



Clashindarroch Wind Farm Extension

INFINERGY

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Scoping Report

August 2020



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Clashindarroch Wind Farm Extension

Scoping Report

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Applicant

Clashindarroch Wind Farm Extension Ltd

INFINERGY

Co-ordinating Consultant



Contributing Consultants



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1. Introduction

Purpose of the Scoping Report

- 1.1. This Scoping Report (the Report) has been prepared on behalf of Clashindarroch Wind Farm Extension Limited ("the Applicant"). The Applicant intends to apply to the Scottish Government for consent under Section 36 of the Electricity Act 1989¹ for the construction and operation of a wind farm (the Proposed Development) on a site which comprises moorland adjoining the existing Clashindarroch Wind Farm.
- 1.2. This report forms the Applicant's written request to the Scottish Government, under Regulation 12 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017² as amended (the EIA Regulations), for its opinion as to the information to be provided in the EIA Report (a Scoping Opinion) for the development of the Site.
- 1.3. The Proposed Development would involve the construction and operation of a wind farm on land (the Site) located approximately 8 km (kilometres) south east of Dufftown and 9 km south-west of Huntly. The Site is approximately 859 hectares (ha) in size and is centred on approximate National Grid Reference (eastings) 340662 and (northings) 829615. The location of the Site is shown in **Figure 1, Appendix A** and is described in Section 2 of this Report.
- 1.4. It is expected that the Proposed Development will consist of up to 28 turbines with a maximum height to blade tip of 200 metres (m) and have a total generating capacity of up to 168 MW. Ancillary infrastructure will also be required as part of the Proposed Development and is likely to include a substation, new access tracks and site entrance, temporary construction compound, crane hard-standings and a permanent meteorological mast. A battery energy storage facility may be included as part of the Proposed Development, and this is likely to be located next to the substation.
- 1.5. Given the iterative nature of the EIA process, the layout of the Proposed Development is still evolving. The Proposed Development is therefore being scoped on a preliminary turbine layout which would represent the likely geographical spread of turbine and infrastructure across the Site. The preliminary turbine layout is shown in **Figure 2, Appendix A**. The results of the Scoping process will feed into the iterative design of the Proposed Development.

The Applicant

- 1.6. The Proposed Development is being progressed by Clashindarroch Wind Farm Extension Limited (formed by the landowner of the Cabrach and

¹ The Electricity Act 1989. Available at: https://www.legislation.gov.uk/ukpga/1989/29/pdfs/ukpga_19890029_en.pdf

² The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: <http://www.legislation.gov.uk/ssi/2017/101/contents/made>

Glenfiddich Estates) in partnership with wind developer Infinergy Ltd. Infinergy was the applicant for the Dorenell Wind Farm nearby on the Glenfiddich Estate, which is now owned and operated by EDF Energy.

- 1.7. Infinergy is a UK based renewable energy company with a strong focus on the development of onshore wind energy in Scotland and Wales. Infinergy develops wind energy projects from inception through to construction and operation, and has offices in Wimborne (England) and Edinburgh (Scotland). For more information visit <http://www.infinergy.co.uk>.

Scoping

- 1.8. As per Section 12 (2) of the EIA Regulations, the Applicant is seeking to confirm the scope of the required assessment which is to be provided in the Environmental Impact Assessment Report submitted with the application (the EIA Report). To aid this process, this Scoping Report includes the following:
- A description of the location of the Proposed Development including figures identifying the Site;
 - Figures identifying the designated and sensitive environmental receptors surrounding the Site; and
 - A brief description of the nature and purpose of the Proposed Development and its potential resultant effects.
- 1.9. This report considers the different aspects of the environment likely to be significantly affected by the Proposed Development and identifies those topics which require consideration as part of the EIA, with a view to inviting comments on the approach to the EIA and the content of the EIA Report.

Consultation

- 1.10. As the design and EIA progress, consultation will form an integral part of the process. This will include one or more public consultation events held in locations near the Site providing members of the public the opportunity to learn more about the Proposed Development and give feedback and comments to the project team.
- 1.11. Consultation on specific technical issues will also be undertaken with relevant consultees, where appropriate, as part of the EIA process. A list of suggested consultees that the Energy Consents Unit at the Scottish Government should provide with this Report is contained in **Appendix B**.

2. The Site

- 2.1. The Site is located approximately 8 km south east of Dufftown, 9 km south west of Huntly and 7.5 km to the north west of Rhynie. The Site lies within Moray, however the Aberdeenshire boundary runs along most of the Site's eastern edge.
- 2.2. The Site, which lies within the Cabrach Estate, covers an area of approximately 859 ha and is centred on approximate National Grid Reference (eastings) 340662 and (northings) 829615 with the location and extent of the Site as shown in **Figure 1, Appendix A**.
- 2.3. The Site generally slopes upwards from approximately 360m AOD at the access corridor to a series of hill crests on the eastern border, comprising: the end of Grumack Hill (527m AOD), Black Hill (505m AOD), Mount of Haddoch (521m AOD) and Leids Hill (460m AOD).
- 2.4. To the west of the site lies Hill of Bank (478m AOD), which is a steeply sided elongated hill orientated north east to south west. Within the central part of the site there is a lower lying 'bowl' landform (350m AOD) containing the Burn of Bank watercourse which has a number of tributaries.
- 2.5. The Site predominately comprises heather upland which has been managed as grouse moor.
- 2.6. The Site lies within the River Deveron catchment. The eastern site boundary broadly represents a watershed, with watercourses within the site generally flowing westwards, including: the steeply sided Burn of Hillock in the northern part, the Burn of Bank and its tributaries in the middle and Burn of Redford in the south.
- 2.7. To the east of the Site lies the expansive Clashindarroch Forest which is owned by Forest and Land Scotland and largely consists of commercial plantation with some recently felled and restocked areas.
- 2.8. The existing Clashindarroch Wind Farm lies immediately to the east of the Site, within the wider forest complex, but on land that has now been largely clear felled. The existing wind farm consists of 18, 110m to tip turbines and is owned and operated by Vattenfall.
- 2.9. Vattenfall has submitted a section 36 application for 14, 180m to tip turbines on land also within the forest complex, which is adjacent, to the north east of the existing wind farm.
- 2.10. The existing Dorenell wind farm lies approximately 5km to the west on the neighbouring Glenfiddich Estate. The Dorenell wind farm consists of 59, 126m to tip turbines and is operated by EDF.
- 2.11. The A941 road which passes between Dufftown and Rhynie lies closeby to the south of the site. To the south west of the site lies a lower area of open land which is located within a 'bowl' formed by higher terrain. The small hamlet of Cabrach, including Cabrach House and church is located

within this area, close to the site to the south of the A941. To the west and north-west of the site, there are steeply sided valleys associated with the River Deveron, River Blackwater and Burn Treble, which join together near Inverharroch and Milltown.

3. Site selection and design evolution

Site Selection

- 3.1. Feasibility work has been undertaken on the site over the last two years as the bird survey work has been undertaken. The Site is being progressed to the EIA and project design stage because it exhibits attributes that include the following:
- The Site lies next to the existing Clashindarroch wind farm. The site presents an opportunity to create a well-designed extension of the existing scheme. This enables power output to be maximised with minimum additional impact, and avoids the creation of a new separate location for wind development;
 - There is the capacity to avoid wide-scale landscape and visual impact, due to the topography of the Site and its surroundings;
 - The Site does not lie within, nor is it in close proximity to, any areas of national landscape designation;
 - The Site lies outside of any Special Landscape Area and largely within an area of search for wind farms in the Proposed Local Development Plan;
 - The Site does not lie within, nor is it in close proximity, to any ecological designation;
 - The Site enables adequate separation to be achieved from the nearest residential properties;
 - The Site is elevated and there is a good average wind speed;
 - The Site is large enough to accommodate sufficient and viable generating capacity;
 - The topography of the Site is compatible with the construction of a commercial scale wind farm;
 - The Site lies within close proximity to an existing grid connection point, and a grid connection offer has been accepted.

Design Evolution

- 3.2. The optimum layout of a wind farm depends on a range of criteria. These vary depending on the type and size of turbine as well as local topography and the turbulence created by ground conditions within and around the Site. Turbine manufacturers recommend that the turbines be spaced between four and five rotor diameters apart depending on the prevailing wind direction, turbine type and site characteristics.
- 3.3. An initial turbine layout was formulated which consisted of 34, 200m to tip turbines, located across the Site, including Hill of Bank, land near Auchmair and the vicinity of Leids Hill.
- 3.4. The next iteration (which is this scoping turbine layout) then involved reducing the number of turbines from 34 to 28 for reasons that include the following: (i) to create a more cohesive form that creates a better design

relationship with the existing Clashindarroch wind farm (ii) to reduce turbine visibility on aviation radars (iii) to increase separation from residential properties and reduce amenity impacts.

- 3.5. Throughout the remainder of the EIA process, the layout will further evolve and take into consideration the results of additional surveys and data gathered through the assessment process. This iterative design process ensures that the final layout of the wind farm submitted responds to the constraints identified onsite. Further information about the iterative design process and the reasoning behind the key changes will be reported in the EIA Report.

4. Project Description

- 4.1. The Proposed Development will consist of:
- wind turbines and turbine foundations;
 - access tracks and crane pads;
 - on site power collection system (transformers and underground cables);
 - substation compound including a battery energy storage array;
 - on site borrow workings
 - construction compound; and
 - permanent meteorological mast.

Turbines

- 4.2. The proposed details are as follows:
- Number of turbines: up to 28;
 - Maximum height to blade tip: 200 m;
 - Maximum generating capacity (per turbine): up to 6 MW; and
 - Total generation capacity: up to 168 MW.
- 4.3. Turbines with a height to blade tip of over 150m are required to be fitted with medium intensity steady red aviation lights. The visual impact of the lighting would, however, be mitigated by using light sensors so that the lighting intensity can be reduced during good visibility. In addition, the applicant will investigate the use of lighting systems where the lights only come on when aircraft approach the wind farm.
- 4.4. An indicative turbine layout is shown in **Figure 2, Appendix A**. This layout has been developed with due consideration to certain known constraints e.g., watercourses, slope gradients, turbine separation requirements and proximity to dwellings.
- 4.5. For the purposes of the EIA, a precautionary approach will be taken and the largest prospective turbine will be assessed as the selected option. The worst-case scenario will be evaluated for each topic; for example, the maximum tip height and rotor diameter for landscape and visual and the maximum rotor diameter and a lower feasible hub height for ornithology.

