFN at three of the wind farms for which complaints had been received and the results were reported in May 2006⁹. The report concluded that:

- *'infrasound associated with modern wind turbines is not a source which will result in noise levels which may be injurious to the health of a wind farm neighbour;*
- *low frequency noise was measurable on a few occasions but below the existing permitted [UK] Night Time Noise Criterion. Wind turbine noise may result in internal noise levels within a dwelling that is just above the threshold of audibility, however at all sites it was always lower than that of local road traffic noise;*
- *that the common cause of complaint was not associated with LFN, but the occasional audible modulation of aerodynamic noise especially at night. Data collected showed that the internal noise levels were insufficient to wake up residents at these three sites. However once awoken, this noise can result in difficulties in returning to sleep.'*

The Applied and Environmental Geophysics Research Group at Keele University was commissioned by the UK Ministry of Defence (MOD), the DTI and the British Wind Energy Association (BWEA) to undertake micro-seismic and infrasound monitoring of LFN and vibrations from wind farms for the purposes of siting wind farms in the vicinity of the Eskdalemuir Seismic Array in Scotland. Whilst the testing showed that vibration can be detected several kilometres away from wind turbines, the levels of vibration from wind turbines were so small that only the most sophisticated instrumentation can reveal their presence and they are almost impossible to detect. Nevertheless, the Renewable Energy Foundation alleged potential adverse health effects and when that story was picked up in the popular press, notably the Scotsman, the report's authors expressed concern over the way in which their work had been misinterpreted and issued a rebuttal statement¹⁰ in August 2005:

'Vibrations at this level and in this frequency range will be available from all kinds of sources such as traffic and background noise – they are not confined to wind turbines. To put the level of vibration into context, they are ground vibrations with amplitudes of about one millionth of a millimetre. There is no possibility of humans sensing the vibration and absolutely no risk to human health.'

⁹ Department of Trade and Industry. *The Measurement of LFN at three UK Wind Farms*. 2006 : s.n.

¹⁰ Keele University Rejects Renewable Energy Foundation. <http://archive.is/d3WB>. *Low Frequency Noise Research Claims*. [Online]



In response to concerns that wind turbines emit infrasound and cause associated health problems, Dr Geoff Leventhall, Consultant in Noise Vibration and Acoustics and author of the Defra Report on Low Frequency Noise and its Effects, said in the article in the Scotsman ('Wind Farm Noise Rules 'Dated'- James Reynolds, 5 August 2005'):

'I can state quite categorically that there is no significant infrasound from current designs of wind turbines.'

An article¹¹ published in the IOA Bulletin (March/April 2009) concluded that there is no robust evidence that either low frequency noise (including 'infrasound') or ground-borne vibration from wind farms, has an adverse effect on wind farm neighbours.

Work by Dr Leventhall¹² looked at infrasound levels within the ear compared to external sources and concluded:

'The conclusion is that the continuous inner ear infrasound levels due to internal sources, which are in the same frequency range as wind turbine rotational frequencies, are higher than the levels produced in the inner ear by wind turbines, making it unlikely that the wind turbine noise will affect the vestibular systems, contrary to suggestions made following the measurements at Shirley. The masking effect is similar to that in the abdomen (Leventhall 2009). The body, and vestibular systems, appear to be built to avoid disturbance from the high levels of infrasound which are produced internally from the heartbeat and other processes. In fact, the hearing mechanisms and the balance mechanisms, although in close proximity, have developed to minimise interaction (Carey and Amin 2006).'

More recently during a planning Appeal (PPA-310-2028, Clydeport Hunterston Terminal Facility, approximately 2.5 km south-west of Fairlie, 9 Jan 2018), the health impacts related to LFN associated with wind turbines were considered at length by the appointed Reporter (Mr M Croft). The Reporter considered evidence from Health Protection Scotland and the National Health Service. In addition, he also considered LFN surveys undertaken by the Appellant and the Local Authority, both of which demonstrated compliance with planning conditions and did not identify any problems attributable to the turbine operations; some periods with highest levels of low frequency noise were in fact recorded when the turbines were not operating.

The Reporter concluded that:

- The literature reviews by bodies with very significant responsibilities for the health of local people found insufficient evidence to confirm a causal relationship between wind turbine noise and the type of health complaints cited by some local residents;
- The NHS's assessment is that concerns about health impact are not supported by good quality research; and,
- Although given the opportunity, the Community Council failed to provide evidence that can properly be set against the general tenor of the scientific evidence.

No information appears to be available in terms of the specific effects of LFN on cattle, however, a number of studies have considered noise levels in general and their effects on cattle.

¹¹ **Institute of Acoustics Bulletin**. *Prediction and assessment of wind turbine noise*. 2009.

¹² *Infrasound and the ear, 5th International conference on Wind Turbine Noise*. **Leventhall, G.** Denver : s.n., 2013.



Effects of Noise on Wildlife and Other Animals (1971), written for the US Environmental Protection Agency includes a section looking at the Effects of Noise on Farm Animals, including pigs, cattle and poultry but found that noise effects had little impact on milk production.

A number of studies have been carried out on the effects of noise on cattle from low-flying aircraft, including jets, helicopters and sonic booms and in response to concerns about noise effects on both milk production and pregnancies in cattle, the U.S. Air Force prepared a handbook for environmental protection summarising these studies. No link was identified between either reduced milk production or disturbance to pregnancies and in a report to congress in 1992 the U.S. Forest Service stated; *“there is no proven cause-and-effect link between startling cattle from aircraft overflights and abortion rates or lower milk production.”*

Whilst noise from low-altitude flights is not directly comparable to continual noise produced by wind turbines, it should be noted that impact or impulsive noise i.e. noise levels that increase and decrease rapidly such as may occur from a low-altitude flypast, is much more likely to cause disturbance to animals than the continual and consistent noise levels generated by wind turbines. In this regard Head et al states, *“Many studies indicate that sudden, novel sounds seem to affect cattle behaviour more than continuous high noise”* (1993).

With regards to the ability of cattle to discern LFN it is worth noting the paper ‘Effect Of Noise On Performance, Stress, and Behaviour of Animals’ (J Brouček), which states; *“Cattle hear high-frequency sounds much better than humans, their high-frequency hearing limit being 37 kHz, compared with only 18 kHz for humans (Heffner, 1998). Their best audible sound is also at a higher frequency, at about 8 kHz, compared with 4 kHz for humans (Phillips, 2009). However, thresholds for discomfort for cattle was noted at 90-100 dB, with physical damage to the ear occurring at 110 dB. (Phillips, 2009). Indeed, cattle, with an auditory range between 25 Hz and 35 kHz, can detect lower pitched sounds than other farm species (Heffner and Heffner 1993). Dairy breeds are more sensitive to noise than beef breeds (Lanier et al., 2000).* Therefore, cattle have a similar low frequency threshold to humans (25Hz compared to 20 Hz), but their higher frequency response extends beyond the human range and they are more sensitive to noise at higher frequencies than humans. Accordingly, it is reasonable to assume that cattle will be no more affected by LFN than a human would.

To summarise, it is acknowledged that LFN can be generated from operational wind turbines, however, the levels are below that at which adverse impacts may occur. Levels of infrasound associated with wind turbine operations are particularly low and no higher than is experienced in everyday settings with no wind turbines present. Accordingly, no adverse health effects, loss of sleep or adverse effects on livestock are anticipated.

Issue 2: Amplitude Modulation

With regards to concerns about the potential for Amplitude Modulation effects, the lack of prediction of Amplitude Modulation within the EIAR and the request for a planning condition to control levels of Amplitude Modulation.

Response

Experts from TNEI have been retained to review the above request and their responses are outlined below.

In the context of wind turbine noise amplitude modulation describes a variation in noise level over time; for example, observers may describe a ‘whoosh’ sound, which can be heard close to a wind turbine as the blades sweep past.



Amplitude Modulation (AM) of aerodynamic noise is an inherent characteristic of wind turbine noise and was noted in ETSU-R-97 *'The Assessment and Rating of Noise from Wind Farms'*¹³, on page 68:

'The modulation or rhythmic swish emitted by wind turbines has been considered by some to have a characteristic that is irregular enough to attract attention. The level and depth of modulation of the blade noise is, to a degree, turbine-dependent and is dependent upon the position of the observer. Some wind turbines emit a greater level of modulation of the blade noise than others. Therefore, although some wind turbines might be considered to have a character that may attract one's attention, others have noise characteristics which are considerably less intrusive and unlikely to attract one's attention and be subject to any penalty.'

'This modulation of blade noise may result in a variation of the overall A-weighted noise level by as much as 3dBA (peak to trough) when measured close to a wind turbine. As distance from the wind turbine [or] wind farm increases, this depth of modulation would be expected to decrease as atmospheric absorption attenuates the high frequency energy radiated by the blade.'

In recent times the acoustics community has sought to make a distinction between the AM discussed within ETSU-R-97, which is expected at most wind farms and as such may be considered as 'Normal Amplitude Modulation' (NAM), compared to the unusual AM that has sometimes been heard at some wind farms, hereinafter referred to as 'Other Amplitude Modulation' (OAM). The term OAM is used to describe an unusual feature of aerodynamic noise from wind turbines, where a greater than normal degree of regular fluctuation in sound level occurs at blade passing frequency, typically once per second. In some appeal decisions it may also be referred to as 'Excess Amplitude Modulation' (EAM). It should be noted that the noise assessment and rating procedure detailed in ETSU-R-97 fully takes into account the presence of the intrinsic level of NAM when setting acceptable noise limits for wind farms and as indicated by Association of Acoustic Consultants of Ireland (AACI), the noise limits in the Wind Energy Development Guidelines (WEDG 2006), although not explicit, *"are evidently derived from ETSU-R-97"*.

On 16 December 2013, Renewable UK (RUK) released six technical papers¹⁴ on AM, which reflected the outcomes of research commissioned over the previous three years, together with a template planning condition. Whilst this research undoubtedly improved understanding of Other Amplitude Modulation (OAM) and its effects, it should be noted that at the time of writing it has not been endorsed by any relevant body such as the Institute of Acoustics (IOA).

On 22 January 2014, the IOA released a statement regarding the RUK research and the proposed planning condition to deal with the issue of amplitude modulation from a wind turbine and stated:

'This research is a significant step forward in understanding what causes amplitude modulation from a wind turbine, and how people react to it. The proposed planning condition, though, needs a period of testing and validation before it can be considered to be good practice. The IOA understands that RenewableUK will shortly be making the analysis tool publicly available on their website so that all interested parties can test the proposed condition, and the IOA will review the results later in the year. Until that time, the IOA cautions the use of the proposed planning condition.'

¹³ ETSU for the DTI (Department of Trade and Industry). *The Working Group on Noise from Wind Turbines ETSU-R-97 The Assessment and Rating of Noise from Wind Farms'*. 1996.

¹⁴ renewable UK. <http://www.renewableuk.com/search/all.asp?bst=amplitude+modulation>. [Online]



Research regarding amplitude modulation continued. In April 2015, the IOA issued a discussion document entitled *'Methods for Rating Amplitude Modulation in Wind Turbine Noise'*. The document presented three methods that can be used to quantify the level of AM at a given measurement location. After extensive consultation a preferred method of measuring OAM, which provides a framework for practitioners to measure and rate AM, was recommended by the IOA.

On 3 August 2015, the UK's Department for Energy and Climate Change (DECC), commissioned independent consultants WSP Parsons Brinkerhoff to carry out a literature review on OAM (which they refer to simply as AM). The stated aims were as follows:

- *"To review the available evidence on Amplitude Modulation (AM) in relation to wind turbines, including but not limited to the research commissioned and published by Renewable UK in December 2013;*
- *To work closely with the Institute of Acoustics' AM working group, who are expected to recommend a preferred metric and methodology for quantifying and assessing the level of AM in a sample of wind turbine noise data;*
- *To review the robustness of relevant dose response relationships, including the one developed by the University of Salford as part of the Renewable UK study, on which the correction (or penalty) for amplitude modulation proposed as part of its template planning condition is based;*
- *To consider how, in a policy context, the level(s) of AM in a sample of noise data should be interpreted, in particular determining at what point it causes a significant adverse impact;*
- *To recommend how excessive AM might be controlled through the use of an appropriate planning condition; and*
- *To consider the engineering/cost trade-offs of possible mitigation measures."*

Their report, which was released in October 2016, concluded that there is sufficient robust evidence that excessive AM leads to increased annoyance from wind turbine noise and recommended that excessive AM is controlled through a suitably worded planning condition, which will control it during periods of complaint. Those periods should be identified by measurement using the metric proposed by the work undertaken by the IOA, and enforcement action would rely upon professional judgement by Local Authority Environmental Health Officers based on the duration and frequency of occurrence.

It is not clear within the body of the report which evidence the authors relied upon to arrive at their conclusions, although the Executive Summary states (page 4):

"It is noted that none of the Category 1 or 2 papers have been designed to answer the main aim of the current review in its entirety. The Category 1 studies have limited representativeness due to sample constraints and the artificiality of laboratory environments, whereas the Category 2 studies generally do not directly address the issue of AM WTN exposure-response. A meta - analysis of the identified studies was not possible due to the incompatibility of the various methodologies employed. Notwithstanding the limitations in the evidence, it was agreed with DECC that the factors to be included in a planning condition should be recommended based on the available evidence, and supplemented with professional experience".



The report¹⁵ states that any planning condition must accord with existing planning guidance and should be subject to legal advice on a case by case basis. Existing guidance would include compliance with the six tests of a planning condition, which are embodied in various UK documents depending on the country e.g. Circular 4/98 in Scotland. In Ireland the same six tests are detailed within *Development Management: Guidelines for Planning Authorities (DECLG)*¹⁶ and these are; Necessary; Relevant to planning; Relevant to the development to be permitted; Enforceable; Precise; and Reasonable.

The report's authors did not dictate a particular condition to be used but did suggest that any condition should include the following elements (p5):

- *“The AM condition should cover periods of complaints (due to unacceptable AM);*
- *The IoA-recommended metric should be used to quantify AM (being the most robust available objective metric);*
- *Analysis should be made using individual 10-minute periods, applying the appropriate decibel ‘penalty’ to each period, with subsequent analysis;*
- *The AM decibel penalty should be additional to any decibel penalty for tonality; [tonality means mechanical sound already covered by ETSU noise limits]; and*
- *An additional decibel penalty is proposed during the night time period to account for the current difference between the night and day limits on many sites to ensure the control method works during the most sensitive period of the day.”*

At the time of writing there has been no official response to those recommendations from the IOA Noise Working Group and, as yet no endorsement from any Government.

At present there is no method available to predict AM and, as a result it is not possible to predict what impact the inclusion of an AM condition would have on the operation of the wind farm.

The recommendation to impose a planning condition and the associated penalty scheme is at odds with the advice from the IOA *A Good Practice Guide To The Application Of Etsu-R-97 For The Assessment And Rating Of Wind Turbine Noise* (GPG), which currently states (paragraph 7.2.10):

“The evidence in relation to “Excess” or “Other” Amplitude Modulation (AM) is still developing. At the time of writing, current practice is not to assign a planning condition to deal with AM.”

¹⁵ Department of Energy & Climate Change. *Wind Turbine AM Review Phase 2 Report*. 2016.

¹⁶ Department of the Environment, Community and Local Government *Development Management: Guidelines for Planning Authorities*. 2007 [online]



Issue 3: Health effects

Concerns about how low frequency noise emitted will lead to health complications relating to sleep, those with mental health issues, autism and epilepsy.

Response:

Experts from TNEI have been retained to review the above request and their responses are outlined below.

A large number of submissions cite concerns with regard to potential adverse health effects in relation to operational turbine noise. The majority of these concerns relate to LFN or infrasound, which has already been covered and is therefore not considered here. This response does consider however, Submission 08 (Professor Alun Evans), which specifically discusses potential health effects that might be associated with a wind farm development.

Submission 08 presents many statements regarding alleged adverse health effects attributable to wind farms but it is noted that there is not one comment, assessment or piece of evidence provided that specifically addresses the Proposed Development. Rather, the submission discusses wind turbines in general and its tone infers that adverse health effects are likely from all wind farm developments. Furthermore, the submission quotes multiple studies related to health effects associated with general noise (which could include industrial, road, rail and air traffic, construction noise etc.) and not noise specifically from wind turbines.

The fact that high levels of noise may contribute to adverse health effects is not under debate here; nor is the evidence that lack of sleep as a result of noise disturbance may contribute to adverse health effects. Both of these issues are well documented, for example, in publications such as those detailed within World Health Organization (WHO) documents. What is important is not whether high levels of noise contribute to adverse health effects but how levels of noise are assessed and controlled to remove, reduce or mitigate this risk.

Section 4 of ETSU-R-97 provides an overview of the practice and guidance in place prior to release of the document in relation to environmental noise. Many references are made to noise limits and guidance relating to minimizing adverse health effects and sleep disturbance. These include multiple references to WHO guidelines, a summary of sleep disturbance criteria and a summary of various noise level limits. References are made to limits and specific guidance throughout the world.

Section 6 of ETSU-R-97 describes the proposed wind turbine noise limits with due regard to the standards and guidelines previously discussed in Section 4. The method by which the ETSU-R-97 limits have been derived is provided in great detail and how these limits relate to the WHO guideline levels and similar guidance is clearly described. It is clear in the ETSU R-97 document, therefore, that the derived noise level limits have already considered the potential for adverse health effects and are there to protect against this.

Dr. Martin Hogan from Corporate Health Ireland has been retained to review to the request noted above and their response is outlined below.

In 2009 the World Health Organisation (WHO) issued “Night Noise Guidelines for Europe”. This explores the impacts of night time noise. It stated that in two European countries studied (Switzerland and The Netherlands), almost 50% of the population are exposed to night time noise in excess of 45dB L_{night} . It quotes some impacts at quite low night time levels and proposed an ideal noise level of 40dB L_{night} outside residences. This however is a yearly average. It does accept that this is essentially unachievable and suggests an interim value of 45dB L_{night} outside, again a yearly average.



In 2018 a major WHO review by Basner and McGuire on Environmental Noise was published in March 2018. While it mainly concentrated on road, rail and aircraft noise it did briefly discuss Wind Turbine noise. It concluded the following:

“The results of the six identified studies that measured self-reported sleep disturbance are consistent, four of the studies found an association between wind turbine noise levels and increased sleep disturbance. However, the evidence that wind turbine noise affects sleep is still limited. This finding is supported by other recent reviews on wind turbine noise and sleep disturbance. Three of the studies referred to noise specifically in the questions which could have led to a bias in the results. Also, while the results from four out of the six studies suggest that sleep disturbance due to wind turbine may occur when noise levels are above 40 or 45 dBA, for two of the studies less than ten percent of the participants were exposed to these higher noise levels. Therefore, it is difficult to make conclusions on populations exposed to these higher levels. In addition, noise levels were calculated using different methods and different noise metrics were reported in the studies.”