Access Tracks

- 4.6. The turbine components would be delivered to the Site using the existing road network. The use of public roads will require further consultation with the appropriate bodies.
- 4.7. Route inspection and modelling suggests that turbine components could be delivered to site from the Port at Dundee, then via the A90 to Aberdeen, the A96 to Huntly, the A920 to Dufftown and then from the north along the A941. A detailed further abnormal indivisible load assessment will be

undertaken to determine the most suitable route of turbine delivery to the Site. The transport assessment would determine any requirements for upgrading of junctions or road verges and would include swept path analysis.

- 4.8. It is possible that local access into the Site could be taken from a location on the A941 near Redford to the south of the site.

Temporary Construction Compound

- 4.9. A temporary construction compound will be required during the construction of the Proposed Development, forming an area of hardstanding providing space for temporary welfare, parking, lay down areas and potentially concrete batching.

Anemometry Mast

- 4.10. An anemometry mast will be required for the life span of the Proposed Development, of a height similar to the hub height of the proposed wind turbines.

Electrical Infrastructure

- 4.11. Onsite underground cabling will be laid alongside the access tracks where possible, linking the turbine transformers to a site substation. The substation will include a single storey building housing the electrical infrastructure, although certain elements will be externally located within a fenced compound.

Grid Connection

- 4.12. The connection to the grid falls under a separate consent process and will be subject to a separate application. As such it will not be considered as part of this EIA.

Construction of the Proposed Development

- 4.13. The construction phase of the Proposed Development will comprise on-site preparation and construction activities, supported by deliveries of materials, components and staff to the Site.
- 4.14. Construction is expected to take approximately 18 months, depending on weather and ground conditions, as well as other technical and environmental factors and is likely to consist of the following principal operations:
- Construction of a temporary construction compound and office facilities;
 - Extraction of stone from on-site borrow workings;

- Construction of site tracks including water crossings/culverts;
- Construction of the substation buildings/compounds;
- Construction of turbine foundations;
- Construction of crane hardstanding areas;
- Excavation of cable trenches and cable laying adjacent to the site tracks;
- Installation of temporary and permanent drainage;
- Erection and commissioning of wind turbines; and
- Reinstatement of temporary works areas such as the construction compound.

Decommissioning

- 4.15. The Proposed Development will be designed to operate for a period of 35 years. Provision will be made for the Proposed Development to be decommissioned and the site restored at the expiry of consent. Typically, all above ground infrastructure will be dismantled and removed from the site, cables and turbine foundations will be cut 1 m below ground level and covered with topsoil. Alternatively, the Applicant may apply for consent to extend the operational life of the Proposed Development in accordance with the relevant legislation at the time of any such application.

5. Environmental Impact Assessment

5.1. EIA is an iterative assessment process with the aim of avoiding or reducing the potential effects resulting from the Proposed Development through the continual refinement of the design of the Proposed Development. These effects can occur throughout all phases of the Proposed Development from construction, through operation and during decommissioning. Any potential effects will be mitigated utilising the mitigation hierarchy of avoid, reduce, offset and compensate.

5.2. Part 1 Section 4 (2), (3) and (4) of the EIA Regulations details what information is required to be included within the EIA Report and states:

"(2) The EIA must identify, describe and assess in an appropriate manner, in light of the circumstances relating to the proposed development, the direct and indirect significant effects of the proposed development (including, where the proposed development will have operational effects, such operational effects) on the factors specified in paragraph (3) and the interaction between those factors.

5.3. (3) *The Factors are –*

Population and human health;

Biodiversity, and in particular species and habitats protected under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora and Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds;

Land, soil, water, air and climate; and

Material assets, cultural heritage and the landscape.

5.4. (4) *The effects to be identified, described and assessed under paragraph (2) include the expected effects deriving from the vulnerability of the development to risks, so far as relevant to the development, of major accidents and disasters."*

5.5. The results of the EIA will be presented in an EIA Report, which, as prescribed in the EIA Regulations is required to include a "description of the likely significant effects" of the Proposed Development; effects which are not considered to be significant do not need to be described. It is therefore necessary for the scope of the EIA to be appropriately defined to ensure all significant effects are covered.

Scope of EIA

5.6. The aim of the Scoping process is to identify key environmental issues at an early stage, to determine which elements of the Proposed Development are likely to result in significant effects on the environment and to establish the extent of survey and assessment required for the EIA.

- 5.7. This Report therefore provides details of the assessment areas which will be included within the EIA Report to meet the information requirements as set out in Schedule 4 of the EIA Regulations. The scope for the assessment areas are detailed in Sections 6 - 21 of this Report and comprise of the following:
- Section 6: Policy Context;
 - Section 7: Landscape and Visual;
 - Section 8: Ecology;
 - Section 9: Ornithology;
 - Section 10: Cultural Heritage;
 - Section 11: Geology and Peat;
 - Section 12: Hydrology and Hydrogeology;
 - Section 13: Noise;
 - Section 14: Traffic and Transport;
 - Section 15: Aviation;
 - Section 16: Socio-economics, Tourism and Recreation;
 - Section 17: Shadow Flicker;
 - Section 18: Telecommunications and Utilities;
 - Section 19: Health and Safety; and
 - Section 20: Climate Change and Carbon;
 - Section 21: Cumulative Effects.
- 5.8. Through the EIA process, effects arising during the construction, operation and decommissioning phases will be assessed, and mitigation measures will be considered for each assessment area, where appropriate. These considerations will also be detailed within the EIA Report.

EIA Process

- 5.9. The EIA is an iterative process of assessment and design, whereby prediction and assessment of effects will inform the eventual design of the Proposed Development. The Proposed Development can then be refined in order to avoid or reduce potential environmental effects where necessary.
- 5.10. The EIA Report, which reports the findings of the EIA as set out in the EIA Regulations, is required to "*describe the likely significant effects*" of a development; effects that are not considered significant do not need to be described to meet the requirements of the EIA Regulations.
- 5.11. The main steps of the EIA process are broadly summarised as follows:
- Scoping: The Scoping Opinion from the ECU will be used to inform and focus the scope of the EIA on likely significant effects that could be anticipated to occur as a result of the Proposed Development.

- Baseline studies: Desk-based assessment (DBA), baseline surveys and site visits will be undertaken, where appropriate, in order to determine the baseline conditions of the environment and area that may be affected by the Proposed Development.
- Predicting and assessing effects: Potential interactions between the Proposed Development and the baseline conditions will be considered. The nature of the effects will be predicted and assessed; e.g. direct or indirect, positive or negative, long, medium or short term; temporary or permanent. Potential cumulative effects arising from the Proposed Development in conjunction with other proposed or consented developments will also be considered.
- Mitigation and assessment of residual effects: Potential effects will be avoided or reduced wherever possible through embedded mitigation. Where this is not possible, operational mitigation or other measures to reduce and/or offset significant effects will be proposed. The residual effects will then be assessed to determine any effects predicted to remain following implementation of the recommended mitigation measures.
- Production of the EIA Report: The results of the EIA will be set out in the EIA Report.

Assessment Methodology

- 5.12. In order to assess the potential effects arising from the Proposed Development, the significance of such effects will be determined. The determination of significance relates to the sensitivity of the resource or receptor being affected and the magnitude of change as a result of the impact. The assessment of effects will combine professional judgement together with consideration of the following.
- The sensitivity of the resource or receptor under construction;
 - The magnitude of potential impact in relation to the degree of change which occurs as a result of the Proposed Development;
 - The type of effect, i.e. adverse, beneficial, neutral or uncertain;
 - The probability of the effect occurring, i.e. certain, likely or unlikely; and
 - Whether the effect is temporary, permanent and/or reversible.
- 5.13. A generalised methodology for assessing significant effects is detailed below; however, each individual technical area will have a specific assessment methodology which may vary from that detailed in the following subsections.

Sensitivity of Receptors

- 5.14. The sensitivity of the receptors, including the importance of environmental features on or near to the Site, will be assessed in line with best practice, legislation or statutory designations and/or judgement.

- 5.15. Table 5.1 details a framework for determining the sensitivity of receptors. Each technical assessment will specify their own criteria that will be applied during the EIA and details will be provided in the relevant EIA Report chapter.

Table 5.1: Framework for Determining Sensitivity of Receptors

Sensitivity of Receptor	Definition
Very High	The receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of international importance.
High	The receptor has low ability to absorb change without fundamentally altering its present character, is of high environmental value, or of national importance.
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value, or is of regional importance.
Low	The receptor is tolerant of change without detriment to its character, is low environmental value, or local importance.
Negligible	The receptor is resistant to change and is of little environmental value.

Magnitude of Effect

- 5.16. The magnitude of potential impacts will be identified through consideration of the Proposed Development, the degree of change to baseline conditions predicted as a result of the Proposed Development, the duration and reversibility of an impact and professional judgement, best practice guidance and legislation.
- 5.17. General criteria for assessing the magnitude of an impact are presented in Table 5.2. Each technical assessment will apply their own appropriate criteria during the EIA, with the details provided in the relevant EIA Report chapter.

Table 5.2: Framework for Determining Magnitude of Effects

Magnitude of Effects	Definition
High	A fundamental change to the baseline condition of the asset, leading to total loss or major alteration of character.
Medium	A material, partial loss or alteration of character.
Low	A slight, detectable, alteration of the baseline condition of the asset.

Magnitude of Effects	Definition
Negligible	A barely distinguishable change from baseline conditions.

5.18. If impacts of zero magnitude (i.e. none / no change) are identified, this will be made clear in the assessment.

Significance of Effect

5.19. The sensitivity of the asset and magnitude of the predicted impacts will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects. Table 5.3 summarises guideline criteria for assessing the significance of effects.

Table 5.3: Framework for Assessment of the Significance of Effects

Magnitude of Impact	Sensitivity of Receptor				
	Very High	High	Medium	Low	Negligible
High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Moderate	Moderate	Minor	Negligible
Low	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

5.20. Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA Regulations, and are shaded in light grey in the above table.

5.21. Zero magnitude impacts upon a receptor will result in no effect, regardless of sensitivity.

Mitigation and Enhancement

5.22. Where the EIA identifies significant adverse environmental effects, mitigation measures will be proposed in order to avoid, reduce, offset or compensate those effects. These mitigation measures will likely include the movement or loss of turbines, access tracks and other infrastructure (i.e. embedded mitigation); or the provision of specific measures during construction and operation phases of the Proposed Development.

5.23. The extent to which mitigation or other measures are taken into account will depend on the facts of each case. In some cases, the measures may form part of the proposal, be modest in scope or so plainly and easily achievable that it will be possible to reach a conclusion that there is no

likelihood of significant environmental effects. The determining authority must have regard to the information provided by the applicant and should interpret this in both light of the precautionary principle and taking into account the degree of uncertainty in relation to the environmental impact, bearing in mind that there may be cases where the uncertainties are such that they need to be examined in the EIA.

- 5.24. In addition, enhancement measures may be incorporated into the design of the Proposed Development to maximise environmental benefits.

Residual Effects

- 5.25. Taking cognisance of the suggested mitigation (and enhancement) measures, the predicted effects will be re-assessed to determine the residual effects.

Cumulative Effects

- 5.26. At the time of writing it is known that there are other operational wind farms and a number of wind energy proposals located in the vicinity of the Site. Known wind farm developments are shown in **Figure 5, Appendix A** and are listed in **Appendix C**. The methodology adopted for assessing the cumulative effects of wind energy developments will be in accordance with advice from SNH³. Cumulative effects will be considered for each technical area assessed within the EIA and include two forms:

- Combined effects of two or more similar developments; and
- Combined effects within the Proposed Development.

- 5.27. The extent of the cumulative assessment relative to each technical assessment will be agreed during the consultation process. For example, the potential landscape and visual effects, which relate to the visibility of the Proposed Development, will be much more wide ranging than noise effects, which will be limited to receptors in the more immediate vicinity of the Proposed Development. Specific guidance and policy exists for certain technical areas which advise how effects should be considered cumulatively and these will be used where relevant.

- 5.28. Further details about the existing cumulative situation is provided in Section 21.

Alternatives

- 5.29. Schedule 4, Part 2 of the EIA Regulations requires a description of the reasonable alternatives (such as project design, technology, location, size and scale) studied by the developer, which are relevant to the Proposed

³ SNH, 2012, *Assessing the Cumulative Impact of Onshore Renewable Energy Developments*. Available at: <https://www.nature.scot/sites/default/files/201709/Guidance%20note%20%20Assessing%20the%20cumulative%20impact%20of%20onshore%20wind%20energy%20development%20s.pdf> [Accessed 09/04/2019]

Development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of environmental effects.

- 5.30. Consideration of alternative designs has already begun. The final layout of the Proposed Development will be based on a range of technical criteria, such as separation distances between turbines, wind speed, prevailing wind direction, existing infrastructure, topography, ground conditions, local environmental issues and landscape and visual considerations.
- 5.31. The identification of these criteria is an iterative process: as they are identified the layout of the Proposed Development, including ancillary infrastructure, will undergo a series of modifications to avoid or reduce potential effects through careful design. This process will be set out in the EIA Report.

Structure and Content of the EIA Report

- 5.32. The content of the EIA Report will broadly follow the specifications detailed within Schedule 4 of the EIA Regulations. The EIA Report will consist of three volumes and a Non-Technical Summary (NTS).
- Volume 1 – Main EIA Report text;
 - Volume 2 – Figures;
 - Volume 3 – Landscape and Visual and Cultural Heritage Visualisations;
 - Volume 4 – Technical appendices.
- 5.33. The front end of the main EIA Report text will include:
- An introduction;
 - Description of the site and its surroundings;
 - Details of alternatives considered and scheme evolution;
 - Description of the Proposed Development;
 - Details of the EIA process and methodology, including a summary of consultation; and
 - Policy context.
- 5.34. The technical chapters of the EIA Report will present details of the assessments undertaken, including any cumulative effects, required mitigation and residual effects.

6. Policy context

Project Need and the Renewable Energy Policy Framework

- 6.1. The EIA Report will describe, in summary, the renewable energy policy framework and associated need case for renewables, identified as a matter of both law and policy, at international, European and domestic levels.
- 6.2. The Proposed Development relates to the generation of electricity from renewable energy sources and comes as a direct response to national planning, energy policy and climate change objectives. The clear objectives of the UK and Scottish Governments will be summarised, in relation to encouraging increased deployment and application of renewable energy technologies, consistent with sustainable development policy principles and national and international obligations on climate change.
- 6.3. The UK Government has stated⁴ (March 2020) that on 27 June 2019, a new legally binding target to reach net zero greenhouse gas emissions by 2050 came into UK law. By 2050, the UK will need an ultra-low carbon power sector to meet this economy wide net zero emissions target. In parallel, generation will need to increase to meet future demand and to achieve this, low carbon electricity generation will need to quadruple by 2050.
- 6.4. At a Scottish Government level, a "Climate Emergency" was declared by the First Minister in April 2019. Furthermore, the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 received Royal Assent on 31 October 2019. The Act sets a legally binding 'net zero' target for Scotland for 2045 (with challenging interim targets), five years ahead of the date set for the whole of the UK.
- 6.5. The Proposed Development relates to the generation of electricity from renewable energy sources and comes as a direct response to national planning and energy policy objectives. Reference will be made to the clear objective of the Scottish Government to encourage increased deployment and application of renewable energy technologies and in particular onshore wind, consistent with sustainable development policy principles and national and international obligations on climate change.
- 6.6. The Proposed Development would clearly make a contribution to the attainment of renewable energy, electricity and climate change targets at both the Scottish and UK levels and the quantification of this contribution would be described. The description of the renewable energy policy framework will also refer to the Scottish Government's Climate Change Plan, Energy Strategy and Onshore Wind Policy Statement.

⁴ 'Consultation on proposed amendments to the Contracts for Difference (CfD) scheme for low carbon electricity generation'. Issued by the Department for Business Energy and Industrial Strategy (BEIS), (March 2020).

National Planning Policy and Guidance

- 6.7. Reference will be made to various national planning policy and guidance documents including:
- The National Planning Policy Framework 3 (NPF3);
 - The Interim Statement on NPF 4 expected to be published in Autumn 2020;
 - Scottish Planning Policy (SPP);
 - Scottish Government web-based Renewables Guidance;
 - The Scottish Climate Change Plan, and emerging update expected to be published later in 2020;
 - Scottish Government policy and good practice guidance on community benefit funding and community shared ownership.

The statutory Development Plan and Supplementary Guidance

- 6.8. The planning policy context applicable to the site will be taken into account in the iterative EIA design process. The relevant planning policy framework will also be described in the EIA Report.
- 6.9. The statutory Development Plan for the site comprises
- the Moray Local Development Plan (the "LDP") (adopted 31 July 2015); and
 - The Moray Onshore Wind Energy Supplementary Guidance (November 2017) (the "SG" or "MOWE").
- 6.10. Included (as an Appendix) to the SG is the Moray Wind Energy Landscape Capacity Study (the "MWELCS" (May 2017).
- 6.11. Relevant policies within the current adopted LDP (2015) will include the following:
- ER1 'Renewable Energy Proposals';
 - PP1 'Sustainable Economic Growth';
 - IMP1 'Developer Requirements';
 - IMP2 'Development Impact Assessments';
 - IMP3 'Developer Contributions';
 - E1 'Natura 2000 Sites and National Nature Conservation Sites';
 - E2 'Local Nature Conservation Sites and Biodiversity';
 - E3 'Protected Species';
 - E4 'Trees and Development';
 - E6 'National Parks and National Scenic Areas';
 - E7 'Areas of Great Landscape Value (AGLV) and impacts upon the wider landscape';
 - EP4 'Private Water Supplies';

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- EP5 'Surface Water Drainage: Sustainable Urban Drainage Systems (SUDS)';
 - EP6 'Waterbodies';
 - EP7 'Control of Development in Flood Risk Areas';
 - EP8 'Pollution';
 - EP13 'Ministry of Defence Safeguarding Areas';
 - BE1 'Scheduled Monuments and National Designations';
 - BE2 'Listed Buildings';
 - BE5 'Battlefields, Gardens and Designed Landscapes'
 - T2 'Provision of Access';
 - T6 'Traffic Management'; and
 - ER6 'Soil Resources'.
- 6.12. A relevant material consideration is the emerging LDP, the Moray LDP 2020. The Proposed Plan was consulted on for a 10-week period from 7 January to 15 March 2019. The Report of Examination for the LDP 2020 was issued on 19 May 2020 and it is anticipated that it will be adopted later in 2020. The policy topics and provisions within the LDP 2020 are broadly similar to those within the adopted LDP and reference will be made to those policies when the new plan is adopted.
- 6.13. It should be noted that a Planning Statement will be provided with the application (but separate from the EIA Report) which will contain an assessment of the accordence of the Proposed Development with the relevant policy and guidance documents as referred to above.

7. Landscape and Visual

Overview

- 7.1. It is acknowledged from the outset that, in common with almost all commercial wind energy developments, some significant landscape and visual effects would occur as a result of the proposals.
- 7.2. A key principle of the European Landscape Convention is that all landscapes matter and should be managed appropriately. It is also acknowledged that landscapes provide the surroundings for people's daily lives and often contribute positively to the quality of life and economic performance of an area.
- 7.3. It is therefore proposed that a Landscape and Visual Impact Assessment (LVIA) is undertaken as part of the EIA and a Landscape and Visual Chapter be included in the EIA Report. The LVIA will be undertaken by Chartered Landscape Architects, who are experienced in the assessment of large scale, on shore wind energy projects and are fully familiar with the landscape in the vicinity of the site.
- 7.4. It is proposed that the LVIA will consider the potential effects of the Proposed Development upon:
 - Individual landscape features and elements;
 - Landscape character; and
 - Visual amenity and the people who view the landscape.