In October 2018 the WHO issued a full Environmental Noise Guidelines for the European Region. They were a development from the publication above. They do give specific guidelines in relation to wind turbine noise. It did however make interesting observations. It stated:

For the relationship between wind turbine noise and prevalence of hypertension, three cross-sectional studies were identified, with a total of 1830 participants (*van den Berg et al., 2008; Pedersen, 2011; Pedersen & Larsman, 2008; Pedersen & Persson Waye, 2004; 2007*).

The number of cases was not reported. All studies found a positive association between exposure to wind turbine noise and the prevalence of hypertension, but none was statistically significant. The lowest levels in studies were either <30 or <32.5 Lden. No meta-analysis was performed, since too many parameters were unknown and/or unclear. Due to very serious risk of bias and imprecision in the results, this evidence was rated very low quality.

The same studies also looked at exposure to wind turbine noise and self-reported cardiovascular disease, but none found an association. No evidence was available for other measures of cardiovascular disease.

As a result, only evidence rated very low quality was available for no considerable effect of audible noise (greater than 20 Hz) from wind turbines or wind farms on self-reported cardiovascular disease. They state that for average noise exposure they conditionally recommend reducing noise levels produced by wind turbines below 45 dB L den as wind turbine noise above this level is associated with adverse health effects.

In relation to annoyance it stated:

*Two publications containing descriptions of four individual studies were retrieved (*Janssen et al., 2011; Kuwano et al., 2014*). All four studies used measurements in the vicinity of the respondents' addresses; the noise exposure metrics used in the three original studies (*Pedersen, 2011; Pedersen & Persson Waye, 2004; 2007*) included in *Janssen et al. (2011)* were recalculated into Lden. The noise levels in the studies ranged from 29 dB to 56 dB.*

*Different scales were used to assess annoyance, with slightly different definitions of “highly annoyed” and explicit reference to outdoor annoyance in the data used for the *Janssen et al. (2011)* curve. Construction of the ERFs provided in the two publications differed and they were therefore not further combined in a meta-analysis. The 10% criterion for % Highly Annoyed (HA) is reached at around 45 dB Lden (where the two curves coincide).*



There was a wide variability in %HA between studies, with a range of 3–13%HA at 42.5 dB and 0–32%HA at 47.5 dB. The %HA in the sample is comparatively high.

Further statistical analyses of annoyance yield evidence rated low quality for an association between wind turbine noise and %HA when comparing an exposure at 42.5 dB and 47.5 dB, with a mean difference in %HA of 4.5 (indoors) and 6.4 (outdoors). There is also evidence rated moderate quality for a correlation between individual noise exposure and annoyance raw scores ($r = 0.28$). given the relatively low noise levels. There is evidence rated low quality for an association between wind turbine noise and annoyance, but this mainly applies to the association between wind turbine noise and annoyance and not to the shape of the quantitative relationship.

In relation to sleep it stated:

Six cross-sectional studies on wind turbine noise and self-reported sleep disturbance were identified (Bakker et al., 2012; Kuwano et al., 2014; Michaud, 2015; Pawlaczyk-Luszczynska et al., 2014; Pedersen & Persson Waye, 2004; 2007). Noise levels were calculated using different methods, and different noise metrics were reported. Three of the studies asked how noise affects sleep; the other three evaluated the effect of wind turbine noise on sleep using questions that explicitly referred to noise.

The risk of bias was assessed as high for all six studies, as effects on sleep were measured by self-reported data. There were a limited number of subjects at higher exposure levels. A meta-analysis was conducted for five of the six studies, based on the OR for high sleep disturbance for a 10 dB increase in outdoor predicted sound pressure level. The pooled OR was 1.60 (95% CI: 0.86–2.94). The evidence was rated low quality.

Therefore, it made no recommendation for average night-time noise exposure of wind turbines. It is stated the quality of evidence of night-time exposure to wind turbine noise is too low to allow for recommendation.

This is the most recent and authoritative guideline regards to human health effects with the guideline of 45 dB L_{den} which is a measure taking into account day, evening and night exposure.

It is important to note that the WHO guidelines are based on papers published largely peer-reviewed journals. The vast majority of these papers used L_{den} as the unit to determine noise measurements.

It is pointed out in the noise chapter of the EIAR that L_{den} is an imperfect measurement when it comes to assessing noise from wind turbines and should not be used for target noise criteria. I agree with this but that does not take away from the value of the WHO guidelines in human health terms. Health reviews are by their nature retrospective looking at any effects that may have occurred in the past there is noise criteria deal with the future.

We can be reassured when we look at the WHO guidelines that human health effects from wind turbine noise are slight and the main effect which the guideline is set to avoid annoyance. The recommendation is conditional because of the relative lack of evidence of an effect but this gives great comfort as there could be no doubt that if there was a significant effect that it would have materialised as evidence in the literature.



Issue 4: Vulnerable Individuals

A number of submissions referred to vulnerable individuals such as children who suffer from Autism Spectrum Disorder (ASD) or indeed persons recovering from cancer.

Any human community will always have vulnerable individuals. It is important to remember that all the studied areas referred to above will have included such vulnerable individuals. Indeed in 2018 the Irish Department of Health estimated the prevalence of ASD as 1% to 1.5% of the population. Therefore, virtually every wind farm in Ireland and in many countries where people are living within a few kilometres of the turbines will have people with ASD in that group.

Very often when new wind farms are proposed, there are genuine concerns expressed by parents, particularly children with ASD. They know from the life experience that they can be very sensitive to noise, a condition known as hyperacusis. One can easily search the Internet and find campaigns mothers and others in relation to wind farms and autism.

If these fears, which are genuinely held, one would certainly expect large numbers of affected children around existing wind farms with problems. This is not however worn out with experience.

While hyperacusis is a well-known symptom of Autistic Spectrum Disorder it is noteworthy that when issuing their noise guidelines for Wind Farms that the WHO have not suggested specific exclusions for certain populations such as ASD, which given the prevalence of ASD they most certainly would have done if they felt it was relevant. It is important to remember that health-based limits, such as those suggested by the WHO, are designed to protect the vulnerable and not the robust. Many people could tolerate or indeed not even notice levels substantially higher than those proposed but some people who are noise sensitive, including those with ASD need to be protected and hence the reason for these limits. This suggests that observation of the limits suggested by the WHO will be sufficient to protect the vulnerable

There is no evidence of increased risk to these groups from windfarms

Issue 5: Construction Noise and Vibration

During the construction phase of the project there will be some effect on nearby noise sensitive properties due to noise emissions from site traffic and other activities. However, given that the construction phase of the development is temporary in nature and the distances between the main construction works and nearby noise sensitive properties, it is expected that the various noise sources will not be excessively intrusive. The predicted impact is assessed as being a temporary slight negative impact and therefore no adverse health impacts are predicted. It is not considered that a significant effect is associated with the development.

While noise levels at low wind speeds will increase due to the proposed development, the predicted levels will remain low, albeit a new source of noise will be introduced into the soundscape.

The predicted operational noise effects are assessed as slight over the long term and as it has been demonstrated that the relevant national guidance in relation to noise associated with wind turbines can be satisfied, the predicted effect associated with the operational turbines is long term and not significant.



A review of the existing literature on wind turbines was performed in 2011 by Knopper. The results of this study were stated as follows:

“Conclusions of the peer reviewed literature differ in some ways from those in the popular literature. In peer reviewed studies wind turbine annoyance has been statistically associated with noise, but found to be more strongly related to visual impact, attitude to wind turbines and sensitivity to noise. To date, no peer reviewed articles demonstrate a direct causal link between people living in proximity to modern wind turbines, the noise they emit and resulting physiological health effects. If anything, reported health effects are likely attributed to a number of environmental stressors that result in an annoyed/stressed state in a segment of the population. In the popular literature, self-reported health outcomes are related to distance from turbines and the claim is made that infrasound is the causative factor for the reported effects, even though sound pressure levels are not measured.”

We can be confident, therefore, that there will be no significant adverse effect from noise on human health.

Issue 6: EIAR

EIAR doesn't address impact of the construction phase noise and vibrations or substation, battery facility.

Response:

The EIAR addresses the impact of the construction phase noise and vibrations of the proposed development as a whole. All areas and works which generate noise have already been assessed and addressed within the EIAR and this response report.

Issue 7: Significance of Effects

In response to submissions questioning the EIAR assessment outcome presented in the ES Noise Chapter, in particular to points raised by William McSweeney.

Response

Experts from TNEI have been retained to review the above request and their responses are outlined below.

This submission focuses on the EIA assessment and significance of noise impacts. It also discusses LFN and AM, this has already been addressed and is not considered here.

The submission raises concerns with the assessed significance of operational noise impacts. In this regard the ES Chapter concludes:

“With mitigation measures, operational wind farm noise levels meet the derived noise limits at all noise sensitive locations surrounding the wind farm which is not considered to be a significant impact. However, new sources of noise will be introduced into the soundscape and it is expected that there will be a slight to moderate significance of impact depending on the dwelling location.”



Submission 399 suggests that the significance of noise impacts will be much greater than slight to moderate and presents a BS 4142 style assessment of the proposed development, with and without the proposed mitigation measures to demonstrate this, however, BS 4142 is not an appropriate assessment methodology for wind turbines, as has already been addressed under the heading *Impact Assessment by Relative Level* within Section 4.1 Issue 6B, and therefore the assessment is not considered here.

Concern is also raised with how compliance can be demonstrated with any conditioned noise level limits and suggests that the use of regression analysis to determine the actual operational noise levels from the Proposed Development will underestimate the true noise level of the turbines. Page 8 of the submission goes on to say that Regression Analysis is not part of ETSU-R-97 methodology, however, this is incorrect and regression analysis is in fact the only method of determining noise levels from both baseline monitoring and compliance monitoring that is described in ETSU-R-97. Furthermore, additional detail and clarification on the compliance monitoring and analysis methods to be used is provided in the IOA GPG, which devotes two supplementary guidance documents to the subject, *Supplementary Guidance Note 2: Data Processing & Derivation of ETSU-R-97 Background Curves* and *Supplementary Guidance Note 5: Post Completion Measurements*. To conclude, the method of measuring and demonstrating compliance (or otherwise) with the noise limits is well documented within industry good practice guidelines and therefore the actual significance of impacts would not be underestimated.



5.4 Ecology

Issue 1: Water Quality

The River Blackwater SAC is 600m south of the development. There are concerns that the project will impact water supply coming from local mountain area and contaminate the river. This would directly affect Atlantic Salmon, pearl muscles and water Salmon. It is also suggested that the potential for pollution is impossible to calculate.

Response:

The potential impact of the CGEP project on the Blackwater River (Cork/Waterford) SAC was not screened out from the need for undertaking Stage 2 of an Appropriate Assessment. It was therefore fully assessed within the Natura Impact Statement and considered possible effects arising from the CGEP on the Qualifying Interests of the SAC. The NIS concluded that, once mitigation measures were included in the assessment, that there would be no likely significant effects arising from the proposed project on the SAC and no adverse effects on the site's integrity.

Issue 2: Hen harrier and other protected species

Concern as Hen Harrier and other protected species reside in the area. No development should take place if it means the demise of a species such as the Hen Harrier and other protected species. Development will also impact the habitats for these species which will negatively interfere with these species.

Response:

Hen Harrier monitoring has formed a substantial element in the Ecology chapter of the EIAR for the proposed CGEP. Although Hen Harriers formerly bred in the area around CGEP, no breeding was recorded in the area during 2021. Nevertheless, it remains possible that Hen Harriers were present but undetected during 2021, so monitoring will continue during pre-construction of the project in 2022 to confirm the conditions predicted in the EIAR.

Furthermore, although some potential Hen Harrier foraging habitats may be impacted by the proposed project, additional land (identified in a Conservation and Habitat Management Plan for Hen Harriers) will be brought into suitable condition for foraging Hen Harriers. The area of land brought under this management exceeds that area of habitat that may potentially be lost to foraging birds, therefore representing a net gain for Hen Harriers as well as a range of other species of conservation concern.

In addition, a full assessment of the possible impact of this project on Hen Harrier breeding in the area has concluded that no likely significant effects to this species will arise from the proposed project. This includes an assessment of collision risk, which determined a likely collision incidence of one Hen Harrier in 138 years (as a likely maxima), which is substantially longer than the lifetime of the windfarm.



Issue 3: Impacts on Peatlands

Concern at the degrading of peatlands and its environmental repercussions

Response:

Windfarms built on peatland can cause negative impacts for the landscape and contribute to increased emissions of greenhouse gas. However turbines are not being placed on these habitats at the proposed CGEP project, so this is not relevant here.

Issue 4: Invasive Species

Concern at the adverse impact the project and construction works will have on environment in the area. Japanese Knotweed still not eliminated in the vicinity of the site. Construction will ignite further spread of Japanese knotweed.

Response:

Appropriate mitigation measures to control the spread of invasive species have been detailed as an integral part of the proposed CGEP project.

This includes deployment measures based on Best Practice guidance (e.g. [Invasives.ie](https://invasives.ie)¹⁷) for the control and mitigation of invasive species. The deployment of these control measures will be overseen by a suitably qualified expert (specifically, a project Ecological Clerk of Works (ECoW)) appointed to ensure compliance with Best Practice management and measures.

Issue 5: Trees and Birds

Concern that the project will have a negative impact on native trees; and that the Rotating Blades Serious danger to birds and other wildlife.

Response:

Various species exhibit different morphological and behavioural attributes which may contribute to collision risk.

However, upon assessing the specifications and risks entailed, the majority of avifauna have a low collision risk with the proposed development without mitigation measures.

In relation to the native trees and wildlife, no significant changes will arise to habitats of local ecological value on the site as some additional areas previously covered in coniferous forest will be allowed to develop into semi natural grassland/ scrub. It is also noted that 62.8 hectares of commercial forestry will be felled to

¹⁷ <https://invasives.ie/>



accommodate the proposed development. Impact on renewable timber resources will be imperceptible due to replanting of forestry at an alternative site.

5.5 Visual Impact

Issue 1: Landscape

Concerns raised that given the size of the turbines, they are considered to be too close to the nearest residential receptors

Response:

The proposed turbines are all situated beyond the buffer distance requirements set out in the Draft Revised Wind Energy Development Guidelines (2019), which specify 4 X the blade tip height – in this instance 676m. Again, this is considerably further than the 500m required under the current 2006 WEDG and is intended to preserve residential and visual amenity (as well as reduce potential noise impacts). Although 169m tall turbines viewed within 1km will appear prominent and are often described in the project LVIA as having a dominant visual presence within a particular scene, this needs to be distinguished from them being spatially dominant and overbearing in relation to the viewer. Spatial dominance is not considered to occur in this instance for viewing distances beyond the minimum separation distance stipulated by the Draft revised Guidelines.

Issue 2: Turbine Quantity and Location

The proximity of the turbines is too close to residential properties and local receptors, and the number of turbines is considered to be too many for the landscape and visual context.

Response:

Some of the same response points made in respect of comments about the turbines being too large are also applicable to concerns about the overall extent / number of turbines. However, the broad landform and land use patterns in this area are considered to be able to accommodate a development of the scale without an undue conflict of scale. It is not a highly elevated and distinctive upland area and this is reflected in the designations within the Cork County Development Plan covering the landscape to the south of the Nagles ridgeline and its 'Open for Consideration' status in the Cork Wind Energy Strategy. The area within 1-2km of the turbines is also lightly populated with many of the views from nearest dwellings oriented across the lower-lying landscape to the southwest. In summary, it is a site that is better suited to a strategic-scale design response in landscape and visual terms than many others around the country.

Other than the fact that significant landscape and visual impacts were not considered to arise from the proposed wind farm in the project LVIA (disputed by a number of observers and will be dealt with below), the findings of the Route Screening Analysis (RSA) also highlights that from within the local area it is not common to have a view of more than 5-10 turbines. It is accepted that from further afield there are some areas with greater potential to see the majority of turbines, but at distances where the scheme will not have an overbearing influence on residential visual amenity.



The proposed turbines are all situated beyond the buffer distance requirements set out in the Draft Revised Wind Energy Development Guidelines (2019), which specify 4 X the blade tip height – in this instance 676m. Again, this is considerably further than the 500m required under the current 2006 WEDG and is intended to preserve residential and visual amenity (as well as reduce potential noise impacts). Although 169m tall turbines viewed within 1km will appear prominent and are often described in the project LVIA as having a dominant visual presence within a particular scene, this needs to be distinguished from them being spatially dominant and overbearing in relation to the viewer. Spatial dominance is not considered to occur in this instance for viewing distances beyond the minimum separation distance stipulated by the Draft revised Guidelines.

Issue 3: Turbine Size

The scale and height of the turbines are considered to be too large for the receiving landscape and give rise to visual dominance from surrounding visual receptors.

Response:

One of the most repeated concerns, not only because it is contained in one of the template submissions, is that the turbines are too large for this area.

The first point to make, by way of response, is that the site of the proposed development is a broad forested hilltop (Bottle Hill cluster) and broad forested hill slopes (Glannasack cluster). This combination of large scale landform and land use pattern is considered to be appropriate for tall turbines and this design approach is consistent with the Wind Energy Development Guidelines (WEDG - 2006 and draft revised 2019). The WEDG promotes a design response to tall turbines in broad scale landscapes even including the Hilly and Flat farmland landscape type) i.e., *“Turbines should relate in terms of scale to landscape elements and will therefore tend not to be tall. However, an exception to this would be where they are on a high ridge or hilltop of relatively large scale”* – this is such a landscape.

As discussed earlier in this RFI response, the 2019 draft revised WEDG seek to accommodate taller turbines in rural areas without a sense of spatial overbearing by using a height-based buffer from residential properties equivalent to 4 X the turbine tip height. In the case of the proposed turbines this requires a minimum 676m setback, which is considerably greater than the 500m required under the current 2006 WEDG and considerably less than the 755m nearest separation distance applied in this instance.

There has been an industry-wide move towards the use of taller turbines over the past decade and the proposed turbines are consistent with current trends in terms of permitted wind energy developments in similar landscapes. There is also a landscape and visual trade-off in terms of turbine density and scale to achieve an equivalent output. In other words, an alternative for this development could have been more turbines at a lower tip height potentially resulting in a higher degree of visual clutter. A good example of this trade-off is the recent permission for Barnesmore Wind Farm in Donegal to repower 25 no. 60m tall existing turbines with 13 no. 180m tall turbines achieving a much greater output capacity. Details of this permission can be found at An Board Pleanála case number PA05E.306303

Many of the submissions refer to the dominating scale of the turbines and compare them to other height comparators such as iconic tall buildings. For the purpose of a landscape and visual impact assessment, however, it is important to consider a structure in its proposed context. Given the buffer distances provided to structures (including dwellings), they will never be seen immediately beneath turbines where a ‘dwarfing’ scale comparison could be made.



More often such structures will be seen in the foreground in any views of the proposed turbines reducing the sense of scale conflict. Turbines are also slender structures that are not comparable to bulky structures such as high rise buildings.

Furthermore, in this rural landscape setting, it is considered that the broad scale land use patterns of the central study area can accommodate tall turbines to a greater degree than landscapes with more intricate landform and land use patterns.

Issue 4: Landscape and Visual Impact Judgements

Concerns that the landscape and visual impact judgements are too low / unrealistic

Response:

This is a common submission theme for nearly all wind farms and in this instance is raised by a number of submitters. The general argument made is *“how can turbines of this height not give rise to significant landscape and visual impacts?”*. The most appropriate response is that landscape and visual impact assessment is not only about scale, but also context. The LVIA methodology also has to be consistent across a broad range of development types and landscape / visual settings. At one end of the spectrum, the very highest level visual impacts will occur from the visual blocking (elimination) of a high sensitivity view, such as a scenic designation affording vast views across a pristine naturalistic landscape, by a large and uncharacteristic development. At the other end of the spectrum, the lowest order visual impacts will occur from the barely noticeable intrusion of a modest scale, characteristic development into an unremarkable and non-designated scene. Put in this context the proposed turbines are a visual intrusion, but not a visual obstruction and although they are tall moving structures that are contained within a productive rural landscape with a broad landform and land use pattern that can accommodate them. Wind turbines are an increasingly familiar and characteristic feature of Ireland’s rural landscapes and they do not appear incongruous in the proposed setting. It is for these reasons that the assessed visual impacts for the Coom Green Energy Park do not exceed the mid-high range of the impact spectrum or, therefore, the significance threshold.

Issue 5: Industrialisation of the rural landscape

Response:

This is also a common submission theme for nearly all wind farms in rural areas and this is also the basis of the response – nearly all wind farms in Ireland are in rural areas. Indeed, wind farms have become synonymous with rural areas, peatland areas and upland areas in Ireland over the past two decades and certainly much more so than they are associated with urban / urban fringe areas or offshore seascapes. Because of this familiar association they are not perceived to be an industrial feature, at least not in the more typical sense involving factories and bulky utilitarian forms. Whilst the proposed wind turbines will contribute to the intensity, diversity and scale of built development within this rural area, they are also slender and arguably elegant features dispersed throughout the receiving landscape as an additional (rather than alternative) vertical layer of productivity within a rural landscape where productivity is a key landscape value. It is acknowledged that rural residential use (unrelated to farming) is also prevalent in this area.



However, protection of rural vistas for those who choose to live in rural landscapes should not preclude other legitimate rural land uses, such as wind farms, as it risks putting non-critical private interest ahead of the public interest, which is not consistent with proper planning.

Issue 6: Sporting Community

Concerns that families will no longer wish to locate in neighbouring parish due to their own negative views on wind turbine technology which would impact the success and security of community groups and clubs.

Response:

A comprehensive analysis has been conducted surrounding the property valuation of dwellings within proximity to wind turbines which can be found in section 5.6 Issue 4 of this report.

As mentioned within this submission, the clubs and services provided throughout the parish have been operational for generations, therefore their security and success is not going to be affected by the proposed development, .

Issue 7: Photomontage

It is requested for a photomontage to be included for T2 and T8 due to the perceived visual impacts these turbines have on the landscape and surrounding area.

Response:

Additional photomontages and associated assessments have been included as part of this RFI response (see section 3.2 and RFI Photomontage set). The RFI assessments served to confirm that significant visual impacts will not occur for the overall development and this includes for turbines T2 and T8.



5.6 Human Health and wellbeing

Issue 1: Health Impacts

The Risk factors of flying broken elements from wind turbine and battery leakage may be detrimental to the local's safety and wellbeing.

Response:

The setback distance from sensitive receptors negates any risk of flying broken elements from the wind turbines or any potential of battery leakage impacting any local receptor, notwithstanding that the likelihood of this occurring is very low.

Details surrounding the battery storage and management can be found in Item 1.2 of the accompanying RFI report and the Emergency Response Plan but again the likelihood of an issue arising here is very low.

Issue 2: Shadow Flicker

The shadow flicker will have negative effect on locals' mental health. The noise and shadow flicker will disrupt locals sleep, leading to greater health complications. The shadow flicker will also lead to health complications and effect the wellbeing of those with mental health issues, autism and epilepsy.

Response:

In terms of perceived effects from shadow flicker and noise, a shadow flicker assessment has been conducted and is included in Chapter 12 of this EIAR and a Noise assessment is included in Chapter 7. In relation to shadow flicker, there will be no exceedances to the guideline limits The Developer has committed to zero shadow flicker - the turbines will be programmed to cease operating when there is a potential for shadow flicker at sensitive receptors.

A number of the submissions mentioned concerns in relation to shadow flicker in relation to disturbing people and one mentioned the possibility of affecting somebody with epilepsy.

TNEI have outlined that the shadow flicker effect is something which, for the vast majority of people, is a minor annoyance but nothing more. However, concerns have been raised that in some people with photosensitive epilepsy it could trigger a seizure.

Even with these sensitive persons, it is only a proportion of those with epilepsy who may be vulnerable. The overall number is estimated as 1 in 4000 of the population would be photosensitive to such an extent as to give the potential flashing lights to trigger an epileptic seizure. For the vast majority of weather conditions and times of the day, there can be no flicker. Firstly, it only happens during the confluence of the following conditions namely, when the wind is blowing, at certain times of the day, at certain times of the year with certain angles of the sun, when cloud is not present and would only pose even a potential risk for a tiny proportion of the day.



Here again the aforementioned, Australian study has something interesting to say and states the following:

“The Environment Protection and Heritage Council of Australia (EPHC; 2010) notes that the risk of seizures from modern wind turbines is negligible, given that less than 0.5% of the population are subject to epilepsy at any point in time and, of this proportion, 5% are vulnerable to strobe lighting (light flashes).

In the majority of circumstances (>95% of the time), the frequency threshold for individuals susceptible to strobe lighting is >8 Hz, with the remainder affected by frequencies >2.5 Hz. The EPHC estimates that the probability of conventional horizontal-axis wind turbines causing an epileptic seizure for an individual experiencing shadow flicker is <1 in 10 million in the general population.”

The risk of shadow flicker flickering an epileptic seizure therefore, even without the shutdown mechanisms, is therefore deemed to be less than one in 10 million.

In fact, with technological advances, where individual turbines will be automatically shut down in conditions that might cause shadow flicker, it will be avoided completely, and this is the case in this project.

With this shutdown scheme in place there will be no shadow flicker and, therefore, no adverse health effects. We can therefore predict that there will be no significant adverse human health effects as a result of shadow flicker

Issue 3: Signal Interference

The development will interference with broadband and television signal.

Response:

Consultation was undertaken with telecommunications providers operating in the area of the CGEP site to determine if the proposed development could have a negative effect on telecommunications services. Refer to Chapter 16 of the EIAR. The Development is not expected to interfere with broadband and television signal.

Issue 4: Devaluation of Property

Property will devalue if project goes ahead.

Response:

Property values will not be negatively affected by the proposed development. Local landowners will benefit from lease agreements and wayleave agreements associated with the lands of the proposed development. Investment opportunities in the project also may economically benefit people living in the area with respect to the provisions of the forthcoming Renewable Energy Support Scheme (RESS). The Community Benefit Scheme will provide funding for community-led and community owned projects which have been known to bolster associated property value. Alongside the community benefit scheme and the opportunity for investment and provision of local jobs, it can be ensured that the surrounding properties will not devalue if the project goes ahead.



Research from around the world has shown that wind turbines don't impact on property prices. In Ireland, some house sales adverts have even highlighted the positive views over nearby wind turbines. References and examples of such research can be found below.

Research carried out in the UK in March 2014 found that Wind farms have no negative impact on the prices of property within a 5km radius of turbines, and can even push up house prices in some areas, according to an analysis of 82,000 transactions over the past two decades. Details of this can be found in *"The Effect of Wind Farms on House Prices"*, by the Centre for Economics and Business Research (CEBR) & Renewable UK, March 2014.

A 2014 report by US researchers supported by the U.S. Department of Energy found no evidence that wind turbines have negative effects on nearby property values or home sales. The study, which involved assembling the largest-ever dataset for research of this type, examined more than 122,000 home sales in Massachusetts between 1998 and 2012 occurring within five miles of the current or future location of 41 turbines. Details of this can be found in *"A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States"* by researchers at the Lawrence Berkeley National Library, January 2014.

Another study from Ontario, Canada published in the *Canadian Journal of Agricultural Economics* (2014) analysed more than 7,000 home and farm sales over an eight-year period – from 2002 to 2010 – to capture property values before, during and after the wind farm's development. During that period, more than 1,000 homes and farms were resold, which allowed for repeat sales analysis. In every case, they found wind farms had *"no statistically significant effect"* on property values. Details of this can be found in *"Wind Farms Do Not Affect Property Values, Study Finds"* by researchers at Geulph University, December 2014 published in the *Canadian Journal of Agricultural Economics*.

A further study titled *"Impact of wind turbines on house prices in Scotland"*, by Dr Stephen Heblich et al, October 2016 was based on analysis of over 500,000 property sales in Scotland between 1990 and 2014. This study, again, found no evidence of a negative impact from wind turbines on house prices and suggests that *"generally speaking the effect is either positive...or not distinguishable from zero"*.

Issue 5: Amenity Value

The area used by many for walking and hiking will be affected. The future proposed plans for a greenway in the area will be ceased due to wind turbines.

Proximity of development to schools, local heritage sites and churches is cause for concern. Construction access routes will interfere with school bus stops.

Response:

Section 15.4.4.3 of the EIAR assesses the impact of the proposed development on amenity and heritage features. The Blackwater Way (Avondhu) national waymarked trail is a 94km walking trail that follows the course of the River Blackwater and is situated just under 4km north of the proposed turbines at its nearest point. The Killavullen looped walk intersects the Blackwater Way south of Killavullen and passes just over 1.5km northwest of the nearest turbine at its nearest point.



The construction phase has potential to impact on recreation, amenity and tourism activities within the vicinity of the site. This will likely occur due to the closure of forestry trails at the site due to construction works. These trails are used by the locals as part of Coillte's Open Forest Policy. Closure of these tracks is expected to last the duration of the construction phase of 18-24 months.

The proposed development is not within proximity to any receptors such as churches and local heritage sites which give cause for concern.

This is a temporary and minor impact which will have no lasting significant effects on the amenities and recreational uses of the area. It must also be noted that the proposed development will not in any way impact the development of any future infrastructural works in the area. In terms of scenic designations, the Cork County Development Plan contains well over 100 designated 'Scenic Routes', with 21 of these falling within the 20km radius study area. Chapter 11 of the EIAR states that, It is expected that there will be no significant, adverse impacts to recreation, amenity and tourism in the surrounding area as a result of the Coom Green Energy Park.

Section 15.4 of the EIAR outlines the magnitude of effect on amenities and assesses surrounding views of recognised scenic value. Section 15.6 of the EIAR outlines the mitigation measures which will be utilised to ensure that the proposed development will not impede upon the scenic integrity of the landscape and not negatively impact local amenities.



5.7 Battery Storage

Issue 1: Size and Standards

The Developer has provided no information in relation to battery size and adherent to international standards.

Response:

A description of the proposed battery energy storage system (BESS) is provided in Section 3.5 of Chapter 3 of the EIAR. Further detail with respect to the description of the BESS has been prepared as part of the response to the request for further information by ABP. Refer to Section 1.2 of the main RFI response report for detailed description of the proposed Battery Energy Storage System (BESS).

Issue 2: Storage

Very little information has been provided regarding the storage of these batteries.

Response:

Please refer to Section 1.2 of the main RFI response report for detailed description of the proposed Battery Energy Storage System (BESS).

Issue 3: Emergency Response Plan

There is no emergency response plan in place or stated.

Response:

An emergency response plan has been prepared by FT and accompanies this report. See Appendix 2.1.

Issue 4: Fire Risk

There is a risk of fire as the project is located within a wooded area and has the potential to escalate as the Irish fire department are not trained to deal with this.

Response:

The Battery Energy Storage System (BESS) consists of 20 no. battery storage units to facilitate on site energy storage and to provide ancillary services to the electricity grid. The units will be situated next to the onsite substation compound at Lackendarragh North. The storage units will use Lithium-ion battery storage technology, which is a widely available and globally used energy storage option which is utilised to provide storage services to the grid at a local level.



The battery storage technology to be used is comparable to the batteries found in domestic electrical appliances such as remote controls, laptops and mobile phones. The battery storage unit will be subject to adequate measures and standards in relation to fire detection, with measures in place for detecting issues, to controlling of temperatures within the storage units, the identification of potential fire risk and the incorporation of fire suppression systems. In particular the BESS units shall comply with Irish building regulations Part B (Fire Safety) of the Second Schedule to the Regulations, 2006 as amended and Irish Standard I.S. EN 54: Fire Detection and Fire Alarm Systems. The above guidance and standards provide details on the following requirements that shall be complied with in the design, construction and operation of the proposed BESS.

- Means of escape in case of fire;
- Internal fire spread (linings and structure);
- External fire spread;
- Access and facilities for the fire service;
- Fire detection and fire alarm systems.

The batteries will be located on a battery rack and sealed within a container where they will be continually monitored and controlled for performance, temperature and other safety factors. The Battery Management System (BMS) shall be capable of detecting problems (e.g. high temperatures, electrical faults) using cell and module voltage measurements and select temperature measurements within the batteries. Automatic disconnect of the batteries will occur if any unusual parameters are measured (i.e. parameters such as system temperature outside normal operational conditions). In the event of an electrical fault, the system will automatically shut down. A Fire Emergency Response Plan for On-Site BESS has been prepared as part of this response and is contained in Appendix 2.1 of this report. This report contains details on the above mentioned control and safety systems which will be implemented at CGEP.

Each battery container will comprise high-quality galvanised metal with a separate external Heating, Ventilation and Air Conditioning (HVAC) to provide external climate control. The battery containers are 16.15m (L) x 2.59 (W) x 2.9 (H) each, and will sit on concrete pad foundations above the finished ground level. Technicians can access the containers with full width steps at one end and an emergency exit with steps at the other.

The cabling trenches and access infrastructure will be completed first. The foundations necessary for elevating the battery containers will then be completed and the empty metal containers brought on to the site and accurately placed in their final position by a mobile crane. Following the placing of the containers, they are then filled with battery racks brought to the site by lorry and connected together via wiring. Upon completion of the wiring of the containerized solution, all the ancillary infrastructure (inverter units, step up transformers and cooling units) will then be installed and connected.

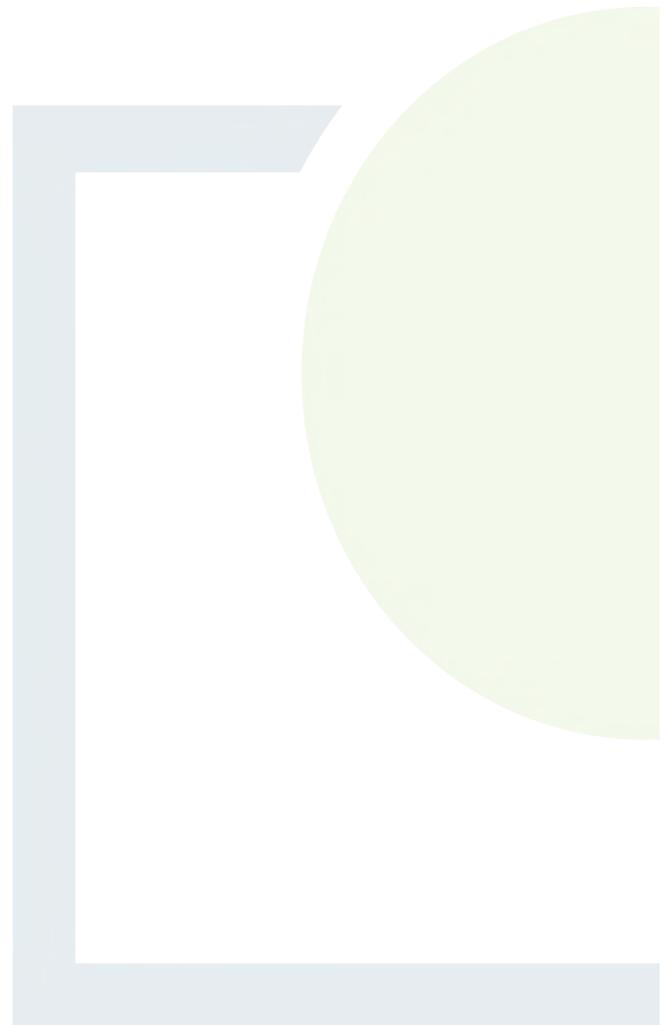
In the extremely rare instance of a fire occurring within an individual container, the internal fire suppression technology will ensure the isolation of the fire within the fireproof container. Furthermore, in the unlikely event of a fire that needs to be extinguished, any water run-off or contaminates associated with fire retardant chemicals will be wholly contained within the specific container, and will be tankered off site by an authorised waste collector to a wastewater treatment plant. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007, will be employed to transport wastewater away from the site as described in Chapter 3 of the EIAR. The internal fire suppression technology is considered robust in nature and will act as the first response in the unlikely event of a fire incident.



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APPENDIX 2.1

Battery Energy Storage
System Emergency Response
Plan





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COOM GREEN ENERGY PARK

FIRE RISK CONTROL/EMERGENCY RESPONSE PLAN FOR ON-SITE BATTERY ENERGY STORAGE SYSTEM (BESS)

Prepared for: Coom Green Energy Park Limited



Date: March 2022

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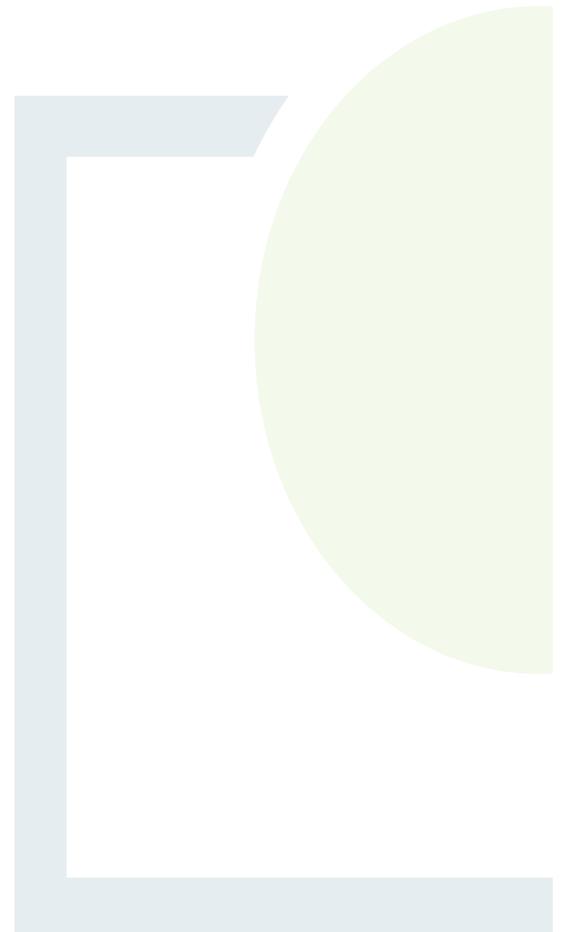


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Appendix 2: IATA Lithium Battery Guidance Document 2022

United Nations Transport of Dangerous Goods New York and Geneva, 2015.