Baseline Landscape Conditions

Landscape Character

- 7.5. Scottish Natural Heritage (SNH) published an updated national set of Landscape Character Types (LCTs) in early 2019. This 2019 national LCT map and associated LCT Descriptions now supersede the earlier 1990s SNH landscape character descriptions and mapping.
- 7.6. The site lies within LCT 292 'Open Upland'. The 'Key Characteristics' of this area are defined by SNH as follows:
 - ***Open, expansive landscape of smooth and steep-sided hills and exposed, rounded fractured rock summits which coalesce across elevated moorland valleys to form an arc of high ground.***
 - ***Simple, large scale vegetation patterns and managed moorland of hill tops and sides, with occasional large conifer plantations.***

- ***Contrasting small scale pattern of land use at lower levels and close to minor roads, consisting of farmsteads, peat cuts, and rough pastures, sometimes integrated with small forest plantations.***
 - ***North-east to south-west orientated burns and rivers with natural, meandering courses, and associated with ribbons of native woodland on the sheltered, steeper valley sides.***
 - ***Broad, farmed and sparsely settled central basin, almost encircled by the arc of hills.***
 - ***Few roads and structures, other than occasional farms, cottages and abandoned stone buildings in lower areas.***
 - ***Sense of remoteness, isolation and openness, resulting from the wide, sweeping scale of the internal landscape and limited settlement and roads, and presence of ruins and relicts.***
- 7.7. Other national Landscape Character Types covering the landscape in the vicinity of the site include: LCT 28 – ‘Outlying Hills and Ridges’; LCT 294 ‘Upland Valleys – Moray and Nairn’; and LCT 32 – ‘Farmed and Wooded River Valleys’.
- 7.8. The Moray Wind Energy Landscape Capacity Study [MWELCS], May 2017, identified this part of the landscape as being within Landscape Character Type 12b ‘Open Uplands with Settled Glens’ in its analysis of the sensitivity of the landscape.
- 7.9. The MWELCS notes that this LCT occurs in the south-eastern part of Moray close to the boundaries of Aberdeenshire and the Cairngorms National Park. It also sets out that the consented Dorenell wind farm is located in this landscape character type and that the operational Clashindarroch and Kildrummy wind farms lie close to the Moray boundary in neighbouring Aberdeenshire.
- 7.10. The MWELCS identifies that ‘These uplands lie adjacent to rounded hills with a similar elevation lying to the northeast within Aberdeenshire although these adjacent hills are forested, contrasting with the open moorland cover of the Open Uplands with Settled Glens (12b)’.
- 7.11. The LVIA will include an assessment of the potential for the Proposed Development to result in significant effects on landscape character, based on the relevant published LCTs covering the study area. This will include the LCTs identified by both Moray Council and Aberdeenshire Council.

Landscape Designations

- 7.12. The Site lies outside any Designated Landscapes identified at a national level.

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- 7.13. The nearest National Park is The Cairngorms located approximately 8km to the south-west. The nearest National Scenic Area (NSA) is The Cairngorm Mountains, located approximately 35km to the south-west.
- 7.14. At a local level, the site currently lies within an Area of Great Landscape Value (AGLV) in the adopted Moray Development Plan (2015), however, this designation is being phased out in the forthcoming Moray Local Development Plan (2020). Instead, a series of Special Landscape Areas (SLAs) have been identified to replace the AGLVs, in line with the findings of the Moray Local Landscape Designation Review (2018). The nearest candidate SLA identified by Moray Council in the Landscape Designation Review is 'Ben Rinnies' located approximately 8km to the west.
- 7.15. The site also lies outwith Wild Land, with the nearest, Area 15: Cairngorms, lying around 28km away to the south-west.
- 7.16. The nearest Garden and Designed Landscape is Leith Hall which lies 13km to the east.
- 7.17. Landscape designations in the vicinity of the site are illustrated in Figure 3. This Figure illustrates the forthcoming SLAs, but excludes the AGLVs which are due to be replaced. The potential for landscape and visual effects in relation to the landscape designations and Wild Land will be considered appropriately in the LVIA.

Visual Receptors

- 7.18. The nearest settlements in the locality surrounding the Site are Rhynie which lies 8km to the south-east, Dufftown which lies 11km to the north-west, and Huntly which lies 12km to the north-east. There are also small cluster of properties scattered along the road network which runs in the vicinity of the site including the A941, A920 and A97, along with a number of minor roads, including that which runs along the valley of the River Deveron immediately to the north-west of the site.
- 7.19. A detailed consideration of the potential for impacts to the visual amenity of receptors in the landscape surrounding the Site will be set out in the LVIA. This visual assessment will be informed by a selection of representative assessment viewpoints, which are discussed further in the methodology section, each of which will be illustrated with visualisations prepared in line with SNH best practice guidance.

Residential Visual Amenity

- 7.20. A detailed consideration with regard to residential visual amenity will also be given within in the LVIA and a separate standalone Residential Visual Amenity Study (RVAS) will be undertaken as part of the LVIA for all residential properties within 2km of a proposed turbine.

Methodology

- 7.21. It is proposed that the main objectives of the LVIA will be as follows:
- To identify, evaluate and describe the current landscape character of the Site and its surroundings, and also any notable individual or groups of landscape features within the Site;
 - To determine the sensitivity of the landscape to the type of development proposed;
 - To identify potential visual receptors (i.e. people that would be able to see the Proposed Development) and evaluate their sensitivity to the type of changes proposed;
 - To identify and describe any impacts of the Proposed Development in so far as they affect the landscape and/or views of it and evaluate the magnitude of change due to these impacts;
 - To identify and describe any mitigation measures (including mitigation which is inherent in the design and layout of the Proposed Development) that have been adopted to avoid, reduce and compensate for landscape and visual effects;
 - To identify and assess any cumulative landscape and visual effects;
 - To evaluate the level of residual landscape and visual effects; and
 - To make a professional judgement about which effects, if any, are significant.

Published LVIA Guidance

- 7.22. The LVIA shall be undertaken in accordance with the principles of best practice, as outlined in published guidance documents, notably the third edition of the Guidelines for Landscape and Visual Assessment (GLVIA3), (Landscape Institute and the Institute for Environmental Management and Assessment, 2013).

- 7.23. The methodology and assessment criteria proposed for the assessment has been developed in accordance with the principles established in this best practice document. It should be acknowledged that GLVIA3 establishes guidelines, not a specific methodology. The preface to GLVIA3 states:

"This edition concentrates on principles and processes. It does not provide a detailed or formulaic 'recipe' that can be followed in every situation – it remains the responsibility of the professional to ensure that the approach and methodology adopted are appropriate to the task in hand."

- 7.24. The approach has therefore been developed specifically for this assessment to ensure that the methodology is fit for purpose.

- 7.25. As part of the development of the proposed methodology, consideration has also been given to the following documents:
- Guidelines for Landscape Character Assessment, (2002) Countryside Agency and SNH;
 - Landscape Character Assessment Guidance for England and Scotland: Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity, (2002) The Countryside Agency and SNH;
 - Assessing the Cumulative Impact of Onshore Wind Energy Developments (March 2012) SNH;
 - Siting and Design of Wind farms in the Landscape, Version 3 (February 2017) SNH;
 - Visual Representation of Wind farms – Version 2.2 (February 2017), SNH;
 - LI Advice Note 02/17 Visual representation of development proposals (March 2017) Landscape Institute;
 - LI Advice Note 02/19 Residential Visual Amenity Assessment (RVAA) (March 2019) Landscape Institute;
 - Assessing the Impacts on Wild Land Interim Guidance Note (SNH, 2007);
 - Assessing Impacts on Wild Land Areas – Technical Guidance (Consultative Draft) (SNH, 2017); and
- 7.26. Full details of the methodology will be provided within the LVIA chapter of the EIA Report. The following provides an outline of the key aspects of the assessment.

Distinction between Landscape and Visual Effects

- 7.27. In accordance with the published guidance, landscape and visual effects shall be assessed separately, although the procedure for assessing each of these is closely linked. A clear distinction has been drawn between landscape and visual effects as described below:
- Landscape effects relate to the effects of the Proposed Development on the physical and perceptual characteristics of the landscape and its resulting character and quality; and
 - Visual effects relate to the effects on specific views experienced by visual receptors and on visual amenity more generally.

Types of Landscape and Visual Impacts Considered

- 7.28. The LVIA will address all phases of the Proposed Development and effects will be considered during the construction phase, when the Proposed Development is being built (temporary effects), following completion of the

Proposed Development (permanent effects) and during decommissioning at the end of the project (temporary effects).

- 7.29. The LVIA will not only assess the impacts associated with the turbines, but also any related impacts resulting from any anemometer masts, control building/substation, underground cabling, site tracks and access roads.
- 7.30. Consideration shall be given to seasonal variations in the visibility of the Proposed Development and these will be described where necessary.
- 7.31. The LVIA will also consider the potential for any cumulative effects to arise. The requirement for consideration of cumulative effects under the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 is set out in Schedule 4, as follows:

*'5. A description of the likely significant effects of the development on the environment resulting from, inter alia: **(e) the cumulation of effects with other existing and/or approved development**, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources';*

- 7.32. This represents a change to the wording of the previous Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2010 which stated: *'A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development'*.
- 7.33. There is therefore no longer any requirement under the current EIA Regulations to consider the potential for cumulative impacts in relation to other developments which are yet to be awarded consent.
- 7.34. Notwithstanding this, it is acknowledged that current best practice guidance for cumulative impact assessment (Assessing the Cumulative Impact of Onshore Wind Energy Developments, SNH, 2012) still refers to a consideration of proposals which are *'awaiting determination within the planning process with design information in the public domain'* and states that *'The decision as to which proposals in the planning / consenting system should be included in an assessment is the responsibility of the determining authority.'*
- 7.35. As such, it is proposed in this LVIA to consider cumulative effects caused by the development of the Proposed Development in conjunction with other sites which are either operational, under construction, consented or the subject of a full planning or S36 application. The SNH best practice guidelines identify two principle types of cumulative visual impact:
- Combined visibility – where the observer is able to see two or more developments from one viewpoint; and

- Sequential visibility – where two or more sites are not visible at one location but would be seen as the observer moves along a linear route, for example, a road or public right of way.
- 7.36. The guidelines state that ‘combined visibility’ may either be ‘in combination’ (where two or more sites are visible from a fixed viewpoint in the same arc of view) or ‘in succession’ (where two or more sites are visible from a fixed viewpoint, but the observer is required to turn to see the different sites). Each of the above types of cumulative effect will be considered in the LVIA.