PROPOSED DEVELOPMENT

Proposed Development

The description of the proposed development is as follows:

- The construction of 22 no. wind turbines with a tip height range of 165 metres to 169 metres, hub height range of 96 metres to 103 metres, and a rotor diameter range of 132 metres to 138 metres and ancillary works including hardstanding areas;
- Upgrade of existing site tracks and the construction of new site tracks and associated drainage infrastructure both permanent and temporary;
- 3 no. on site borrow pits and associated ancillary infrastructure within the townlands of Tooreen South, Mullenaboree and Lackendarragh North;
- Construction of up to 2 no. onsite electrical substations including control buildings and electrical plant and equipment, a battery energy storage facility, welfare facilities, carparking and waste water holding tanks within the townlands of Knockacullata and Lackendarragh North;
- 3 no. Temporary construction site compounds and associated ancillary infrastructure including parking within the townlands of Tooreen South, Knockdoorty and Lackendarragh North;
- All associated underground electrical and communications cabling within private lands connecting the wind turbines to the 2no. proposed on-site substation;
- Upgrade of existing access junctions for temporary construction access from the local roads, L-1219-0 and L-1501 within the townlands of Tooreen South and Lackendarragh North;
- Permanent access junctions; from the local road L-1219-0 within the townland of Tooreen South, and from the local road L-1501 within the townland of Lackendarragh North.
- Erection of 2no. permanent meteorological masts with a height of 100 m for the measuring of metrological conditions within the townlands of Tooreen South and Knoppoge;
- Temporary accommodation works at 5 no. locations to facilitate delivery of abnormal loads on the public road within the townlands of Grange West, Ballyhooly South, Glashaboy South and Castleblagh. These works will primarily relate to the cutting back of hedgerows and lowering of boundary walls and the temporary installation of hardcore including an off-site turning area;
- All related site works and ancillary development including landscaping and drainage;



1. FIRE RISK CONTROL

The proposed Battery Energy Storage System (BESS) for the Coom Green Energy Park will use a NEC system or similar fire suppression system with Novec 1230 clean agent as a suppression system. Novec 1230 is a widely accepted clean fire suppression agent due to its benign, non-ozone depleting characteristics. More information on the NEC system and Novec 1230 clean fire suppression agent is available in the NEC Fire Detection and Suppression Presentation included in Appendix 1 of this Emergency Response Plan.

The proposed BESS has been designed to ensure that the potential for a fire to occur has been substantially avoided. If notwithstanding these robust design measures, further described below, a fire event does occur, which is highly unlikely, measures are prescribed to ensure any such fire is automatically suppressed at an early stage.

The containers have early warning indicators to ensure no cell, rack, battery or container has a fault. In the event of a fault the system will shut down and as a final last resort the containers have a suppression system linked to smoke detectors and the other sensors. These systems are robust and meet the highest international standards for suppression in these types of facilities.

In addition any container with a fire incident will be disconnected from the mains automatically.

It is important to note the following:

- A fire event is a highly unlikely event due to the control systems employed in each container.
- All batteries are contained in non-combustible cases.
- The system is in a non-combustible container.
- If a fire event occurs an inert gas suppression system will engage and will suppress the oxygen levels within the container below the stoichiometric ratio thus extinguishing the fire.
- The fire will be contained within the container and not spread to adjacent containers.
- If a fire occurs this container will be electronically isolated and can be tackled by the local fire department, Mallow Fire Station and (or) Ballyvolane Fire Station, from the outside by cooling the container.
- As there will not be anyone occupant it would not be advisable for any fire fighters to enter the container and attempt to tackle the fire with water or foam.
- As the batteries contain lithium tackling lithium fires with mist systems is considered to be dangerous and this can cause the by product of a fire to be hydrogen which is highly volatile, therefore best practice by all BESS systems is to use an inert gas suppression system which suppresses oxygen levels in the container to extinguish fires.
- Prior to the construction and commissioning of the premises. All local fire safety staff will be briefed on the fire control systems employed and how to fight any battery container fire and what active and fire safety systems will be employed to ensure the safety of fire-fighting staff.
- The battery systems are in remote locations and if a fire event occurs the local fire fighting staff at Mallow Fire Station and Ballyvolane Fire Station, the nearest fire departments are trained to tackle battery fires or let it burn out and cool it from the outside once disconnected from the Grid.
- Please note that local fire fighters would be aware of the risks from such facilities and are trained in safety protocols on how to tackle fires at premises like this.



2. INTERNATIONAL STANDARDS

The proposed CGEP BESS will meet the highest international standards including safety standards with respect to the battery system, containers, racks, modules, cells, suppression system, fire detection and alarm systems, and emergency lighting system during design, construction and operation. The standards that the system and individual components meet are detailed below:

2.1 Overall Battery System

2.1.1 The system will meet the following standards:

- IEEE Std 1547-2018 (Revision of IEEE Std 1547-2003) – IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces
- UL 1741SA advanced inverter testing and certification for the Rule 21 tariff and other grid support documents.

2.1.2 The containers will meet the following standards:

- UL9540 Standard for Energy Storage Systems and Equipment
- IEC62040-1 Uninterruptible power systems (UPS) – Part 1: Safety requirements

2.1.3 The racks will meet the following standards:

- UL1973 Standard for Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications
- IEC62619; Safety requirements for secondary lithium cells and batteries, for use in industrial applications
- IEC61508 Functional Safety of Electrical/Electronic/Programmable Electronic Safety-relate Systems

Please note the BMS provides functional safety, certified to IEC61508 Safety Integrity Level 2 (SIL 2)

2.1.4 The modules will meet the following international standards:

- UL1973 Standard for Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications
- IEC62619; Safety requirements for secondary lithium cells and batteries, for use in industrial applications
- UN 38.3 Li-Ion Battery Transportation Safety Testing



2.1.5 The Cells will meet the following international standards:

- UL1642 Standard for Lithium Batteries
- IEC62619; Safety requirements for secondary lithium cells and batteries for use in industrial applications
- UN38.3 Li-Ion Battery Transportation Safety Testing

2.1.6 The suppression system will meet the following international standards:

- NFPA 70 and NFPA 70E for electrical safety in the workplace (National Fire Protection Association)

2.1.7 Fire Detection and Alarm system

- The fire detection and alarm system will achieve a L3XM standard for coverage and will be designed installed and commissioned in accordance with IS 3218 2013

2.1.8 Emergency Lighting system

- The Emergency Lighting system will be provided internally within containers and externally to the site and its perimeter and will be designed installed and commissioned in accordance with IS 3217 2013.

In addition to meeting international standards referenced above, The BESS shall comply with Irish building regulations Part B (Fire Safety) of the Second Schedule to the Regulations, 2006 as amended and Irish Standard I.S. EN 54: Fire Detection and Fire Alarm Systems. The above guidance and standards provide details on the following requirements that shall be complied with in the design, construction and operation of the proposed BESS.

- Means of escape in case of fire;
- Internal fire spread (linings and structure);
- External fire spread;
- Access and facilities for the fire service;
- Fire detection and fire alarm systems.

2.2 Conclusion

The proposed Coom Green Energy Park BESS system will meet best practice and international standards described in Section 2 and due to the very high level of control, monitoring and with the suppression system, a fire incident is highly unlikely. However if a fire was to take place on site, sufficient mitigation measures are in place to contain the fire and any fire water run off from same as described in Section 4 of this report.



3. RISK FROM TOXIC FUMES

As with any fire the emissions are toxic and if anyone is exposed to these there are potential adverse affects, however the risk of a fire incident is extremely low this is because:

- All batteries are contained in non-combustible cases.
- The system is in a non-combustible container.
- If a fire event occurs an inert gas suppression system will engage and will suppress the oxygen levels within the container below the stoichiometric ratio thus extinguishing the fire.
- The fire will be contained within the container and not spread to adjacent containers.
- If a fire occurs this container will be switched out and electronically isolated in order to be tackled by the local fire department, Mallow Fire Station and (or) Ballyvolane Fire Station from the outside by cooling the container
- As there will not be anyone occupant it would not be advisable for any fire fighters to enter the container and attempt to tackle the fire with water or foam.
- As the batteries contain lithium by tackling with water or mist systems this can cause the by product of a fire to be hydrogen which is highly volatile and dangerous therefore best practice by all BESS systems is to use an inert gas suppression system which suppresses oxygen levels in the container to extinguish fires.
- The battery systems are in remote locations and if a fire event occurs the local fire fighting staff will be trained to tackle the fire or let it burn out and cool it from the outside once disconnected from the Grid.
- Prior to the construction and commissioning of the premises. All local fire safety staff will be briefed on the systems employed and how to fire fight any container and what active and fire safety systems will be employed to ensure the safety of fire-fighting staff.
- Please note that local fire fighters would be aware of the risks from such facilities and are trained in safety protocols and how to tackle fires from premises like this.

A fire in this instance will have toxic emissions however due to the provision of a Battery Management System (BMS) control system, the proposed suppression system, small size of the battery containers and that the containers are of a material that is non combustible material it is highly unlikely that a fire incident will occur and as such it is highly unlikely that there will be toxic fumes emitted.

The fore runners in building standards are insurance companies who look to limit the risk to property and life. Due to this fact AIG and other companies have a best practice list of items which should be adhered to during planning and construction to mitigate the event of a fire occurring. These are detailed below and will be implemented in full:

3.1 Extract AIG Whitepaper

The current practice recommends, companies that want to use BESS's must assess their fire protection challenges and reduce their risks wherever possible.



3.1.1 Planning

It is useful to consider these questions:

- How should the BESS be constructed (e.g. using individual containers of batteries, physical separation of batteries, use of dedicated fire areas, fire protection systems etc.)?
- What testing should be conducted during commissioning?
- How do batteries of this chemistry/technology react in a fire?
- How would firefighters make sure this type of battery is fully extinguished?
- How would firefighters handle a damaged battery that is still charged with power?
- Have fire fighters been invited to site to perform a planning review?
- What are the risks to first responders and the public from exposure to toxic fumes, electricity and other hazards if a fire or other incident were to occur?
- What environmental hazards would be created when fire systems interact with failed batteries?

3.1.2 Construction

There are practical steps that organisations can take to minimise their risks when constructing a battery system:

- Use non-combustible materials.
- Check where the batteries were made/who the manufacturer is.
- Transport the batteries very carefully as they are fragile, despite their robust appearance.
- Carry out extensive testing to detect any faults.
- Ensure an effective Battery Management System is included in the design.
- For external installations:
Locate storage systems well away from critical buildings or equipment.
- Where spatial separation is not possible, provide exterior protection such as a passive thermal barrier, or active fire protection such as drenchers.
- Install battery and battery management systems/electrical switch gear in separate rooms.

3.2 Compliance with AIG's Whitepaper and Best International Practice

Please note the following with regards to the list above and how Coom Green Energy Park ensures they comply with AIG's list and best international practice:

3.2.1 Planning

As a starting point, it is useful to consider these questions as mentioned in section 2.1.1:



- **How should the BESS be constructed (e.g. using individual containers of batteries, physical separation of batteries, use of dedicated fire areas, fire protection systems etc.)?**

Coom Green Energy Park BESS systems will be constructed in containers with physical separation of batteries in racks, with each container being a dedicated fire area with fire protection systems which include the following:

- Extensive system monitors and controls which ensure if there is any alarm or fault the system is disconnected from the rack
- Automatic smoke detection which will alert the companies control centre who will remove the battery or container from the grid
- A fire suppression system which will suppress and extinguish any fire incident within the container
- Emergency lighting systems both internally and externally

The containers have early warning indicators to ensure no cell, rack, battery or container has a fault. In the event of one, the system will shut down by electronically isolating the container and as a final last resort the containers have a suppression system linked to smoke detectors and the other sensors. These systems are robust and meet the highest international standards for suppression in these type of facilities.

All containers will include a suppression system and the likelihood of a fire incident is extremely low. In addition any container with a fire incident will be disconnected from the mains automatically.

- **What testing should be conducted during commissioning?**

All systems of this type are tested to the highest international safety standards, International Fire Safety Standards (IFSS) ISBN 978 1 78321 384 9. In addition all systems will have to meet the required standards as per the Building Regulations which include:

- IS 3218 2013 for Fire Detection and Alarm systems
- IS 3217 2013 for Emergency Lighting systems
- ET 101 for Electrical Installations

- **How do batteries of this chemistry/technology react in a fire?**

A Material Data sheet for Lithium-ion detailing its hazard class (Class 9) will be supplied to the local fire department pre-construction to ensure they know the risk and potential emissions from this type of fire.

The Lithium-Ion systems have been assessed for their reaction in the event of a fire and mitigation measures have been employed to prevent and limit any fire event. The system controls, removal from the grid and suppression system ensure that any fire event is minimized and limited to the container. The emissions from these type of potential fires have been identified (such as toxic hydrogen fluoride gas) and due to this reason CGEP will ensure all active and passive fire systems meet the highest international and Irish standards, International Fire Safety Standards (IFSS) ISBN 978 1 78321 384 9.

All local fire fighters from Mallow and Ballyvolane fire stations will be briefed on the systems employed to ensure their safety on site before construction of the BESS.



- **How would firefighters make sure this type of battery is fully extinguished?**

Fire fighters will be briefed prior to construction and commissioning on all the systems. Please note all battery containers are built with multiple levels of safety systems in place to mitigate the risk of fire. However, in the unlikely event that a smoke or heat event is detected by our fire detection system, all DC battery racks will be safely disconnected and the related Process Control System (PCS) is shut down.

While each battery zone is equipped with a DC manual disconnect, the master controller within the BMS will automatically command the contactors of all BMS's in the zone to open and disconnect in the event that heat or smoke is detected. In addition the containers will be provided with fire suppression which should extinguish and contain any incident to one container. Once disconnected the containers can be approached similar to any other fire incident.

The Applicant is also proposing a L3X automatic detection and alarm system in accordance with IS 3218 2013 which will provide early warning to any personnel on site which will also be radio linked to the local fire station, Mallow Fire Station and (or) Ballyvolane Fire Station, which will enable a rapid response from the local retained fire brigade. This system comprises of heat detectors and smoke detectors. Prior to construction and the premises being made operational all local fire stations, Mallow Fire Station and Ballyvolane Fire Station, will be provided with the Emergency Response Plan.

- **How would firefighters handle a damaged battery that is still charged with power?**

Coom Green Energy Park will engage with the local fire department and local Fire fighters will be trained to handle the damaged battery or will be directed to leave for Coom Green Energy Park staff to remove when they are on site.

- **Have fire fighters been invited to site to perform a planning review?**

Subject to a successful planning and prior to construction a Fire Safety Certificate will have to be submitted for approval to Cork County Council for the development. During this process Coom Green Energy Park will engage with Cork County Fire Department and particularly the head of operations in Cork County Fire Department and all local Station Officers and sub-station officers will be trained up on Coom Green Energy Park Systems and best practice in tackling fires on site. This is of paramount importance to Coom Green Energy Park and the local Fire Department, this will be a minimum requirement of Cork County Fire Departments prior to the granting of a Fire Safety Certificate for the buildings pre-construction.

- **What are the risks to first responders and the public from exposure to toxic fumes, electricity and other hazards if a fire or other incident were to occur?**

The premises is in a relatively remote location and it is anticipated that in the unlikely event of a fire incident there will be very little emissions from the containers as the fire should be suppressed and extinguished. There should be very few members of the public near the site and none will be on site as the site is a secure site which is remotely monitored and alarmed.

The premises are generally unmanned and the first responders will be the Fire Department as there should be no occupants on site for paramedics to tend to. In the event of a casualty the fire department will liaise with local paramedics in how to enter site and ensure their health and safety.



- **What environmental hazards would be created when fire systems interact with failed batteries?**

The environmental hazards depend on the extent of a fire however we envisage two scenarios:

1. Most likely:

If a fire is extinguished within a container then the majority of the inert gas which suppressed the fire would dissipate through the vents. There will most likely be a small amount of inert gas within the container when it is opened, this will readily dissipate into the atmosphere and will have a negligible affect on atmospheric conditions.

2. Less Likely:

If a fire grows within the container and cannot be extinguished and there is thermal runaway, due to the nature of the containers which are non-combustible these should remain within the container with emissions coming from the doors and vents. These will be tackled externally by the local fire department using an AFFF (Aqueous Fluoro Foam Forming) foam mixed with water which will be provided by stored water from the onsite rainwater holding tanks and supplemented by imported water from tanker trucks as required. Runoff shall be contained within the compound drainage network. The outfall will be temporarily blocked and contaminated water shall be pumped out and removed from site via tanker truck to be treated at a licensed wastewater treatment facility such as Ballyellis Waste Water Treatment Plant, Mallow, Co. Cork. This will all be addressed as part of a Commencement Notice under BCAR of the building Regulations.

3.2.2 Construction

There are practical steps that organisations can take to minimise their risks when constructing a battery system:

- **Use non-combustible materials.**
The containers are of metal construction which are non-combustible. In addition all batteries are held in non-combustible shells.
- **Check where the batteries were made/who the manufacturer is.**
Coom Green Energy Park will ensure that the batteries are procured from the best international manufacturers who meet the highest international safety standards i.e. NEC, Siemens etc.
- **Transport the batteries very carefully as they are fragile, despite their robust appearance.**
Coom Green Energy Park ensure that safety is of the highest importance during any transportation of the batteries. All batteries are transported to site using best international practice (IATA 2022 Lithium Battery Guidance Document), the applicant refers to guidance within Appendix 2, IATA document: Transport of Lithium Metal and Lithium Ion Batteries.
- **Carry out extensive testing to detect any faults.**
Due to the nature of the systems and connecting to the Grid all systems are rigorously tested during commissioning. The systems have extensive monitors and alarms which will indicate any alarm or fault with any part of the system before and during operation.
- **Ensure an effective Battery Management System is included in the design.**
Coom Green Energy Park will ensure an effective Battery Management System will be procured with 24/7 monitoring with key safety protocols to ensure a fire incident will not occur.



For external installations:

- **Locate storage systems well away from critical buildings or equipment.**
The storage systems have been designed and located with an appropriate setback distance from the site boundary and any control buildings or equipment to ensure that there is no fire spread. This will be confirmed during the Fire Safety Certificate process to comply with Section B4 of Technical Guidance Document.
- **Where spatial separation is not possible, provide exterior protection such as a passive thermal barrier, or active fire protection such as drenchers.**
The storage systems will be sufficiently located away from the site boundary and any control buildings or equipment to ensure that there is no fire spread. This will be confirmed during the Fire Safety Certificate process to comply with Section B4 of Technical Guidance Document. Where this cannot be achieved Coom Green Energy Park will provide exterior protection, either a passive thermal barrier, or active fire protection such as drenchers.
- **Install battery and battery management systems/electrical switch gear in separate rooms.**
The Battery Management System will be housed in the sub-station separate to the battery containers and will be monitored 24/7 by Coom Green Energy Park network control centre where any fault or alarm will be addressed immediately.

3.3 Conclusion:

As detailed above Coom Green Energy Park will comply with AIG's white paper for Lithium- Ion Battery Energy Storage Systems and best international practice for transportation of Lithium Ion Batteries (IATA 2022 Lithium Battery Guidance Document in Appendix 2).



4. RISK FROM CONTAMINATED FIRE WATER

It is proposed to bund (walled structure surrounding the BESS area to prevent contaminated fire water run-off from spreading) the site and external contractors will be employed to remove all fire water runoff and dispose of it at an EPA waste water licensed site. Coom Green Energy Park will ensure that the local water course and supply are not affected by any fire water run-off by bunding the BESS area.

4.1 Key Fire Safety Features of Coom Green Energy Park Battery Energy Systems.

Please note Coom Green Energy Park will use systems that are built with multiple levels of safety systems in place to mitigate the risk of fire. However, in the unlikely event that a smoke or heat event is detected by our fire detection system, all DC battery racks will be safely disconnected and the related PCS is shut down.

While each battery zone is equipped with a DC manual disconnect, the Master Controller will automatically command the contactors of all BMS's in the zone to open (disconnect) in the event that heat or smoke is detected.

A decision has not been made on the system or suppression supplier to date and this FI response is not intended to definitively identify a supplier, however an appropriate battery and suppression system similar to NEC's will be provided in each container using optical smoke sensors to detect presence of a fire; include a centrally located internal strobe light/horn to provide indication of smoke and fire detection for personnel inside the container, and external strobe light(s) to notify personnel outside the container; uses a gaseous, clean firefighting agent (Novec 1230) to suppress fire supplemented by internal water spray system for first responders to operate; include security cameras to provide remote video of conditions inside the container. There are early warning indicators to ensure no cell, rack, battery or container has a fault.

In the event of a fault the system will shut down by electronically isolating the container and as a final last resort the containers have a suppression system linked to smoke detectors and the other sensors. These systems are robust and meet the highest international standards (IFSS 2020 ISBN 978 1 78321 384 9) for suppression in these type of facilities.

As every container will be provided with an internal suppression system. A fire incident will be restricted to one container and will not increase to a sizeable heat to transfer the fire to other containers.

Please note the risk of fire is greatly reduced with the provision of a suppression system within each unit, this is considered acceptable as:

- An automatic suppression system is proposed;
- An early warning system is proposed;
- An emergency lighting system is proposed;
- All occupants will be staff and will only be within any container for a short period of time and will not be in the container when operational;
- There are two escape routes from each container;



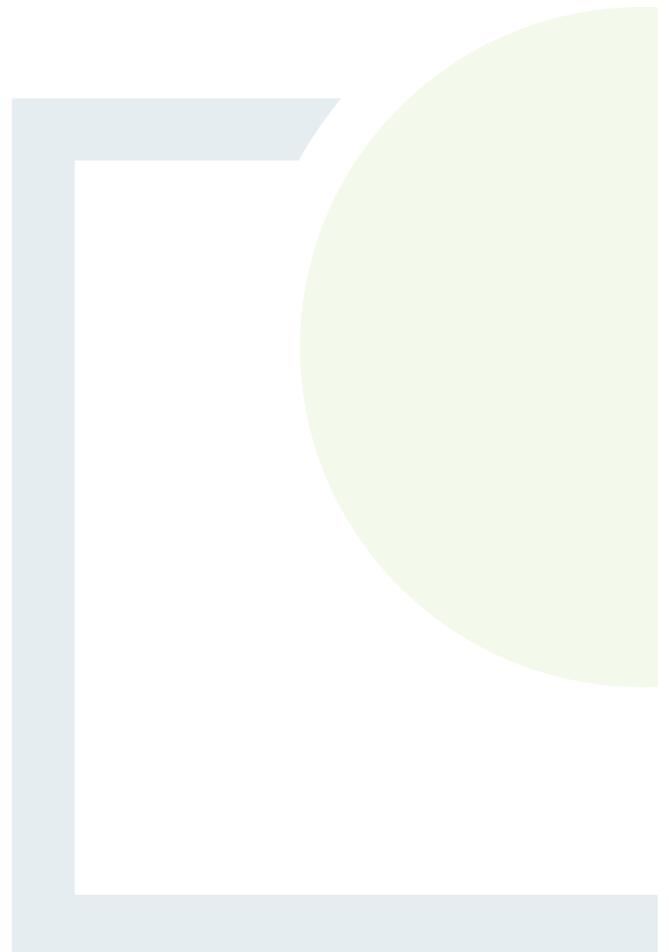
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- All fire cues will be immediately apparent. Internal strobe light and horn to provide indication of smoke and fire detection for personnel inside the container, and external strobe light(s) to notify personnel outside the container;
 - All occupants will be alert able bodied and able to safely egress unaided;
 - There is sufficient means of escape;
 - There is a low occupancy level;
 - The containers are non-combustible and as there will be a suppression system it is considered that a fire will not grow to a sufficient size to cause external fire spread;
 - The container in which a fire incident occurs will be electronically isolated and can be tackled and cooled from the outside;
 - The management of the facility will be able to respond to an emergency in a reasonable time. Alarms and warnings will be monitored 24/7 by the operational team.



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APPENDIX 1

NEC- Fire Detection and
Suppression



NEC \ Orchestrating a brighter world

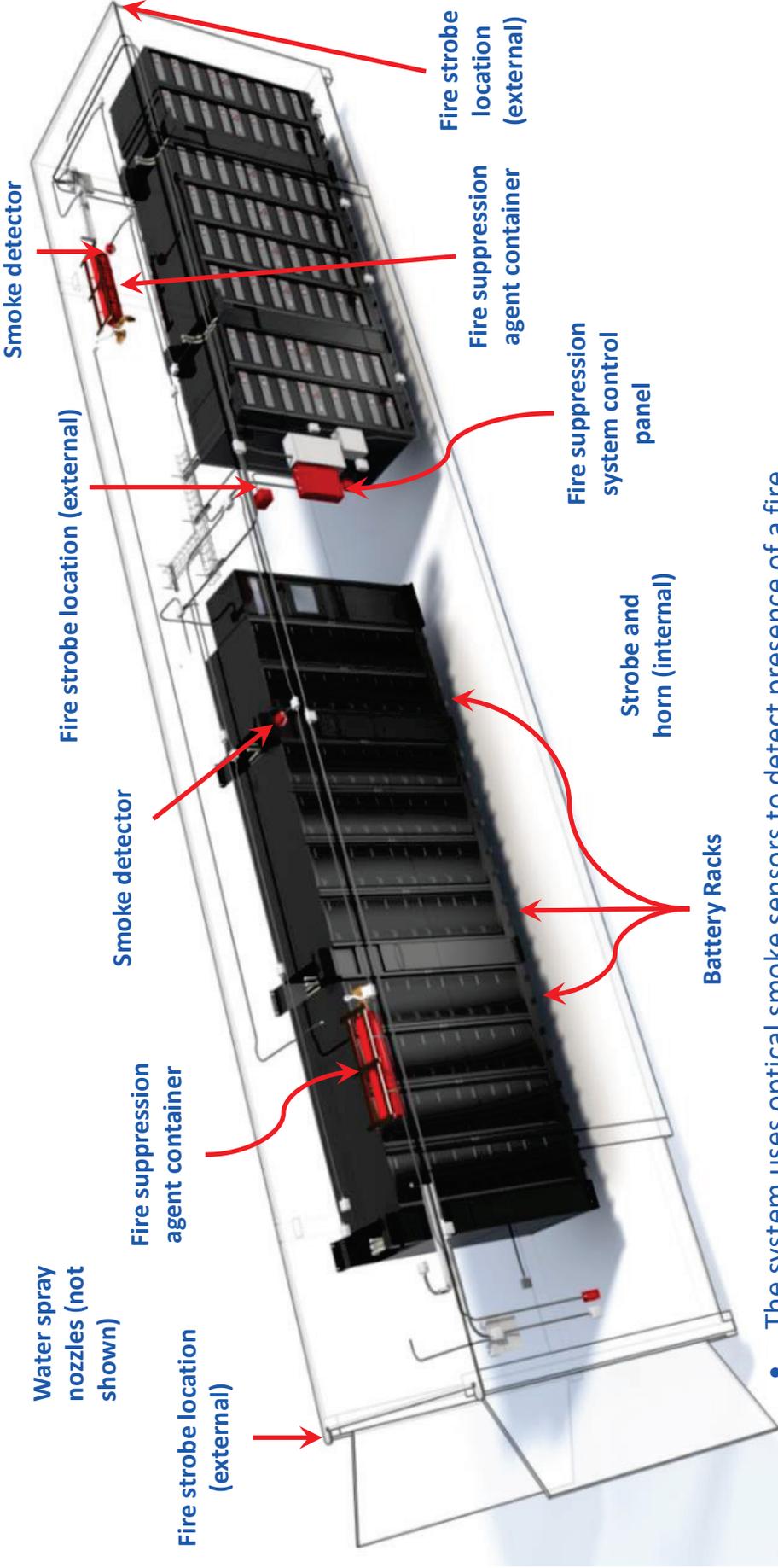
Fire Detection and Suppression

UL 9540A large-scale fire test results

NEC Energy Solutions



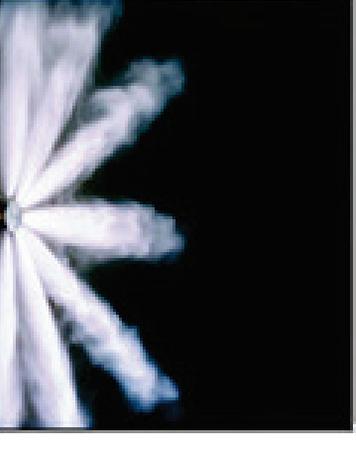
On-board Fire Protection System Overview



The GBS® is the DC energy storage component of the NEC Energy Solutions GSS®. Each GBS® is equipped with dedicated fire detection and suppression system.

- The system uses optical smoke sensors to detect presence of a fire.
- The system has a centrally located internal strobe light/horn to provide indication of smoke and fire detection for personnel inside the container, and external strobe light(s) to notify personnel outside the container.
- The system uses a gaseous, clean firefighting agent to suppress fire supplemented by internal water spray system for first responders to operate
- The system also has optional security cameras to provide remote video of conditions inside the container.

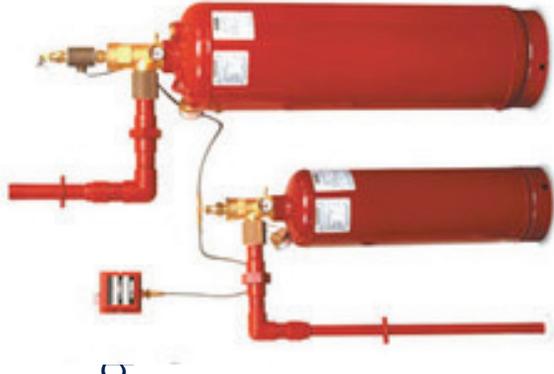
How it Works



- **Automatic release of fire suppression agent**
 - A single detection of smoke or fire in the GBS will cause
 - Signal sent to fire suppression system
 - Strobe light operation, horn sound at 60BPM
 - High voltage contactors will open (switch to "Off" mode)
 - A second detection will cause
 - Same as previous, but horn now sounds at 120BPM, plus
 - Time delay countdown (20 sec) begins and is displayed on the control panel
 - Upon expiration of time delay, horn sounds steadily, and the fire suppression agent will be discharged, flooding the GBS container
- **Manual release of fire suppression agent**
 - Horn and strobe operate continuously
 - Time delay countdown (only 10 sec for manual release) begins and is displayed
 - Upon expiration of time delay system will respond in the same manner as above
- **Abort switch can be operated at any time**
 - Manual release switch can be operated at any time and will override the Abort
- **Optional autodial notification to local fire and other authorities is available.**
- **As first responders arrive, water spray system supplied with water to fully extinguish fire**

Fire Suppression Agent

- Novec 1230 clean agent
 - Fluoroketone; non-ozone depleting; breaks down rapidly in the atmosphere
 - Colorless, odorless, non-toxic, electrically non-conductive vapor
 - Stored as a liquid
 - When discharged, the fluid quickly evaporates into a gaseous state.
 - Agent suppresses fire by removing heat from the fire
 - Agent suppresses flame rapidly, helps prevent re-ignition, leaves no residue and rec cleanup after discharge.
- Novec 1230 is a widely accepted clean fire suppression agent due to its benign, non-ozone depleting characteristics.



Typical fire suppression clean agent container

Fire Suppression Agent Determination Test

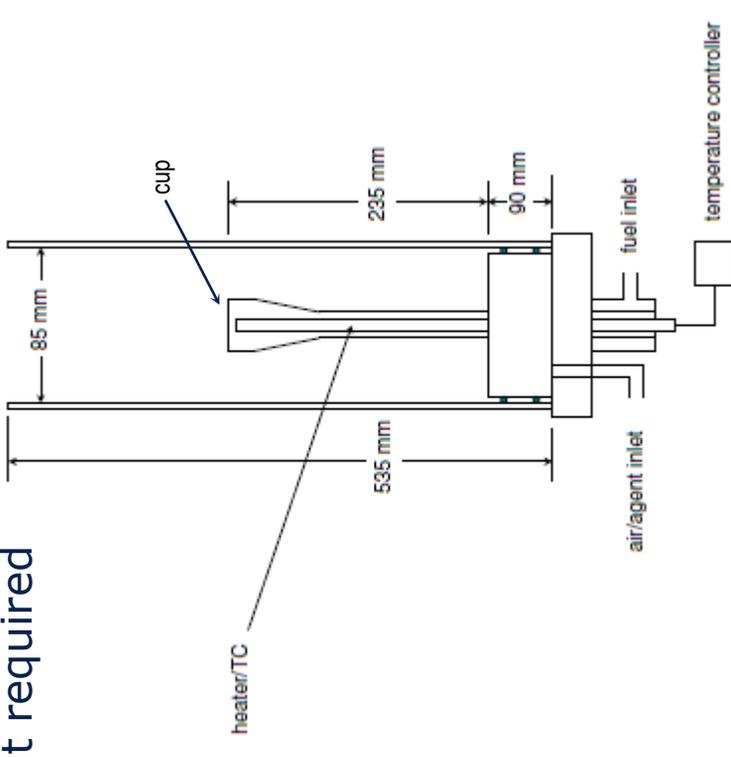
- Cup Burner Method used to determine level of fire suppression agent required
 - In accordance with NFPA 2001 Standard on Clean Agent Fire Extinguishing Systems (2012 edition), Appendix B
- Pure battery electrolyte used as fuel
 - Most flammable component of battery; permanently sealed inside the cells
 - Heated to the point of combustion and fire

Cell component	Chemical Name	CAS No.	EINECS	Concentration range in electrolyte (w/w %)	Mass range in cell (g/g %)
Electrolyte salt	Lithium hexafluorophosphate	21324-40-3	244-334-7	10 - 20	1 - 5
Electrolyte solvents	Includes one or more of the following: Ethylene Carbonate, Propylene Carbonate, Diethyl Carbonate, Dimethyl Carbonate Ethyl Methyl Carbonate	96-49-1 108-32-7 105-58-8 616-38-6 623-53-0	202-510-0 203-572-1 203-311-1 210-478-4 Not Listed	80 - 90	10-20

- Agent is introduced at various concentrations

- Test determined concentration of agent in air required to extinguish flame

- This concentration is used in the design of the fire suppression system to determine how much clean agent is required



Cup Burner Method; test apparatus set up

UL9540A Installation Level Large-Scale Fire Test

BEFORE

AFTER



Summary

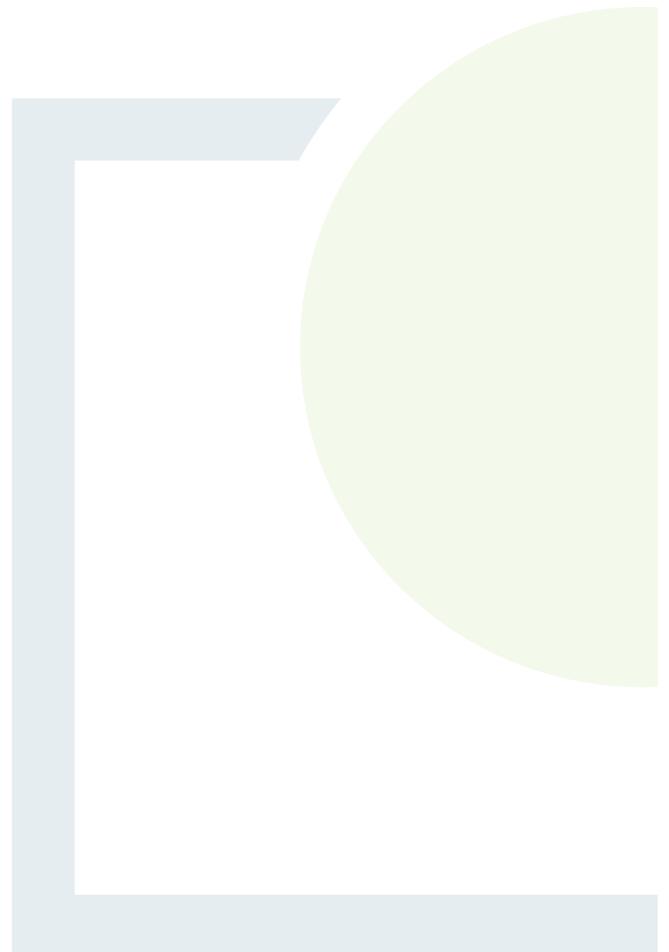
- GBS® battery container is designed with a dedicated fire detection and suppression system in case all other safety measures fail
 - Uses multiple smoke detectors to identify presence of a fire
 - Indicates visual/audible smoke and fire detection both internal and external to GBS container
 - Fans and high voltage contactors automatically respond to fire detection to reduce hazard level
 - Clean agent + water effectively prevents propagation and extinguishes flames
- Clean agent can be used to suppress incipient fires inside container, and followed up with water spray system, full extinguishing with no re-ignition was seen in third-party laboratory testing
 - Clean agent concentrations are determined specifically to combat fires involving lithium-ion battery cells
 - Successfully tested at UL fire test laboratory in accordance with UL 9540A



CONSULTANTS IN ENGINEERING,
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APPENDIX 2

IATA Lithium Battery
Guidance Document 2022





2022 Lithium Battery Guidance Document

Transport of Lithium Metal and Lithium Ion Batteries

Revised for the 2022 Regulations

Introduction

△ This document is based on the provisions set out in the 2021-2022 Edition of the ICAO *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Technical Instructions) and the 63rd Edition of the IATA Dangerous Goods Regulations (DGR).