Study Areas

- 7.37. In order to assist with defining the study area, a digital Zone of Theoretical Visibility (ZTV) model was created as a starting point to illustrate the geographical area within which views of development on the Site are theoretically possible. This was based on a ‘bare-earth’ scenario, whereby the screening effect of areas of existing vegetation or built features in the landscape are not taken into account. The ZTV was modelled to blade tip height using the currently proposed turbine height of 200m. In addition, as the Proposed Development would comprise an extension to the operational Clashindarroch Wind Farm comprising 18 no. turbines, 110m to blade tip, a comparative exercise of ZTV coverage between the proposed development and the turbines in the already operational scheme has been undertaken and is presented at Figure 4.
- 7.38. Having reviewed the ZTVs and with regard to best practice guidance, it is proposed that the LVIA will consider an initial 35 km radius study area. Detailed assessment will then be provided for a 20 km section of this study area, which it is considered represents a proportionate extent of the study area and the limit within which any potential significant effects might occur.
- 7.39. For the cumulative assessment, consideration was initially given to a 60 km radius from the Site, as recommended by SNH best practice guidance. Following this review, it is proposed that a 20 km detailed study area be adopted to consider cumulative effects, which is considered represents a proportionate extent of the study area and the limit within which any potential significant cumulative effects might occur. Cumulative sites within 20 km of the site are illustrated on **Figure 5 in Appendix A** and listed in Table 7.1.

Table 7.1: Cumulative Sites within 20 km

Operational		
Clashindarroch Wind Farm	18 Turbines – 110m to blade tip	0km to the east
Dorenell Wind Farm	59 Turbines – 126m to blade tip	6km to the west

Hill of Towie I	21 Turbines – 100m to blade tip	15km to the north
Edintore	6 Turbines – 125m to blade tip	16km to the north
Cairnborrow	5 Turbines – 100m to blade tip	12km to the north-east
Dummuies	7 Turbines – 80m to blade tip	16km to the north-east
Glens of Foudland	20 Turbines – 78m to blade tip	20km to the north-east
Kildrummy	8 Turbines – 105m to blade tip	9km to the south
Cairnmore Farm	3 Turbines – 81m to blade tip	11km to the south-east
Planning Permission Granted/ Under Construction		
Hill of Towie II	16 Turbines – 125m to blade tip	14km to the north
Application Submitted		
Clashindarroch II	14 Turbines – 180m to blade tip	0km to the east

Proposed LVIA Viewpoint Locations

- 7.40. It is proposed that the 15 locations set out in Table 7.2 are included as viewpoints in the LVIA. A number of the viewpoints replicate locations which were included as part of the recently prepared Clashindarroch II Wind Farm LVIA.
- 7.41. The proposed viewpoint locations are illustrated on **Figure 4, Appendix A** and represent visual receptors and character types at a range of distances and directions from the Site.

Table 7.2: Proposed LVIA Assessment Viewpoints

Ref.	Location	OS Grid Ref
1	A941- Blackwater Bridge	337801, 830811
2	Minor Road near Boghead	339342, 832772
3	Minor road near Backside	341163, 836133
4	Meikle Firbriggs	335939, 828742
5	Minor Road near Cabrach Parish Church	338674, 826794
6	B9002, near Innesbrae	343738, 825162
7	A920 between Huntly and Dufftown	340667, 840372
8	Clashmach Hill	349773, 838507
9	Tap O’ Noth	348408, 829302
10	The Buck	341308, 823638

Ref.	Location	OS Grid Ref
11	Meikle Balloch	347149, 849511
12	Ben Aigan	331000, 848194
13	Ben Rinnes	325508, 835453
14	Ladder Hills, Little Geal Charn	329839, 819686
15	Correen Hills, Old Military Road	354685, 823345

- 7.42. Each of the representative viewpoints will be visited to evaluate the sensitivity of views. In addition, the study area will also be extensively visited to consider visibility of the Proposed Development as receptors move through the landscape.
- 7.43. The viewpoints will be used as the basis for determining the effects on visual receptors within the study area. The sensitivity of different receptor groups will be set out in the LVIA methodology.
- 7.44. The level of effect experienced by different visual receptor groups will be determined by considering in tandem the sensitivity and view with the magnitude of impact.

Visualisations

- 7.45. For each of the viewpoints, visualisations will be prepared in line with Visual Representation of Wind farms – Version 2.2 (February 2017), SNH.

Visible Turbine Lighting Assessment and Visualisations

- 7.46. Turbines over 150m are required to be fitted with visible red aviation warning lighting. As a consequence of this, it is best practice for LVIAs for wind farms fitted with such lighting to include an assessment of the effects which would arise from this. A detailed proposed methodology for the assessment is set out in **Appendix D**. This includes information on the proposed selection of viewpoints for the production of Dusk Period Visualisations, in addition to daytime visualisations set out above. These are proposed to be as follows:
 - Viewpoint 2: Minor Road near Boghead; and
 - Viewpoint 5: Minor Road near Cabrach Parish Church;

Key Questions

- 7.47. The following are thought to be the key issues which require consideration by the consultees:
 - Do you agree with the detailed study areas proposed for the assessment?
 - Are there any comments on the proposed list of viewpoint locations?
 - Are there any further wind farm sites, to those listed in Table 7.1, to consider as part of the cumulative assessment?

- Do you agree that the proposed scope of assessment is appropriate, including the approach to the residential visual amenity study and the night-time lighting assessment?

8. Ecology

- 8.1. Ecological desk study and survey work in relation to the site commenced in June 2020. BSG have considerable experience of the site gained through the coordination of ornithological survey (see Section 9 of this document). Knowledge of the upland habitats present, and incidental records of protected species (or signs of their presence) has informed the approach to the work.
- 8.2. Desk study and consultation undertaken to inform the ornithological survey work has also identified that the Hill of Towanreef Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) lies to the south of the site, and part of this area extends to the A941 which forms the southern border of the site. The SAC was designated for its calminarian grassland, European dry heath, alpine boreal heath, juniper formation on heaths / calcareous grassland and blanket bog habitats. It was also designated due to the population of the Annex II plant marsh saxifrage that it supports. The SSSI notification reflects this mosaic of high quality semi-natural habitat as well as the nationally important geological interest of the site.
- 8.3. A detailed Phase 1 habitat survey (in which plant communities will be assigned to National Vegetation Classification communities in the field based on surveyor experience) will be completed across the site. This will be used to assess habitat quality, the potential for groundwater dependent terrestrial ecosystems to be present, and whether there are potential impacts on the Hill of Towanreef SAC / SSSI as a result of the Proposed Development.
- 8.4. A range of protected species survey work, including bat, water vole, otter, pine marten, Scottish wildcat and fisheries survey, is also being undertaken.

Methods

Consultation

- 8.5. Limited consultation has been undertaken with regard to the scope of ecological works to date. However, it was noted in a (primarily ornithologically-focussed) meeting with Jennifer Heatley of SNH that they would welcome positive habitat management of a suitable part of the Site to ensure a favourable biodiversity outcome if the scheme is consented. Jennifer Heatley was also contacted on 16 December 2019 to discuss the requirement for wildcat survey at the site.

Desk Study

- 8.6. In addition to open source aerial photography and Ordnance Survey mapping, the following sources have been interrogated to understand the context of the site in relation to designated areas and in the local landscape:

- The Multi Agency Geographic Information for the Countryside (MAGIC) website.
 - Natural Heritage Zone information (SNH, 2002).
- 8.7. The following organisations will be contacted for ecological information for the site and a 2 km perimeter area around it:
- North-east Scotland Biological Records Centre
 - Scottish Natural Heritage (SNH) [as part of wider consultation on survey and assessment]
 - The Scottish Wildlife Trust
 - Scottish Wildcat Action
 - Forestry Commission Scotland
 - The Deveron, Bogie and Isla Rivers Trust

Surveys

Habitat Survey

- 8.8. A Phase 1 Habitat Survey will be completed in accordance with industry standard (JNCC, 2010) survey guidance. The survey area will extend to at least 300 m from turbine locations to reflect Scottish Environmental Protection Agency (SEPA) (2017) guidance regarding peatland excavations of more than 1 m depth, and to account for micro-siting.
- 8.9. During the Phase 1 survey plant communities will be assigned to NVC categories in the field (based on the experience of the surveyor and the community types identified by Rodwell (1991), and species lists recorded for each habitat type present. Target Notes (TNs) will be used to identify discrete areas where there is variation in community type. This approach will allow the condition of each discrete area of habitat to be assessed based on indications of quality / degradation in the Phase 1 handbook and the more detailed vegetative descriptions provided based on Rodwell.
- 8.10. Particular consideration in both survey and subsequent data analysis and reporting will be given to any habitats present that are on the Scottish Biodiversity List, are of European Conservation Priority (Annex 1 habitats) or are potentially groundwater dependent. Representative photographs will be taken of the habitats present.
- 8.11. Information on potential Ground Water Dependent Terrestrial Ecosystems (GWDTES) will be made available to the project hydrologist and wider project team in order to inform the design process.

Bat Survey

- 8.12. Bat survey work based on SNH et al (2019) guidance is in progress. Detectors were deployed at twelve locations in spring 2020 for a period of ten consecutive nights., Due to recent evolution and amendment of the layout the number of sampling locations will also be increased (to 14 units) for the summer and autumn periods.

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- 8.13. The area is relatively homogenous and has few potential roosting features. Pending the analysis of spring results, it is considered very unlikely that deploying 12 units in spring 2020 will constitute a data gap in assessment terms (and in summer and autumn guidance will be exceeded). The bat community is likely to be fairly impoverished due to the location and altitude of the site.
- 8.14. A weather station has been deployed to collect site specific data on wind speed and other weather parameters for the periods in which bat activity will be sampled.
- 8.15. No bat survey other than static detector deployment will be completed unless the Phase 1 survey identifies potential roost features close to the proposed turbines (within approximately 200 m) that should be checked for bat occupancy. This is in accordance with SNH *et al* (2019) guidance.