The provisions of the DGR with respect to lithium batteries may also be found in the IATA lithium Battery Shipping Regulations (LBSR) 9th Edition. In addition to the content from the DGR, the LBSR also has additional classification flowcharts and detailed packing and documentation examples for lithium batteries.

Information on the DGR and LBSR can be found here:

<http://www.iata.org/dgr>

<http://www.iata.org/lbsr>

The purpose of this document is to provide guidance for complying with provisions applicable to the transport by air of lithium batteries as set out in the DGR. Specifically, the document provides information on:

- Definitions;
- Classification (including classification flowcharts);
- Prohibitions;
- Restrictions;
- Frequently Asked Questions
- Additional Information
- Abbreviations, Acronyms, Symbols

Definitions

Lithium Battery – The term “lithium battery” refers to a family of batteries with different chemistries, comprising many types of cathodes and electrolytes. For the purposes of the DGR they are separated into:

Lithium metal batteries. Are generally primary (non-rechargeable) batteries that have lithium metal or lithium compounds as an anode. Also included within lithium metal are lithium alloy batteries. Lithium metal batteries are generally used to power devices such as watches, calculators, cameras, temperature data loggers, car key fobs and defibrillators.

△ **Note:**

Lithium metal batteries packed by themselves (not contained in or packed with equipment) (Packing Instruction 968) are forbidden for transport as cargo on passenger aircraft. In accordance with Special Provision A201, lithium metal cells or batteries that meet the specified quantity limits may be shipped on a passenger aircraft under an approval issued by the authority of the State of Origin, State of Destination and State of the Operator. Or in the case of urgent medical need, one consignment of lithium batteries may be transported as Class 9 (UN 3090) on passenger aircraft with the prior approval of the authority of the State of Origin and with the approval of the operator, see Special Provision A201. All other lithium metal cells and batteries can only be shipped on a passenger aircraft under exemption issued by all States concerned.



Lithium-ion batteries (sometimes abbreviated Li-ion batteries) are a secondary (rechargeable) battery where the lithium is only present in an ionic form in the electrolyte. Also included within the category of lithium-ion batteries are lithium polymer batteries. Lithium-ion batteries are generally used to power devices such as mobile telephones, laptop computers, tablets, power tools and e-bikes.



Note:

Lithium ion batteries packed by themselves (Packing Instruction 965) (not contained in or packed with equipment):

(a) must be shipped at a state of charge (SoC) not exceeding 30% of their rated capacity. Cells and/or batteries at a SoC of greater than 30% may only be shipped with the approval of the State

of Origin and the State of the Operator under the written conditions established by those authorities, see Special Provision A331; and

- △ (b) *in accordance with Special Provision A201, lithium ion cells or batteries that meet the specified quantity limits may be shipped as cargo on a passenger aircraft under an approval issued by the authority of the State of Origin, State of Destination and State of the Operator. Or in the case of urgent medical need, one consignment of lithium batteries may be transported as Class 9 (UN 3480) on passenger aircraft with the prior approval of the authority of the State of Origin and with the approval of the operator, see Special Provision A201. All other lithium ion cells and batteries can only be shipped as cargo on a passenger aircraft under exemption issued by all States concerned.*

Aggregate lithium content means the sum of the grams of lithium content contained by the cells comprising a battery.

The technical definition of a battery and cell, as indicated in the UN *Manual of Tests and Criteria*, is as follows:

Battery means two or more cells or batteries which are electrically connected together and fitted with devices necessary for use, for example, case, terminals, marking and protective devices. Units which have two or more cells that are commonly referred to as "battery packs", "modules" or "battery assemblies" having the primary function of providing a source of power to another piece of equipment are for the purposes of the UN Model Regulations and this guidance document treated as batteries. See definitions for "cell" and "single cell battery". (See also "Power Banks")

Button cell or battery means a round small cell or battery when the overall height is less than the diameter.

Cell means a single encased electrochemical unit (one positive and one negative electrode) which exhibits a voltage differential across its two terminals. Under the UN Model Regulations, UN *Manual of Tests and Criteria* and this guidance, to the extent the encased electrochemical unit meets the definition of "cell" herein, it is a "cell", not a "battery", regardless of whether the unit is termed a "battery" or a "single cell battery" outside of the UN Model Regulations, the UN *Manual of Tests and Criteria* and this guidance.

Consignment, one or more packages of dangerous goods accepted by an operator (airline) from one shipper at one time and at one address, receipted for in one lot and moving to one consignee at one destination address.

Net quantity, either:

- (a) the weight or volume of the dangerous goods contained in a package excluding the weight or volume of any packaging material; or
- (b) the weight of an unpackaged article of dangerous goods (e.g. UN 3166).

For the purposes of this definition "dangerous goods" means the substance or article as described by the proper shipping name shown in Table 4.2, e.g. for "Fire extinguishers", the net quantity is the weight of the fire extinguisher. For articles packed with equipment or contained in equipment, the net quantity is the net weight of the article, e.g. for "Lithium ion batteries contained in equipment", the net quantity is the net weight of the lithium ion batteries in the package.

Overpack means an enclosure used by a single shipper to contain one or more packages and to form one handling unit for convenience of handling and stowage. Dangerous goods packages contained in the overpack must be properly packed, marked, labelled and in proper condition as required by the IATA Dangerous Goods Regulations.

The overpack must not contain packages enclosing different substances which might react dangerously with each other or packages of dangerous goods which require segregation according to Table 9.3.A. In addition, packages containing UN 3090, lithium metal batteries prepared in

accordance with Section IA or Section IB of PI968 or UN 3480, lithium ion batteries prepared in accordance with Section IA or Section IB of PI 965 are not permitted in an overpack with packages containing dangerous goods classified in Class 1 other than Division 1.4S, Division 2.1, Class 3, Division 4.1 or Division 5.1.

Power bank (power pack, mobile battery, etc.), these are portable devices designed to be able to charge consumer devices such as mobile phones and tablets. For the purposes of this guidance document and the IATA Dangerous Goods Regulations, power banks are to be classified as batteries and must be assigned to UN 3480, lithium ion batteries, or UN 3090, lithium metal batteries, as applicable. For carriage by passengers, power banks are considered spare batteries and must be individually protected from short-circuit and carried in carry-on baggage only.

Rated capacity means the capacity, in ampere-hours or milliampere-hours, of a cell or battery as measured by subjecting it to a load, temperature and voltage cut-off point specified by the manufacturer.

Note:

The following IEC standards provide guidance and methodology for determining the rated capacity:

- (1) IEC 61960 (First Edition 2003-12): Secondary cells and batteries containing alkaline or other non-acid electrolytes -Secondary lithium cells and batteries for portable applications;*
- (2) IEC 62133 (First Edition 2002-10): Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications;*
- (3) IEC 62660-1 (First Edition 2011-01): Secondary lithium-ion cells for the propulsion of electric road vehicles-Part 1: Performance testing.*

State of Origin, the country (State) in the territory of which the consignment is to first be loaded on an aircraft.

State of the Operator, the country (State) in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

Watt-hour rating, expressed in Watt-hours (Wh), the Watt-hour rating of a lithium cell or battery is calculated by multiplying the rated capacity in ampere-hours by the nominal voltage.

Classification (DGR 3.9.2.6)

Lithium batteries are classified in Class 9 – Miscellaneous dangerous goods as:

- UN 3090, **Lithium metal batteries**; or
- UN 3480, **Lithium ion batteries**

or, if inside a piece of equipment or packed separately with a piece of equipment to power that equipment as:

- UN 3091, **Lithium metal batteries contained in equipment**; or
- UN 3091, **Lithium metal batteries packed with equipment**; and
- UN 3481, **Lithium ion batteries contained in equipment**; or
- UN 3481, **Lithium ion batteries packed with equipment**.

Lithium battery test summary –manufacturers and subsequent distributors of cells or batteries and equipment powered by cells and batteries manufactured after 30 June 2003 must make available the test summary as specified in the UN *Manual of Tests and Criteria*, Revision 7. 1, Part III, sub-section 38.3, paragraph 38.3.5.

Note:

The requirement is for the manufacturer and subsequent distributors to make this test summary available. There are numerous ways this can be achieved, such as by listing the applicable summary document on the company website. There is no expectation for the shipper/distributor to provide paper copies with each consignment containing lithium batteries. The supply chain are encouraged to make use of technology to facilitate the availability of the test summary.

The following table provides details of the information required in the test summary:

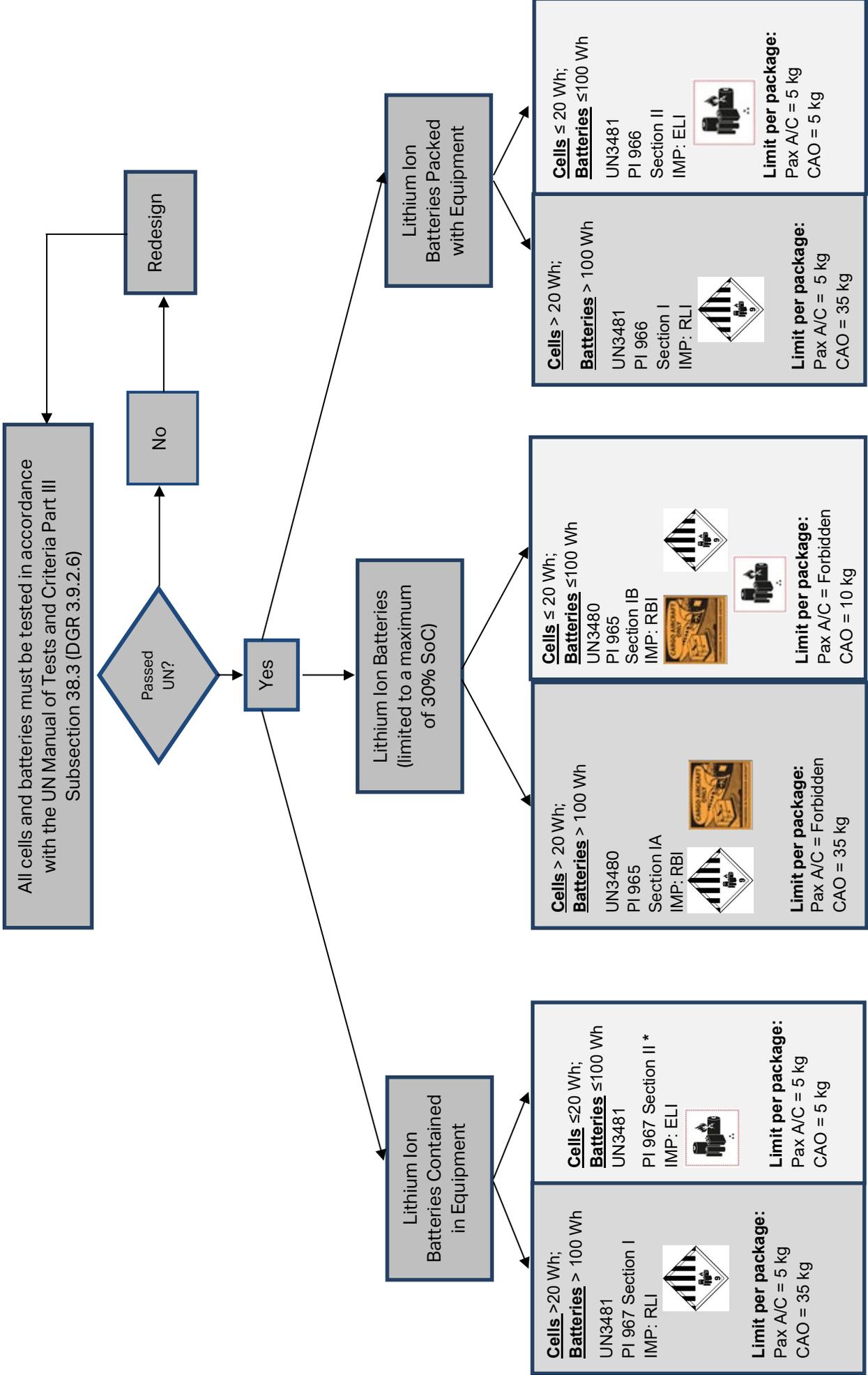
Lithium cell or battery test summary in accordance with sub-section 38.3 of Manual of Tests and Criteria
<p>The following information shall be provided in this test summary:</p> <ul style="list-style-type: none"> (a) Name of cell, battery, or product manufacturer, as applicable; (b) Cell, battery, or product manufacturer's contact information to include address, phone number, email address and website for more information; (c) Name of the test laboratory to include address, phone number, email address and website for more information; (d) A unique test report identification number; (e) Date of test report; (f) Description of cell or battery to include at a minimum: <ul style="list-style-type: none"> (i) Lithium ion or lithium metal cell or battery; (ii) Mass; (iii) Watt-hour rating, or lithium content; (iv) Physical description of the cell/battery; and (v) Model numbers. (g) List of tests conducted and results (i.e., pass/fail); (h) Reference to assembled battery testing requirements, if applicable (i.e. 38.3.3 (f) and 38.3.3 (g)); (i) Reference to the revised edition of the Manual of Tests and Criteria used and to amendments thereto, if any; and (j) Signature with name and title of signatory as an indication of the validity of information provided.

Further information on the test summary and FAQ's is available in [Part 4](#) of this guidance document.

△ **Classification Flowcharts**

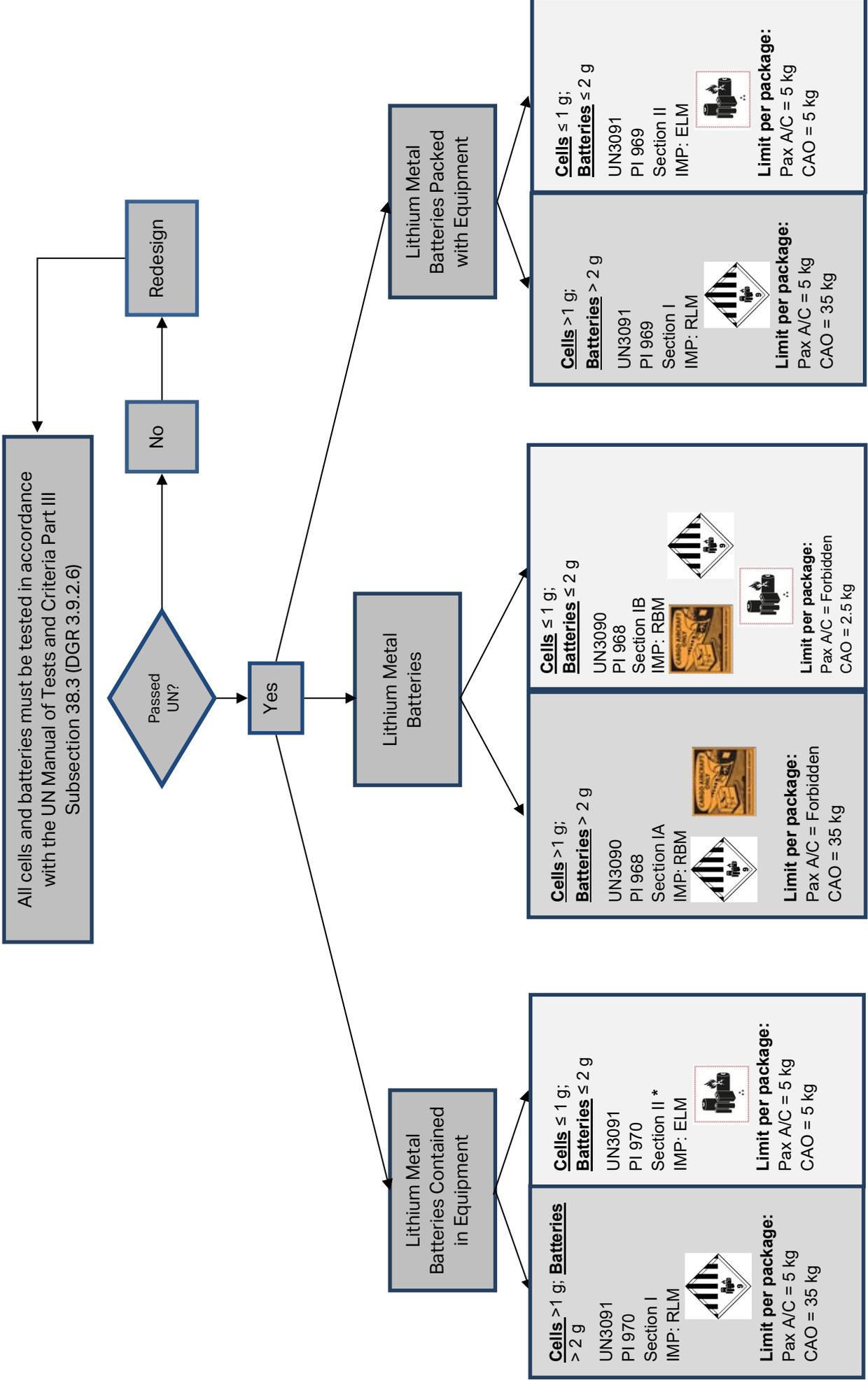
The following (2) classification flowcharts are intended to provide guidance on the classification for lithium ion and lithium metal batteries.

Classification Flowchart – Lithium Ion Batteries



* exceptions exist to the marking requirements – see PI 967 Section II

Classification Flowchart – Lithium Metal Batteries



* exceptions exist to the marking requirements – see PI 970 Section II

Prohibitions

Lithium ion batteries

All lithium ion cells and batteries shipped by themselves (UN 3480) are forbidden for transport as cargo on passenger aircraft. All packages prepared in accordance with Packing Instruction 965, Section IA and IB, must bear a Cargo Aircraft Only label, in addition to other required marks and/or labels.

Lithium metal batteries

All lithium metal cells and batteries shipped by themselves (UN 3090) are forbidden for transport as cargo on passenger aircraft. All packages prepared in accordance with Packing Instruction 968, Section IA and IB, must bear a Cargo Aircraft Only label, in addition to other required marks and/or labels.

Restrictions

Lithium ion batteries

All lithium ion cells and batteries (UN 3480 only) must be shipped at a state of charge (SoC) not exceeding 30% of their rated capacity. Cells and/or batteries at a SoC of greater than 30% may only be shipped with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities, see Special Provision A331.

Packing Restrictions

PI 965 & PI 968 Section IA & IB

UN 3090, lithium metal batteries prepared in accordance with Section IA or Section IB of PI 968 and UN 3480, lithium ion batteries prepared in accordance with Section IA or Section IB of PI 965 must not be packed in the same outer packaging with dangerous goods classified in Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers). Packages containing cells or batteries must not be placed in an overpack with packages containing dangerous goods classified in Class 1 other than Division 1.4S, Division 2.1, Class 3, Division 4.1 or Division 5.1.

⊗

Frequently Asked Questions

Part 1 – Questions Related to Definitions

A. What are the various types of lithium batteries?

Lithium batteries fall into two broad classifications; lithium metal batteries and lithium ion batteries. Lithium metal batteries are generally non-rechargeable and contain metallic lithium. Lithium ion batteries contain lithium which is only present in an ionic form in the electrolyte and are rechargeable.

Within these two broad classifications there are many different chemistries. For example within lithium ion batteries there are lithium polymer, lithium iron phosphate (LiFePO₄), lithium air to name a few.

B. What is the difference between a lithium cell and a lithium battery?

A lithium cell is a single encased electrochemical unit consisting of one positive and one negative electrode that exhibits a voltage differential across the two terminals. A lithium battery is two or more cells electrically connected. A single cell battery is considered a cell and not a battery for the purposes of the limitations set out in the DGR.

Note:

Units that are commonly referred to as “battery packs” or “power banks” having the primary function of providing a source of power to another piece of equipment are for the purposes of these Regulations treated as batteries. This includes uninterruptible power supply (UPS) fitted with lithium ion batteries. Refer to the section on Definitions for complete details.

C. How are component cells connected to form a battery?

Cells in batteries may be connected in parallel, in series, or in a combination of the two. When cells are connected in series, the voltage of the battery increases but the capacity in ampere-hours (Ah) does not change. By contrast, when cells are connected in parallel the capacity in ampere-hours of the battery (Ah) increases but the voltage stays the same.

△ D. How do I determine the watt-hour rating for a particular lithium ion battery?

The Watt-hour (Wh) rating is a measure by which lithium ion batteries are regulated. Lithium ion batteries with a Watt-hour rating in excess of 100 Wh manufactured after 31 December 2011 and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh manufactured after 1 January 2009 are required to be marked with the Watt-hour rating on the outside case.

You can also arrive at the number of Watt-hours your battery provides if you know the battery's nominal voltage (V) and capacity in ampere-hours (Ah):

$$\text{Ah} \times \text{V} = \text{Wh}$$

Note:

If only the milliampere-hours (mAh) are marked on the battery then divide that number by 1000 to get ampere-hours (Ah) (i.e. 4400 mAh / 1000 = 4.4 Ah).

Most lithium ion batteries marketed to consumers are below 100 Watt-hours. If you are unsure of the Watt-hour rating of your lithium ion battery, contact the manufacturer.

E. What is a button cell battery?

A button cell battery is a small round cell where the overall height is less than the diameter. Button cells are often referred to as “coin” cells.

Part 2 – Questions related to Packaging and Transport Provisions

A. How do I safely package lithium batteries for transport?

One of the major risks associated with the transport of batteries and battery-powered equipment is short-circuit of the battery as a result of the battery terminals coming into contact with other batteries, metal objects, or conductive surfaces. Packaged batteries or cells must be separated in a way to prevent short circuits and damage to terminals. They must be packed in a strong rigid outer packaging unless when contained in equipment, the battery is afforded equivalent protection by the equipment in which it is contained. Sample packaging meeting these requirements is shown below:



B. How can batteries be effectively protected against short circuit?

Methods to protect against short circuit include, but are not limited to, the following methods:

- Packing each battery or each battery-powered device when practicable, in fully enclosed inner packagings made of non-conductive material (such as a plastic bag);
- Separating or packing batteries in a manner to prevent contact with other batteries, devices or conductive materials (e.g. metal) in the packagings; and
- Ensuring exposed terminals or connectors are protected with non-conductive caps, non-conductive tape, or by other appropriate means.

If not impact resistant, the outer packaging must not be used as the sole means of protecting the battery terminals from damage or short-circuiting. Batteries should be securely cushioned and packed to prevent shifting which could loosen terminal caps or reorient the terminals to produce short circuits.

Terminal protection methods include but are not limited to the following:

- Securely attaching covers of sufficient strength to protect the terminals;
- Packaging the battery in a rigid plastic packaging; and
- Constructing the battery with terminals that are recessed or otherwise protected so that the terminals will not be subjected to damage if the package is dropped.

C. I'm shipping using Section II of the packing instructions, what constitutes "adequate instruction"?

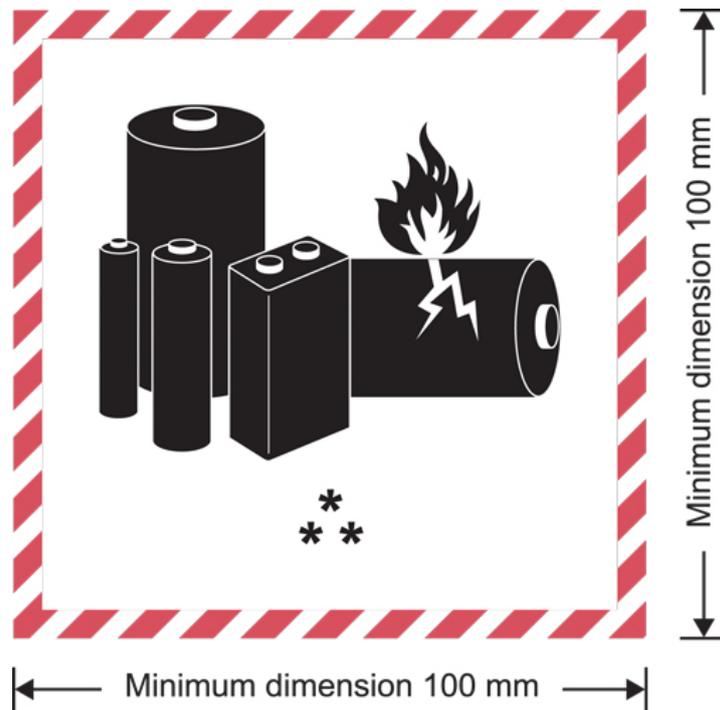
Shippers of lithium batteries prepared in accordance with Section II of the lithium battery packing instructions are not subject to the formal dangerous goods training requirements set out in DGR 1.5. However, persons preparing such shipments must be provided with "adequate instruction" as described in DGR 1.6.

The following is offered as a starting point for an employer on what could be considered as being adequate instruction:

1. The employer must identify the different configurations of lithium batteries that they ship, i.e. lithium batteries and/or lithium batteries packed with equipment and/or lithium batteries contained in equipment; lithium metal batteries and/or lithium ion batteries.
2. The employer must document the procedures that apply to the configurations and battery types that they ship as determined in 1, above.
3. The procedures should be written up as a clear work instruction or other information that is available to all employees responsible for the preparation of lithium battery shipments.
4. All employees that are involved in the process of preparing lithium battery shipments must be taken through the procedure to ensure that they understand and can demonstrate the correct application of documented procedures for the packing, labelling, marking and documentations requirements, as applicable to their job function.
5. A record must be maintained that identifies each applicable employee and the date(s) that this instruction was provided.
6. Employees should be given periodic refresher, or at least demonstrate that they remain "adequately" instructed on how to perform the task. This should be done at least every two years or whenever the procedure is revised, or regulations are changed, whichever is sooner.
7. Companies that are involved in reverse logistics, i.e. arranging for returns of lithium batteries, lithium batteries packed with equipment or lithium batteries contained in equipment must develop a clear instruction for consumers on the process to be followed for returning products. This instruction must include packaging materials and lithium battery marks, as necessary. The instruction must also include the transport method and mode of transport that must be followed; this must include a clear statement on applicable prohibitions.

△ D. What does the lithium battery mark look like and when is it required?

The lithium battery mark is required as specified in the additional requirements of Section II of Packing Instructions 966, 967, 969 and 970. It is also required as specified in the additional requirements of Section IB of Packing Instructions 965 and 968 in addition to the Class 9 lithium battery hazard label and Cargo Aircraft Only label. The mark (see below) is as shown in Figure 7.1.C of the IATA Dangerous Goods Regulations. The border of the mark must have red diagonal hatchings with a minimum width of 5 mm. The symbol (group of batteries, one damaged and emitting flame, above the UN number for lithium ion or lithium metal batteries or cells) must be black on white or suitable contrasting background. The lithium battery mark may be printed directly on the outer packaging provided that there is sufficient contrast between the elements of the lithium battery mark and the colour of the packaging material. The mark must be in the form of a rectangle or a square with minimum dimensions of 100 mm x 100 mm. If the size of the package so requires, the dimensions/line thickness may be reduced to not less than 100 mm wide x 70 mm high.



* Place for UN number(s), i.e. UN 3090, UN 3091, UN 3480 and/or UN 3481, as applicable. The UN number(s) indicated on the mark should be at least 12 mm high.

** Place for telephone number

Note:

E. If I have smaller packages, can I use a smaller lithium battery mark?

Where the packages are of dimensions such that they cannot bear the full-size lithium battery mark, the mark dimensions may be reduced to 100 mm wide × 70 mm high. The design specifications remain otherwise the same.

Where any face of a package is large enough to bear the full-size lithium battery mark, the full-size mark must be used.

F. When is a lithium battery mark not required on the package?

A lithium battery mark must not be affixed to packages prepared in accordance with Section IA of Packing Instructions 965 and 968 and Section I of Packing Instructions 966, 967, 969 and 970.

A lithium battery mark is **not required** for packages prepared in accordance with Section II of PI 967 or PI 970 containing only button cell batteries installed in equipment (including circuit boards) or consignments of two packages or less where each package contains no more than four cells, or two batteries installed in equipment.

Note:

The Air Waybill is required to contain the statements "Lithium [ion or metal] batteries in compliance with Section II of PI9XX" when the lithium battery mark is affixed to the package(s).

G. Section II in Packing Instructions 967 and 970 states that “the lithium battery mark is not required on consignments of two packages or less where each package contains no more than four cells, or two batteries installed in equipment.” What is the intent of this provision?

This provision is to require, where there are more than two packages in the consignment, that each package bears the lithium battery mark, and therefore the air waybill has the compliance statement e.g. “Lithium [ion or metal] batteries in compliance with Section II of PI 9xx [67 or 70]”.

The provision continues to allow for small consignments of one or two packages, containing no more than four cells or two batteries installed in equipment per package, to move without the lithium battery mark and therefore without the compliance statement on the air waybill.

Note:

A consignment is one or more packages of dangerous goods accepted by an operator (airline) from one shipper at one time and at one address, receipted for in one lot and moving to one consignee at one destination address.

△ H. I have a mobile (cell) phone that contains one single-cell lithium ion battery. Do I have to mark the shipping box that contains each mobile phone? What if I place five mobile phones in a shipping box? Does this require the lithium battery mark?

For packages of a single mobile phone, no lithium battery mark would be required since you can place up to 4 of these single-cell batteries in a box without applying the lithium battery mark on the outer box. In the case where 5 mobile phones are in a shipping package, a lithium battery mark on the shipping package is required.

I. Can a single lithium battery mark be used to identify that both lithium metal and lithium ion batteries are contained inside the package?

Yes. The mark may bear all applicable UN numbers, e.g. UN 3091, UN 3481, to identify that the package contains lithium metal batteries packed with or contained in equipment and lithium ion batteries packed with, or contained in equipment.

J. What are the requirements for the telephone number on the lithium battery mark?

The telephone number should be of a person knowledgeable about the shipment but is not intended to be for the purposes of obtaining immediate emergency response guidance and is therefore not required to be monitored at all times that the package is in transit. It is acceptable for the number to be monitored during the company’s normal business hours in order to provide product-specific information relative to the shipment. However, it also is acceptable to use an emergency response, 24-hour phone number on the lithium battery mark.

K. Must the lithium battery mark be placed on the same face of the package with the Class 9 hazard label and/or Cargo Aircraft Only label?

No, the lithium battery mark does not have to be on the same face of the package with these labels. It may be placed on a different face. However, if the package is of sufficient size all required marks and labels should be applied to one face of the package.

L. For the purposes of the lithium battery packing instructions, what is considered the “package”?

The package is the complete product of the packing operation that satisfies the requirements of the packing instruction and in a manner ready to be presented for transport (shipper/consignee information, hazard communication, etc.). The package may contain multiple batteries or pieces of equipment provided the limitations set out in the applicable packing instruction are not exceeded. The package must be marked and labelled as required by the packing instruction. A single package may be offered for transport, or one or more packages may then be placed into an overpack for ease of handling or transport purposes. When an overpack is used, the package marks and labels must be

duplicated on the overpack unless the marks and labels required on individual packages are visible or are not required by the packing instruction (i.e. not more than 4 cells or 2 batteries when contained in equipment and no more than two packages in the consignment).

M. Does the IATA DGR require a MSDS or SDS containing the UN test data?

No. The IATA DGR does not require a safety data sheet (SDS) when offering lithium batteries for transport.

Notes:

1. *A SDS is not a transport document. A SDS is only required for the supply and use of a substance or mixture meeting the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) classification criteria. GHS does not include provisions for manufactured articles.*
2. *Manufacturers and subsequent distributors of lithium cells and batteries and equipment with installed lithium cells or batteries must make available a test summary that identifies that the cell and battery types have passed the applicable UN 38.3 tests, see Part 4 of this document.*

N. Under Packing Instructions 966 and 969, it states that "The maximum number of batteries in each package must not exceed the minimum number required to power the equipment, plus two spare sets. A "set" of cells or batteries is the number of individual cells or batteries that are required to power each piece of equipment". If a package contains 4 power tools (each tool contains 1 lithium ion battery), can 2 extra lithium ion batteries be placed in the package for each piece of equipment for a total of 12 batteries?

Yes, providing you do not exceed the maximum net quantity for the relevant section of the packing instruction and the chosen aircraft type. The 12 batteries reflect two spare sets (8) for each of the 4 power tools in the outer package plus one each to power the device (4).

O. May lithium battery packages be placed in an overpack in accordance with the IATA Dangerous Goods Regulations?

Yes, but there are segregation requirements that need to be considered for certain other classes of dangerous goods. UN 3090, lithium metal batteries prepared in accordance with Section IA or Section IB of PI 968 and UN 3480, lithium ion batteries prepared in accordance with Section IA or Section IB of PI 965 are not permitted in the same outer packaging with dangerous goods classified in Class 1 other than Division 1.4S, Division 2.1, Class 3, Division 4.1 or Division 5.1. The overpack may also contain goods not subject to the Regulations provided there are no packages enclosing different substances which might react dangerously with each other. An overpack must be marked with the word "overpack" and must be labelled with the lithium battery mark (DGR Figure 7.1.C), unless the mark(s) on the package(s) inside the overpack are visible or not required by the Packing Instruction.

⊗

P. Do the quantity limits shown in the lithium battery packing instructions apply to overpacks containing lithium batteries?

No. The quantity limits shown in the packing instructions refer to the maximum net weight of the lithium cells or batteries that is permitted in each package. Provided each package remains within the limit specified in the packing instruction, there are no limits specified for an overpack.

⊗

Q. Packing Instructions 966 and 969 Section II include a requirement for a 1.2 metre drop test. What portion or portions of the package are subject to this test?

The completed package containing batteries as prepared for transport in accordance with the relevant packing instruction must be capable of withstanding the 1.2 m drop test. This could apply to a package solely containing batteries that is packaged in full compliance with the provisions of the

packing instruction (to include the 1.2 m drop test capability requirement) and is then packed with equipment in a strong rigid outer packaging and offered for transport (see item 2N for additional information related to overpacks). Or, it could apply to a package that includes batteries properly packed in inner packaging and equipment or other non-dangerous goods that are placed in a strong rigid outer packaging. The package that includes both the inner packaging containing batteries and the equipment must comply with the packing instruction to include meeting the capability to pass the 1.2 m drop test.

R. How do I transport prototype lithium cells and batteries that have not passed the UN 38.3 Tests?

Pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low-production runs (i.e. annual production runs consisting of no more than 100 lithium cells and batteries) of lithium cells or batteries that have not been tested to the requirements in subsection 38.3 of the UN Manual of Tests and Criteria may be transported aboard cargo aircraft, if approved by the appropriate authorities of the State of Origin and the State of the Operator and the requirements in Packing Instruction 910 of the Supplement to the Technical Instructions are met (see Special Provision A88).

The appropriate authority of the State of Origin should provide details of PI 910 as part of the approval process.

S. Can I ship recalled, damaged or non-conforming cells or batteries?

Lithium batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport by air (e.g. those being returned to the manufacturer for safety reasons). This applies also to lithium cells or batteries installed inside equipment such as mobile phones, laptops or tablets where the devices are subject to recall due to the safety concerns of the lithium cell or battery installed in the device, see Special Provision A154 in the DGR.

Batteries which have some other defective feature (e.g. LEDs not showing charge, incorrect model number on label, or batteries not holding enough charge) could still be shipped by air. Also, laptops being returned may not have a defective battery, it may not meet the needs of the customer, may be defective itself (but not the battery), etc. In these situations air transport would be permitted. The battery or equipment manufacturer should be contacted to determine the appropriate shipping method.

T. How do I protect against “inadvertent activation”?

When batteries are contained in equipment, the equipment must be packaged in a manner that prevents unintentional activation or must have an independent means of preventing unintentional activation (e.g. packaging restricts access to activation switch, switch caps or locks, recessed switches, trigger locks, temperature sensitive circuit breakers, etc.). This requirement does not apply to devices which are intentionally active in transport (RFID transmitters, watches, sensors, etc.) and which are not capable of generating a quantity of heat sufficient to be dangerous to packaging or personal safety.

U. What is the maximum weight of batteries per package for fully regulated batteries contained in equipment (Section I)?

The maximum weight is 5 kg of lithium batteries per package for passenger and cargo aircraft and 35 kg of lithium batteries per package for cargo aircraft only. The net quantity shown excludes the weight of the equipment:

	Net Quantity per Package Passenger Aircraft	Net Quantity per Package Cargo Aircraft Only
Lithium Ion & Lithium Metal cells and batteries contained in equipment	5 kg	35 kg

△ **V. Do I need to declare a gross weight or a net weight for lithium batteries (Section I)?**

All lithium battery shipments, including when packed with or contained in equipment, must be declared by the net weight of lithium cells or batteries contained in the package.

The net weight that must be declared is the weight of the lithium cell or batteries contained in the package. This applies for both lithium ion cells and batteries and lithium metal cell and batteries.

⊗

W. I am shipping Section IB lithium [ion or metal] batteries; do I need dangerous goods training?

Yes. All the provisions of the Dangerous Goods Regulations apply to shipments of Section IB batteries except the references listed in Section IB. Therefore, dangerous goods training as indicated in Subsection 1.5 of the Dangerous Goods Regulations is required.

X. What are the additional marking requirements for a package prepared under Section IB of Packing Instruction 965 and 968?