Water Vole and Otter Survey

- 8.16. Water vole and otter survey work at the site is underway. Burns, pools and wet flushes within 200 m of indicative turbine locations and infrastructure will be searched for evidence of presence (such as latrines / spraints, burrows / holts, and feeding remains). The first of two visits has been completed (in June 2020), with the second to be undertaken in late summer / autumn as recommended in guidance for water vole survey (Dean *et al*, 2016). Otter survey will be completed in conjunction with this on both occasions.

Pine Marten Survey

- 8.17. Pine marten survey will be completed in mid to late summer 2020, to coincide with the period when scats are most abundant. Following an initial assessment of habitat quality in accordance with Cresswell *et al*. (2012), a more thorough inspection of habitats suitable for den creation / animals to use (such as areas of boulders) will be completed.

Scottish Wildcat Survey

- 8.18. Clashindarroch Forest lies within the Strathbogie Wildcat Priority Area. This area is heavily surveyed; large numbers of feral and hybrid cats have been trapped, vaccinated and neutered to help conserve the local wildcat population, the movements of which also appear to be well understood and monitored. However, whilst Clashindarroch Forest has been surveyed extensively, it is unlikely that data exists for the moorland within the extension site.
- 8.19. Areas with potential to be used by Scottish wildcat have been searched alongside the spring bat detector deployment work, and initial otter and water vole survey. Further searches will be completed during the Phase 1 survey. Trail cameras have been deployed at five locations in August 2020 and will be left in situ for two months duration (in accordance with SNH (2011) Commissioned Report No. 479, and as discussed in consultation with Jennifer Heatley of SNH). In conjunction with this, we intend to liaise

with Scottish Wildcat Action for further information and records held by the group.

Fisheries Survey

- 8.20. We intend to undertake electro-fishing surveys of the streams within the site in order to record the fish species present, produce fish density estimations and assess habitat quality. This work will be undertaken by the local fisheries board or another specialist contractor.

Other Species

- 8.21. It is not considered, at this stage, that surveys for other species are likely to be required to inform the Proposed Development, either because they will be adequately surveyed during the Phase 1 work (such as badger) or because impacts on them are unlikely to be significant.

Assessment

- 8.22. The approach to the ecological impact assessment will be based on Chartered Institute of Ecology and Environmental Management Guidance (CIEEM, 2016).
- 8.23. This is a professional judgement as opposed to a matrix-based method of assessment (a matrix-based assessment will be applied in other ES Chapters (except the ornithological assessment) as outlined in the introductory sections of this document).

Conclusions

- 8.24. The main ecological issues at this stage are likely to be potential impacts on the Hill of Towanreef SAC and SSSI, Annex 1 habitats such as blanket bog, and on groundwater dependent terrestrial ecosystems.
- 8.25. There is also the potential for watercourses, and the fish populations they support, and for protected mammals to be impacted, particularly during the construction of the site. It is considered unlikely, given the geographical location and altitude of the site that impacts on bat populations will be a key concern.
- 8.26. Mitigation is likely to be principally achieved through the design of the wind farm; through the incorporation of stand-offs around watercourses, and the avoidance of ecologically sensitive habitats.

Key Questions

- 8.27. The following are thought to be the key issues which require consideration by the consultees:
- Are consultees aware of other sources of desk study data relevant to the proposed scheme?

- Do consultees consider that the scope of baseline survey work is appropriate?

9. Ornithology

Overview

- 9.1. BSG have completed two years of baseline ornithological work in relation to the Clashindarroch Wind Farm Extension Site. This has involved desk study, a range of bird survey in accordance with industry standard guidance (SNH, 2017), baseline reporting and consultation.
- 9.2. The vantage point survey work has been based on three vantage points. This has covered the substantial majority of the scoping layout area. Due to layout evolution and amendment there are currently four turbines that lie outside of the VP viewshed areas. Despite this, however, it is considered that the work, in combination with that from nearby wind farm schemes, provides a solid basis for assessment.
- 9.3. The work has recorded a range of species typical of upland habitats / managed grouse moor in the region. These have included small numbers of breeding raptors and waders, and lekking black grouse to the west of the Site. Low levels of 'target species' flight activity have been noted throughout the course of the work.

Methods

Consultation

- 9.4. Consultation was completed with Jennifer Heatley of SNH during summer and autumn 2019. Following initial correspondence by telephone and email, a report outlining the methods and results of a first year of ornithological work was issued ahead of a teleconference between Infinergy, BSG Ecology and SNH on 4 September 2019.
- 9.5. The aim was to agree the scope of the work completed was appropriate and to agree what further work might be necessary to inform an application.

Desk study

- 9.6. In addition to open source aerial photography and Ordnance Survey mapping, the following sources were interrogated to understand the context of the site in relation to designated areas and in the local landscape:
 - The Multi Agency Geographic Information for the Countryside (MAGIC) website.
 - Natural Heritage Zone information (SNH, 2002).
- 9.7. The following organisations were contacted for ornithological information for the site and a 2 km perimeter area around it:
 - RSPB Scotland

- Forestry Commission Scotland
- 9.8. The North East Scotland Raptor Study Group have been contacted to confirm data availability. We will request the data once a design freeze has been reached.
- 9.9. Further sources of information used to inform the scope of work included:
- Ornithological information collected in 2015 and 2016 in relation to the proposed Clashindarroch II wind farm site (comprising 160 hours of vantage point survey from three locations (not overlooking the Extension Site) between May 2015 and July 2016), raptor survey in both years and black grouse survey in 2016).
- 9.10. In addition to the above we will seek to obtain ornithological monitoring information in relation to Vattenfall's operational Clashindarroch wind farm to the east of the Site to inform the assessment. We understand that monitoring that included raptor survey within 1 km and black grouse survey within 1.5 km of the Site was completed in 2017.
- 9.11. We further understand that monitoring has not been completed at the operational wind farm in 2020 due to Covid-19.

Surveys

- 9.12. The following survey work has been completed in relation to the Clashindarroch Extension Site:
- Vantage point (VP) surveys from three locations. A total of 108 hours of data have been collected in each of the 2018 and 2019 breeding seasons and the winters of 2018/19 and 2019/20. The locations of the VPs and their field of view in relation to the current scheme are shown on Figure 6.
 - Breeding raptor surveys extending to 2 km from the turbine array (at the time of survey) for moorland-nesting raptors (such as hen harrier and short-eared owl) and 1 km for forest-nesting raptors (such as goshawk). Extensive areas of forest edge and glades within 2 km of the turbines were also searched (for species including (tree-nesting) merlin) using a combination of walkover survey and local VPs. The raptor survey area in relation to the current scheme is shown on Figure 7.
 - Black grouse lek surveys extending to 1.5 km from the proposed turbine array at the time the surveys were completed (the extent of coverage is shown on Figure 8).
 - Wader survey extending to 800 m from the turbine array at the time the surveys were completed (the extent of coverage is shown on Figure 9).
- 9.13. All survey work was undertaken in accordance with industry standard guidance (SNH, 2017; Brown & Shepherd, 1993 (as amended by Calladine *et al*, 2009; Gilbert *et al.*, 1998).

Assessment

- 9.14. The approach to the ornithological impact assessment will be based on Chartered Institute of Ecology and Environmental Management Guidance (CIEEM, 2016).
- 9.15. This is a professional judgement as opposed to a matrix-based method of assessment (a matrix-based assessment will be applied in other ES Chapters as outlined in the introductory sections of this document).
- 9.16. For species for which regular flight activity over the Site has been recorded, collision risk analysis will be completed using SNH's Band Model to inform the assessment of likely effects.

Results

Consultation

- 9.17. Key ornithological outcomes of the consultation with SNH in autumn 2019 included confirmation that:
- they had no concerns or issues with regard to the work completed.
 - they were not aware of any further sources of baseline data than those that had been identified
 - a further winter of survey should be completed
 - impacts on common gull would be a key element of the assessment due to potential for impacts on the Tips of Corsemaul and Tom Mor Special Protection Area (SPA) population.

Desk Study

- 9.18. The Site is located within the North East Glens Natural Heritage Zone, an area with a high cover of semi-natural habitats.
- 9.19. The nearest site designated for its ornithological interest is the Tips of Corsemaul and Tom Mor SPA approximately 4.6 km to the north of the extension site. The SPA is classified for its population of breeding common gull. It is also notified as a Site of Special Scientific Interest (SSSI) for its bird populations.
- 9.20. There are no further designated sites located within 10 km of the Site that classified or notified due to ornithological interest features.
- 9.21. Information returned included by RSPB Scotland included:
- A number of low resolution records of black grouse indicating likely breeding to the south and west of the proposed turbine array (three records were from within 2 km of it).
 - Indications of regular breeding within 2 km of the turbine array by lapwing and curlew, and of golden plover within the wider area.

- 9.22. Information with regard to four historic goshawk territories in Clashindarroch Forest to the east of the Site was provided by Jackie Cumberbirch of Forestry Commission Scotland. One of these was within 1 km of the Site.
- 9.23. Survey work to inform the Clashindarroch II Wind Farm in 2016 and 2015 resulted in the following:
- A total of nine target species during VP surveys. Goshawk (22 flights mainly in late winter / spring 2016), hen harrier (one flight in November 2015), honey buzzard (one flight in June 2015), short-eared owl (3 flights in November 2015), osprey (one flight in June 2016) and curlew (one flight of two birds in April 2016). Passage golden plover, pink-footed and greylag geese were noted during the autumn, winter and spring, but the numbers and frequency of flights of these species was unremarkable.
 - Three breeding sites of goshawk were confirmed in Clashindarroch Forest. Hen harrier was also noted breeding at an unspecified location beyond 2 km from the Clashindarroch II site, and a kestrel nest site was also located.
 - Black grouse were not recorded during targeted work for this species.