Because all of the requirements of the dangerous goods regulations apply other than the requirement to use UN specification packaging, each package must be marked with:

- the UN Number preceded by "UN" and the Proper Shipping Name (DGR 7.1.4.1 (a));
- the name and address of the shipper and consignee (DGR 7.1.4.1 (b));
- in addition, the net weight as required by (DGR 7.1.4.1(c)) must be marked on the package; and
- the lithium battery mark (see item 2D) in addition to the Class 9 lithium battery hazard label and Cargo Aircraft Only label.

Note:

When using an overpack, each package must be marked in accordance with the Regulations and then, when placed in an overpack, marked as required by DGR 7.1.7.

△ **Y. I work for a pharmaceutical manufacturer that is shipping vaccines and other pharmaceutical products with lithium battery powered temperature or data loggers; do I need to follow the Dangerous Goods Regulations?**

Yes. All the applicable provisions for lithium batteries will need to be followed by the shipper of such devices, including the limitations for devices that are "active" (on) during transport.

However, there are exceptions for packages containing only COVID-19 pharmaceuticals in Special Provision A220 that these packages containing cargo tracking devices containing lithium batteries are not subject to the marking and documentation requirements of Section II of Packing Instruction 967 or 970. This same exception is also applicable to the same package configuration, when

consigned without the COVID-19 pharmaceutical for the purposes of use or re-use when prior arrangements have been made with the operator.

Note:

1. The IATA [Temperature Control Regulations \(TCR\)](#) also apply to such shipments.
2. Further information on active devices in the guidance document that is posted on the IATA website – www.iata.org/pharma

△ **Z. Do I need to include an additional document or statement to certify that my lithium ion batteries are at no more than 30% SoC?**

No. For lithium ion batteries shipped in accordance with Section IA or Section IB of PI 965, which must be on a Shipper's Declaration, the Shipper's Declaration includes a certification statement "I declare that all of the applicable air transport requirements have been met."

By signing the Shipper's Declaration the shipper is making a legal statement that all the applicable provisions of the DGR have been complied with, which includes that the lithium ion batteries are at no more than 30% SoC.

△ **AA. I have lithium ion batteries packed with equipment (PI 966, Section I) where the lithium ion batteries are packed in a UN specification fibreboard (4G) box and then that box is packed with the equipment in a fibreboard outer packaging. Is this an overpack?**

No, Section I of PI 966 (and also PI 969) allows two methods of having lithium batteries packed with equipment. Either:

- (a) the lithium batteries are packed into a UN specification packaging meeting Packing Group II performance standards and then packed with the equipment in a strong rigid outer packaging; or
- (b) the lithium batteries are packed into an inner packaging and then packed with the equipment into a UN specification packaging meeting Packing Group II performance standards.

In either case what is presented for transport is a "package" and not an overpack.

△ **BB. Does the definition of "consignment" apply to the house air waybill (HAWB) or to the master air waybill (MAWB)?**

The use of HAWB or MAWB has no direct relationship to what is a "consignment". For example a MAWB may have multiple consignments where each of the consignments are from separate shippers, or are from one shipper but to separate consignees, or the MAWB may be just be a single consignment from one shipper to one consignee.

The following limitation applies to consignments:

1. a shipper is not permitted to consign more than two packages of lithium batteries contained in equipment under Section II of PI 967 and PI 970 where there are no more than 4 cells or 2 batteries in the package without the application of the lithium battery mark on the package.

The objective of this condition is to:

1. require appropriate hazard communication on packages and on the air waybill where a shipper has more than two packages of lithium batteries contained in equipment.

Notes:

1. This does not mean that every retail "package" must bear the lithium battery mark. A shipper may place multiple retail boxes, each containing a lithium battery meeting Section II installed in equipment, into an outer packaging to form the package for air transport. There is no limit on the number of individual retail boxes that can be placed into the outer packaging, except that a "package" must not contain more than 5 kg net weight of lithium batteries. Each such package must bear the lithium battery mark and when an air waybill is used, the air waybill

must show the applicable compliance statement, e.g. "lithium ion batteries in compliance with section II of PI 967".

2. *Shippers or freight forwarders should not try to split a consignment across multiple air waybills to try to avoid the application of the lithium battery mark where there are more than two packages with lithium batteries contained in equipment under Section II in a consignment.*

△ **CC. What is the correct classification where I want to ship 2 mobile phones in the same package with 2 power banks?**

The power banks are classified as UN 3480, **Lithium ion batteries** and therefore must be shipped in accordance with Section IB of PI 965 if the power bank has a Watt-hour rating not exceeding 100 Wh or in accordance with Section IA of PI 965 if the Watt-hour rating exceeds 100 Wh. Under the provisions of PI 965 Section IA and IB other lithium battery-powered equipment may be packed in the same outer packaging provided that all applicable parts of the relevant packing instructions are followed, which includes the net weight of lithium batteries contained in the package. Therefore, the package must be classified as UN 3480, Lithium ion batteries. The power banks are also not considered as "spares" for the purposes of PI 966, Lithium ion batteries packed with equipment.

DD. What is the correct classification for hearing aids or Bluetooth® "earbuds" that are shipped in a charging case or with a charging case in the same package?

Bluetooth® earbuds or hearing aids that are shipped in or with a charging case should be classified as "UN3481, Lithium batteries packed with equipment" and packaged in accordance with PI 966. If the charging case is shipped without the earbuds, the case must be classified as "UN3480, Lithium ion batteries" and packaged in accordance with PI 965.

EE. Can a package containing an AC adaptor or charger and lithium ion batteries be classified as UN 3481, Lithium ion batteries packed with equipment?

No, for the purpose of Packing Instruction 966, "equipment" means the device or apparatus for which the lithium ion batteries will provide electrical power for its operation. When a package contains only the AC adaptor or charger and lithium ion batteries, the package must be classified as "UN 3480, Lithium ion batteries" and packaged in accordance with PI 965.

Part 3 – Questions Related to Design Type Testing Provisions

A. Where can I find requirements related to testing of battery design types?

The UN Manual of Tests and Criteria sets out specific tests that must be conducted on each lithium cell or battery design type. Each test is intended to either simulate a common transportation occurrence such as vibration or changes in altitude or to test the integrity of a cell or battery. You may obtain a copy of these testing requirements via the following website:

http://www.unece.org/trans/danger/publi/manual/manual_e.html

B. What constitutes a design change requiring renewed design type testing?

The following provisions are taken from the 7th revised edition of the UN Manual of Tests and Criteria, paragraph 38.3.2.2.

A cell or battery that differs from a tested design by:

- (a) For primary cells and batteries, a change of more than 0.1 g or 20% by mass, whichever is greater, to the cathode, to the anode, or to the electrolyte;
- (b) For rechargeable cells and batteries, a change in Watt-hours of more than 20% or an increase in voltage of more than 20%; or
- (c) A change that would materially affect the test results.

shall be considered a new type and shall be subjected to the required tests.

Note: the type of change that might be considered to differ from a tested type, such that it might lead to a failure of any of the test results, may include, but is not limited to:

- (a) A change in the material of the anode, the cathode, the separator or the electrolyte;*
- (b) A change of protective devices, including the hardware and software;*
- (c) A change of safety design in cells or batteries, such as a venting valve;*
- (d) A change in the number of component cells;*
- (e) A change in connection mode of component cells;*
- (f) For batteries which are to be tested according to T.4 with a peak acceleration less than 150 g_n, a change in the mass which could adversely impact the result of the T.4 test and lead to a failure.*

In the event that a cell or battery type does not meet one or more of the test requirements, steps shall be taken to correct the deficiency or deficiencies that caused the failure before such a cell or battery type is retested.

C. Which edition of the UN Manual of Tests and Criteria must be used when testing new lithium cell or battery designs

If a newly produced lithium cell or battery design is being tested for the first time, then the edition of the UN *Manual of Tests and Criteria* in effect at the time that the cell or battery designs are first tested must be used. For example, a new lithium ion battery design is produced for the first time in March 2022. This battery must be tested in accordance with the provisions of the 7th revised edition of the UN *Manual of Tests and Criteria* as this is the edition in effect, see Note under DGR 1.1.1 (1.1 of the LBSR).

Part 4 – Questions Related to the Lithium Battery Test Summary¹

A. Does the test summary apply to equipment containing lithium cells or batteries?

Yes, the test summary applies to all lithium cells and batteries, including button cells, irrespective of whether they are shipped alone or contained in equipment.

B. Can multiple batteries/manufacturers/products be listed on one report?

Yes, it is acceptable to have a single document that addresses multiple batteries / manufacturers / products, provided all required information is stated. For example, a tablet manufacturer may purchase lithium ion batteries from three different battery manufacturers. The test summary for the product will therefore list batteries and all related information (e.g. Watt-hours, test labs) from the three battery manufacturers without naming the manufacturer due to confidentiality issues.

C. Is it acceptable to list the various test houses, tests and range of revisions tested to for the UN 38.3 revision and amendments?

Yes, it is acceptable to have multiple test houses and their addresses, email information, etc. listed provided all required information is stated. The test house is not required to be aligned to a specific battery or product on the test summary when the test summary covers multiple batteries/products. It is required to have the test report number and date of test for each cell/battery/product listed on the test summary.

D. What is meant by physical description of cell or battery?

A physical description is intended to provide a check for the person requesting the test summary to know that it applies to the cell/battery/product covered by the test summary, i.e. if a cellular phone is the product being shipped, the invoice description or marketing name of the product as the physical description could be used on the test summary.

E. What does availability of report mean: "When requested?"

The test summary must be made available upon request. Any individual or entity in the supply chain may request the test summary, e.g. regulator, consumer, or transport provider.

F. Can the test summary provider require a requestor to obtain the document from a website?

Yes, it is acceptable for the provider to require the requestor to obtain a document electronically from a provider's website. The provider must ensure that the cell/battery/product has appropriate identifiers to align to the test summary.

G. If a manufacturer considers their suppliers, test house and battery data confidential and competitive information, how would test summary compliance be achieved?

All 10 data elements and listed subsets of information are required to be on the test summary. As indicated above, the test house information may be listed to cover a range of products.

H. If a test summary is requested by a dangerous goods enforcement agency, how quickly must the test summary be made available? For example, would a manufacturer be expected to immediately produce a test summary or provide it within a certain amount of time (e.g. 72 hours)

Due to the large volume of lithium batteries and lithium battery powered products that are shipped daily, manufacturers and distributors should not be expected to immediately provide a test summary for every product they ship. Manufacturers and distributors should be provided a reasonable amount of time to provide the required test summary.

I. Would manufacturers and distributors of battery powered vehicles (UN3171) and hybrid vehicles containing a lithium battery (UN3166) be expected to provide a test summary?

Yes. The test summary requirement applies to manufacturers and distributors of lithium cells and batteries. Therefore, a test summary must be made available for lithium battery-powered vehicles and other vehicles containing lithium batteries.

J. Is there a mandated format for the test summary that manufacturers and distributors must follow?

No. Manufacturers and distributors may compile the information required in the test summary using any format. Below are 3 examples of a test summary:

Example 1 of a Lithium Ion Battery Test Summary

**LITHIUM CELLS OR BATTERIES TEST SUMMARY
IN ACCORDANCE WITH SUB-SECTION 38.3
OF UN MANUAL OF TESTS AND CRITERIA**

Revision Date: March 27, 2017 Revision Number: 001

Product Manufacturer: Beta Bell Phone Company
123 Beta Bell Lane
Bellweather, Arizona 99999

Telephone: 800-999-4545
Email: betabell@gmail.com
Web: www.betabell.com

Beta Bell’s product lithium ion cells and batteries have been successfully tested and comply with the UN Model Regulations, Manual of Test and Criteria, Part III, subsection 38.3.

PERFORMED TESTS		RESULTS	
38.3.4.1	T1	Altitude Simulation	Pass
38.3.4.2	T2	Thermal Test	Pass
38.3.4.3	T3	Vibration	Pass
38.3.4.4	T4	Shock	Pass
38.3.4.5	T5	External Short Circuit	Pass
38.3.4.6	T6	Impact / Crush	Pass
38.3.4.7	T7	Overcharge	Pass
38.3.4.8	T8	Forced Discharge	Pass

The UN38.3 tests were performed by one of the following test houses and were tested to UN Manual Test and Criteria Revision 3 Amendment 1 or subsequent revisions or amendments.

Test House A 123 Alpha Street Shanghai China E: testhousea@gmail.com T: 086-0310-04566 U: www.testhousea.com	Test House C 123 Chi Street Shanghai China E: testhouseC@gmail.com T: 086-0310-04588 U: www.testhousec.com
Test House B 123 Beta Street Shanghai China E: testhouseb@gmail.com T: 086-0310-04577 U: www.testhouseb.com	Test House D 123 Delta Street Shanghai China E: testhoused@gmail.com T: 086-0310-04599 U: www.testhoused.com

**LITHIUM CELLS OR BATTERIES TEST SUMMARY
IN ACCORDANCE WITH SUB-SECTION 38.3
OF UN MANUAL OF TESTS AND CRITERIA**

Product Test Information

Model numbers	Physical Description	Battery weight (kg) Mass	Wh rating	Test report number	Test report date
BB12389	Li ion polymer Cell phone Alpha A	0.035	6.25	RTS123, NMD456PO98 N4569-2 BN890A	03.02.2010 03.07.2010 03.10.2010 03.15.2010
BB12450	Li ion polymer Cell Phone Beta B	0.090	6.76	TYh765-KL-09 567-908HGT	08.09.2012 09.01.2012
BB67896	Li ion polymer Cell phone Chi C	0.026	5.25	89065RT-90 NHI-kl09	07.07.2010 07.04.2010
etc					

Signature _____
Name, Title

Example 2 of a Lithium Ion Battery Test Summary

UN38.3 Lithium Battery Test Summary for GreenTech Tablet Model No. T54321	
1	Battery Manufacturer <i>Confidential and Proprietary GreenTech Information</i>
2	Product Manufacturer GreenTech 123 Main Street Annapolis, MD 21012 888.111.2345 contact@greentech.com; www1.greentech.com
3	UN38.3 Test Lab Bob's Battery Test Lab 1600 Pennsylvania Avenue Smithfield, VA 12345 Phone: 211.789.2345 bob@testlab.org; www.testlab.org
4	Test Report Number Liion621345
5	Date of Test Report April 1, 2017
6	Description of Cell or Battery 7.4 V, 1800 mAh, 13.32 Wh Li ion battery, Model No. P1789 Small, rectangular plastic case, 100 grams
7	UN38.3 Tests Performed and Successfully Passed T.1, T.2, T.3, T.4, T.5, and T.7. (Note that T.6 and T.8 are not applicable to batteries.)
8	Assembled Battery Testing Requirements Not Applicable
9	Edition of UN Manual of Tests and Criteria Used Sixth Revised Edition
10	Name and Title of Signatory <i>Jason Alexander</i> Jason Alexander GreenTech Staff Engineer

Example 3 of a Lithium Metal Cell Test Summary

**LITHIUM CELLS OR BATTERIES TEST SUMMARY
IN ACCORDANCE WITH SUB-SECTION 38.3
OF MANUAL OF TESTS AND CRITERIA**

BATTERY TRANSPORTION INFORMATION

Name of cell, battery or product manufacturer, as applicable: Item Number : 4A23123 Item Name : Battery Alpha Prime Item Description : Lithium Metal Battery (Primary)		Cell, battery or product manufacturer's contact information to include address, phone number, email address and website for more information: Manufacturer XYZ 3480 Lithium cells Rd Lithiumionville, CA 98765 United States (+1-987) 987-6543 email@xyz.com	
Name of the test laboratory to include address, phone number, email address and website for more information: Test Lab A 1919 Alpha St Testcity, IA 55555 USA (+1-333) 555-1122 email@testlab.com		A unique test report identification number: ABC12345	Date of the test report: 03-Apr-2013
Description of cell or battery to include at a minimum: Lithium ion or Lithium metal cell or battery; Mass; Watt-hour rating, or lithium content; Physical description of the cell/battery; and Model numbers: Battery used in consumer power tools Cell/battery Type : Lithium metal Cell or Battery : Cell LC or W/h rating : LC (g): >0.3 <= 1 Cell or Battery Weight : 12.00 Grams		List of tests conducted and results (i.e., pass/fail): Test T.1: Altitude Simulation : Pass Test T.2: Thermal Test : Pass Test T.3: Vibration : Pass Test T.4: Shock : Pass Test T.5: External short circuit : Pass Test T.6: Impact/Crush : Pass Test T.7: Overcharge : Not applicable Test T.8: Forced discharge : Pass Testing additional comments:	
Reference to assembled battery testing requirements, if applicable (i.e., 38.3.3(f) and 38.3.3(g)): Not applicable	Reference to the revised edition of the Manual of Tests and Criteria used and to amendments thereto, if any: Revision 5	For air transport only: Does the cell or battery comply with the 30% State of Charge? Not Applicable	
PRODUCT CLASSIFICATION FOR TRANSPORT (According to UN - DGP)			
UN Classification: UN 3090		Proper Shipping Name: Lithium metal batteries	
Signature with name and title of signatory as an indication of the validity of information provided: Wayne Purple Testing Manager		This document remains valid as long as no changes, modifications, or additions are made to the model(s) described in this document, after being transported from a Manufacturer XYZ facility. The model(s) has (have) been classified according to the applicable transport regulations and the UN Manual of Tests and Criteria as of the date of the certification. The model(s) must be packaged, labeled, and documented according to country and other international regulations for transportation.	
Date document was generated: 04-Mar-2017 11:49 am			

¹ Information in Part 4 kindly provided by PRBA – The Rechargeable Battery Association, RECHARGE the Advanced Rechargeable & Lithium Batteries Association and the Medical Device Battery Transport Council

Additional Information

Further information can be found here:

<http://www.iata.org/lithiumbatteries>

Information for passengers can be found here:

<http://www.iata.org/dgr-guidance>

www.faa.gov/go/safecargo

You may also contact the airline of your choice or your national civil aviation authority if you have any further concerns about travelling with lithium metal or lithium ion batteries.

You can also contact the IATA Dangerous Goods Support team if you have questions or concerns which may not have been addressed in this document: dangood@iata.org.

Abbreviations, Acronyms, Symbols

The following abbreviations, acronyms and symbols are used throughout the document.

Abbreviation	Meaning
A/C	Aircraft
Li Ion (li-ion)	Lithium ion
Li batt.	Lithium battery
Pax	Passenger
Acronym	Meaning
CAO	Cargo Aircraft Only
DGD	Shipper's Declaration for Dangerous Goods
DGR	IATA Dangerous Goods Regulations
LBSR	IATA Lithium Battery Shipping Regulations
Symbol	Meaning
≥	Equal to or greater than
≤	Equal to or less than
>	Greater than
<	Less than
□	Addition of an item
△	Change to an item
⊗	Deletion of an item