Surveys

- 9.24. Target species recorded during the breeding VP survey work in 2019 were hen harrier, goshawk, kestrel, common gull and pink-footed goose. The species assemblage was very consistent with that recorded in 2018, and activity levels were also very similar for most species:
- hen harrier was recorded less frequently in 2019 (one flight) than in 2018 (22 flights).
 - goshawk flight activity was relatively consistent (three flights in 2019 and five in 2018), with most recorded over adjacent areas of plantation east of the Site.
 - low levels of kestrel activity were noted in both years (two flights and five flights respectively).
 - common gull flight activity was also limited, with singletons noted on five occasions and two birds on another in 2019 and three flights of singletons in 2018.
 - during both 2019 and 2018 spring passage skeins of pink-footed geese were noted on single dates in April (17 and 29 birds respectively) flying very high (above collision risk height) through the area.
- 9.25. Target species recorded during winter VP survey work in both 2019/20 and 2018/19 were goshawk, kestrel and pink-footed goose.
- 9.26. Goshawk activity was relatively consistent, with three and two flights recorded respectively over the successive winters. Kestrel was noted on two dates in 2019/20 and six in 2018/19, suggesting less use of the area in the second winter.

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- 9.27. Breeding raptor survey in 2018 recorded a breeding pair of hen harrier to the west of the proposed turbine array. It was considered possible that two females attempted to breed in this area (based on field observations of two ringtails), but there was no evidence of nesting success and only one nest site was located. There was no evidence of attempted breeding in 2019.
- 9.28. Three Goshawk nest territories were checked in Clashindarroch Forest under license in 2018 and found to be occupied; all were in excess of 1 km from the proposed turbine array. The closest of these to the Site was checked again in 2019 and remained occupied.
- 9.29. There was no clear evidence of breeding in other raptors within the survey area. Kestrel appeared to breed beyond 2 km from the turbine array based on a combination of VP and raptor survey sightings of up to three birds. No nest site was located, and activity was generally noted towards the edge of the survey area. An osprey was seen incidentally during the 2019 work.
- 9.30. Lekking black grouse were noted at Bank Farm and Blackmiddens in both 2019 and 2018 (see Figure 8). The peak counts of males attending these leks were 15 and eight birds respectively. Both peak counts were in 2019.
- 9.31. Wader survey recorded curlew breeding to the south of the proposed turbine array in both 2019 and 2018, and further territories of both curlew and lapwing to the north and west of the survey area (See **Figure 9 in Appendix A**).

Conclusions

- 9.32. The main ornithological issue that will need to be considered in the section 36 application is likely to be collision risk to common gull associated with the Tips of Corsemaul and Tom Mor SPA.
- 9.33. There will also need to be consideration of potential displacement of hen harrier (on the assumption a pair nests locally in future years), black grouse and breeding waders during construction and operation.
- 9.34. Flight activity over the Site has been very limited, and collision risk modelling will not be applicable for some target species (due to minimal time at collision risk height in combination with low levels of activity). For those for which modelling is completed predicted collision fatality will be very low.
- 9.35. Mitigation in relation to disturbance and displacement of breeding waders and lekking grouse in particular will most readily be achieved through Site design and appropriate timing of works.

Key Questions

- 9.36. The following are thought to be the key issues which require consideration by the consultees:
- Are consultees aware of other sources of desk study data pertinent to the proposed scheme?
 - Do consultees consider that the combination of desk study and survey data provides a suitable basis for an assessment of the likely ornithological impacts of the proposed wind farm?

10. Cultural Heritage

Introduction

- 10.1. This section details the approach to the assessment of potential impacts upon Cultural Heritage. The 'cultural heritage' of an area comprises archaeological sites, historic buildings, gardens and designed landscapes, historic battlefields and other sites, features or places in the landscape that have the capacity to provide information about past human activity, or which have cultural relevance due to associations with folklore or historic events. Sites of cultural heritage interest may also derive some, or all, of that interest from their 'setting' within the wider landscape.
- 10.2. Historic landscape is not treated as a heritage asset for the purposes of this assessment except where a defined area of landscape has been designated for its heritage interest (including Conservation Areas and areas included in the Inventory of Gardens and Designed Landscapes). It is recognised that all landscapes have an historic dimension, and this will be considered as part of the assessment of Landscape Character (covered in Chapter 7: Landscape and Visual Impact Assessment).
- 10.3. It is important to note that, although any effects on the significance of heritage assets due to change in their setting are likely to be visual in nature, the assessment of these visual effects is distinct from the assessment of visual change in the LVIA. The assessment of effects on setting may be informed by visualisations prepared as part of the LVIA but the conclusions reached regarding visual change in the setting of a heritage asset are distinct.
- 10.4. This cultural heritage section of the scoping report is intended to identify potential effects of the Proposed Development upon the physical fabric and settings of heritage assets within the Site, and potential effects on the settings of assets within the wider landscape.
- 10.5. The cultural heritage chapter of the EIA report will characterise the historic environment within the Site and in the wider study area. It will use the results of consultation, desk-based research, walkover surveys and setting visits to define a study area and to assemble a baseline of heritage assets within it, and then to assess the potential effects of the Proposed Development on that baseline. Where potential effects are identified, mitigation measures will be suggested.

Baseline

- 10.6. The baseline used for this scoping section has been compiled using existing data on the historic environment available online from Historic Environment Scotland (HES) via the Canmore database and the Pastmap website, and designations data available as GIS datasets from the HES website.

- 10.7. Two study areas have been used for the identification of heritage assets that may be affected by the Proposed Development:
- The Inner Study Area (ISA) corresponds to the extent of the scoping site boundary (**Figure 10 Appendix A**).
 - The Outer Study Area (OSA) extends to 20km from the proposed turbines, which is taken as the maximum extent of potentially significant effects on the settings of heritage assets (**Figure 11 Appendix A**). Within the OSA, assets will be included in the assessment based on the level of importance assigned to the asset (defined in the EIA Methodology), to ensure that all significant effects are recognised:
 - Up to 2km from proposed turbines: Category C Listed Buildings, and any undesignated asset of local importance which has a wider landscape setting that contributes substantially to its cultural significance.
 - Up to 5km from proposed turbines: all assets of national or regional importance, including Scheduled Monuments, Category A and B Listed Buildings, Conservation Areas, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields and undesignated assets of more than local importance.
 - Up to 20km from proposed turbines: any asset which is considered exceptionally important, and where long-distance views from or towards the asset are thought to be particularly sensitive, in the opinion of the assessor or consultees. Between 5km and 20km, the baseline will be screened (and agreed with consultees) in order to identify any assets of particular sensitivity or importance.

The Inner Study Area

- 10.8. There are no designated heritage assets recorded within the ISA.
- 10.9. A study of the Pastmap website and the Canmore database has identified two undesignated heritage assets recorded within the ISA. Both known heritage assets are below approximately 430m aOD. They comprise a partially dismantled cairn (at Daugh of Corinacy) of possible prehistoric date and a farmstead at Redford recorded on the 1st Edition OS map (Canmore notes that it was occupied and/or in use between 1695 and 1923).
- 10.10. The baseline of the assessment will be informed by reference to designations data maintained by Historic Environment Scotland (HES) and to the Moray Council Historic Environment Record (HER, maintained by Aberdeenshire Council Archaeology Service). A digital extract will be obtained from the HER to ensure that the most up-to-date version of the data is used, and a walkover survey will be undertaken to confirm the presence of any known features within the site boundary once the layout has progressed and likely infrastructure locations have been identified.
- 10.11. The distribution of known archaeology in the surrounding area indicates that previously unidentified archaeological remains are more likely to be found below 450m aOD and/or on sheltered ground close to the principal watercourses.

The Outer Study Area

- 10.12. There are eight designated heritage assets within 5 km of the Scoping layout (**Figure 11 in Appendix A**). These comprise three Scheduled Monuments and five Listed Buildings (one Category B and four Category C).
- 10.13. Between 5km and 10km of the turbines, there are 22 Scheduled Monuments and three Category A Listed Buildings (**Figure 11 in Appendix A**).
- 10.14. Between 10km and 20km of the turbines, there are three Inventory Garden and Designed Landscapes (IGDL), two Inventory Historic Battlefields (IHB) and three Conservation Areas.
- 10.15. The Scheduled Monuments comprise seven prehistoric ritual or funerary monuments; nine prehistoric forts and/or settlements; three stone crosses and/ or carved stones; one medieval ecclesiastical site, and two post-medieval industrial and/or agricultural sites.
- 10.16. The Listed Buildings within 5km comprise three bridges, a burial ground and a house. The Category A Listed Buildings are LB2736 Craig Castle, LB2743 Druminnor Castle and LB9164 Beldorney Castle.
- 10.17. The IGDLs comprise Leith Hall (also the site of a Category A-listed building), Kildrummy Castle and Candacraig House. The Conservation Areas are Huntly, Keith and Keith Mid Street. The IHBs record the 1645 Battle of Alford and the 1594 Battle of Glenlivet.

Potential Impacts

- 10.18. Effects on the historic environment can arise through direct physical impacts, impacts on setting or indirect impacts:
- Direct physical impacts describe those development activities that directly cause damage to the fabric of a heritage asset. Typically, these activities are related to construction works and will only occur within the application site.
 - An impact on the setting of a heritage asset occurs when the presence of a development changes the surroundings of a heritage asset in such a way that it affects (positively or negatively) the cultural significance of that asset. Visual impacts are most commonly encountered but other environmental factors such as noise, light or air quality can be relevant in some cases. Impacts may be encountered at all stages in the life cycle of a development from construction to decommissioning but they are only likely to lead to significant effects during the prolonged operational life of the development.
 - Indirect impacts describe secondary processes, triggered by the development, that lead to the degradation or preservation of heritage assets. For example, changes to hydrology may affect archaeological preservation; or changes to the setting of a building may affect the viability of its current use and thus lead to dereliction.

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- 10.19. Cultural heritage constraint areas will, where necessary, be defined to include an appropriate buffer around known heritage assets. Constraint areas can be treated as a 'trigger' for the identification of potential direct impacts: they represent areas within which works *may* lead to direct impacts of more than negligible significance on known heritage assets.
- 10.20. Potential impacts on unknown heritage assets will be discussed in terms of the *risk* that a significant effect could occur. The level of risk depends on the level of archaeological potential combined with the nature and scale of disturbance associated with construction activities and may vary between high and negligible for different elements or activities associated with a development, or for the development as a whole.
- 10.21. Potential impacts on the settings of heritage assets will be identified from an initial desk-based appraisal of data from HES and the HER and consideration of current maps and aerial images available on the internet. Where this initial appraisal identifies the potential for a significant effect, the asset will be visited to define baseline conditions and identify key viewpoints. Visualisations will be prepared to illustrate changes to key views, where potentially significant effects are identified.

Potential Mitigation

- 10.22. Where potentially significant effects are identified, mitigation measures will be proposed. The preferred mitigation option is always to avoid or reduce impacts through design, or through precautionary measures such as fencing off heritage assets during construction works. Impacts which cannot be eliminated in these ways will lead to residual effects.
- 10.23. Adverse effects may be mitigated by an appropriate level of survey, excavation, recording, analysis and publication of the results, in accordance with a written scheme of investigation (SPP paragraph 150 and PAN2/2011, sections 25-27). Archaeological investigation can have a beneficial effect of increasing knowledge and understanding of an asset, thereby enhancing its archaeological and historical interest and offsetting adverse effects.

Assessment Methodology and Consultation

- 10.24. The assessment will be carried out with reference to the following policy and guidance:
- Scottish Planning Policy (SPP) 2014;
 - Standard and Guidance for Historic Environment Desk-Based Assessment (Chartered Institute for Archaeologists (CIfA) 2014);
 - Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment (CIfA 2014)
 - Planning Advice Note (PAN) 2/2011: Planning and Archaeology;

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- Managing Change in the Historic Environment: Setting (Historic Environment Scotland (HES) 2016);
 - Environmental Impact Assessment Handbook (5th Edition), Scottish Natural Heritage & Historic Environment Scotland (2018);
 - Designation Policy and Selection Guidance (2019);
 - Historic Environment Policy for Scotland (HEPS, 2019);
 - Historic Environment Scotland Circular (2019).
- 10.25. The consultees below will be approached for information during the EIA process. These consultees may also be contacted by the Scottish Government regarding the scope of the EIA:
- The Aberdeenshire Council Archaeology Service;
 - Historic Environment Scotland; and
 - Local archaeological interest groups (as appropriate).

Key Questions

- 10.26. The following are thought to be the key issues which require consideration by the consultees:
- Do you agree with the detailed study areas proposed for the assessment?
 - Are consultees aware of other sources of desk study data pertinent to the proposed scheme?

11. Geology and Peat

Introduction

- 11.1. This section of the Scoping Report sets out the proposed scope of the assessment for the following aspects: geology (bedrock and superficial deposits); soils (including peat); land quality and land use; and peat stability (landslide hazard).
- 11.2. Potentially significant effects are identified; and where there is a strong justification that factors would not result in significant effects, they are scoped out. The assessment will also consider if there may be any cumulative effects arising from the Proposed Development, such as other current or future (known) developments with the same bedrock geology or those potentially affecting the same area of peatland, and cumulative loss of forestry or agricultural land.
- 11.3. The potential effects of the Proposed Development on the loss of stored carbon and the continued ability of peatland to sequester Carbon are addressed in section 20: Climate Change and Carbon Balance.

Assessment Methodology

- 11.4. The purpose of this assessment will be to:
- Define the superficial and solid (bedrock) geology;
 - Assess the potential effects on geological interest features or resources;
 - Define the peat extent, depth and properties across the Site;
 - Assess the potential effects of peat disturbance;
 - Assess the potential for peat destabilisation through identification of areas susceptible to peat slide;
 - Inform the siting of turbines, tracks and other hardstanding to minimise the volumes and area of disturbed peatland;
 - Inform the siting of potential borrow pits (temporary quarries); and
 - Inform mitigation measures required to control on-site activities to reduce or offset any adverse effects on peat and geological interest features or resources.

Geological Desk-Based Assessment

- 11.5. A desk-based assessment of the solid geology of the Site will be made by examination of mapping undertaken by the British Geological Survey (BGS) and borehole records held within their GeoIndex database. BGS geological memoirs will also be consulted, where available.

Soils and Peat Desk-Based Assessment

- 11.6. The following published data sources will be used during the desk-based aspect of this assessment before the site survey (relevant geological information as described above will also be consulted):
- James Hutton Institute (2016) 1:25,000 National Soil Map of Scotland.
 - Scotland's soils (2016) Carbon and Peatland 2016 Map⁵ (combines historical soil information, at the 1:25 000 scale where available, and 1:250 000 scale elsewhere, with land cover from 1988 data; prepared by SNH based on James Hutton Institute data).

Peat Survey

- 11.7. The peat survey will comprise two phases; the first, a low-resolution, Phase 1 survey across the full Site; and a high-resolution, Phase 2 survey undertaken once the locations of the proposed infrastructure have been identified (following the design freeze).
- 11.8. Peat surveys will be carried out in accordance with the guidance set out in Scottish Government, SNH and SEPA, guidance⁶ in which: the Phase 1 survey is carried out on a 100 m grid across the full Site; and the Phase 2 survey is carried out along the access tracks, and in the planned turbine; crane pad; compounds; and borrow pit locations, including a 50 m micro-siting zone. Based on experience of the consultant the following approach to peat probing density is proposed for this project:
- Proposed new tracks: every 20 m in lines parallel to the track centreline, at 5 and 15 m offset from the centreline in areas of no peat; in areas of peat consistently exceeding 100 cm in depth, additional lines of probing at 20 m intervals along the parallel lines offset further from the track.
 - Turbine bases and crane pads: 20 m grid, increasing to a 10 m grid in areas where peat depth consistently exceeds 100 cm.
- 11.9. During the main Phase 2 survey, peat cores taken in representative areas of the site will be taken and logged using the von Post classification, with samples of known volume taken for laboratory analysis (bulk density; moisture, carbon content, and pH).
- 11.10. During each of the site surveys, geomorphological features such as grips (moorland drainage ditches); unmapped streams and flushes; erosion; rock outcrops; indicators of historic slope instability; underground drainage; etc. will be recorded.

⁵ Scotland's Soils, 2016. Carbon and peatland 2016 map. Available at: <https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/>

⁶ Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland. Available at: <https://www.gov.scot/publications/peatland-survey-guidance/>

Peat Landslide Hazard and Risk Assessment

- 11.11. Due to the presence of peat within the Site, the assessment of the risk of potential instability will be undertaken in accordance with Scottish Government guidance⁷.

Outline Peat Management Plan

- 11.12. A site-specific Outline Peat Management Plan (OPMP) will be prepared to outline the measures necessary to minimise peat disturbance and provide a clear description of mitigation measures to minimise potential adverse impacts on peat. The OPMP will:
- Provide volume estimates of cut and fill balance, and proposals for re-use of excavated peat on site; and
 - Detail management techniques for the handling, storage and reinstatement of peat.

Assessment of effects

Receptor sensitivity – geology

- 11.13. Geology is generally not a sensitive receptor unless there are designated sites with geological interest features present or that could be affected by the Proposed Development. Geological materials (rock, sand and gravel) would be extracted from borrow pits within the Site for use as construction materials for roads and hardstandings.

Receptor sensitivity – peat and soils

- 11.14. Peat and soils are an essential natural resource that provides important ecosystem services, including:
- Growing medium for food, timber and other crops;
 - Storing and filtering water;
 - Controlling the rate at which rainwater reaches watercourses;
 - Storing carbon and gaseous exchange;
 - Supporting habitats for plants and animals; and
 - Protecting archaeological heritage.
- 11.15. These functions are very important but can be overlooked in the EIA as the assessments usually focus on more easily separated aspects of the environment, such as the air, water, and wildlife, which have more explicit statutory protection. At the same time, peat and soils are a basis for the functioning of entire ecosystems and changes to these resources can have effects on the air, vegetation and the water environment.

⁷ Scottish Government, 2017. Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments.

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- 11.16. To provide clarity on the impacts of the Proposed Development on peat and organo-mineral soils, they will be assessed by looking at how they could affect the following functions.
- 11.17. One of the most important functions in the context of climate change, is the ability for peat and organo-mineral soils to draw down and store carbon from the atmosphere. The dominant controls on this carbon cycling are the plant inputs, the climatic regimes, the water table and the soil chemistry. Soil receives carbon primarily as CO₂ from the atmosphere via plant and animal detritus which gets incorporated into the soil. Through this process, CO₂ is converted into organic compounds and then either sequestered as soil organic matter or released back to the atmosphere as CO₂ and methane (CH₄) via aerobic and anaerobic respiration, respectively.
- 11.18. The amount of carbon held within a soil (carbon stock) depends on the balance between these biomass inputs and respiration outputs, with carbon sequestered only when losses of carbon through respiration are smaller than the inputs. However, in the majority of systems, this sequestration only occurs in the short-term, until the soil reaches a new equilibrium; at which point the soils will only be acting as a carbon store (and thus not deemed carbon sequestration). Peatlands differ, in that when in a good, healthy condition, the peat can continue to accumulate carbon via the accumulation of partially decomposed organic material as peat; i.e. a continued carbon sequestration capability. The potential effect of the Proposed Development on these functions is considered in Chapter 20.
- 11.19. The function of storing carbon and gas exchange is one that is highly pronounced in peatlands due to their ability to support unique plants such as Sphagnum mosses and the cool, anaerobic conditions, minimising decomposition. The dominant peat forming species, Sphagnum mosses, are believed to store more carbon in both dead and living biomass, than any other genus of plant, facilitating a build-up of peat.
- 11.20. While the function of supporting plants and animals is considered in the 'Ecology' Chapter, the type of vegetation present is one of the main indicators of the carbon sequestration activity of the peat, therefore its condition is used as a factor in determining the sensitivity of the peatland to change.
- 11.21. Finally, the hydrological condition of the peat is important in terms of controlling the rate of carbon sequestration or indeed, loss of carbon. The Sphagnum mosses and other peat forming species are subject to slow, anaerobic decomposition when permanently waterlogged. However, plant litter inputs are lost rapidly in aerobic conditions. Therefore, the depth of the water table is an important component to determine whether the peat will likely be sequestering peat (i.e. a high water table within 0.3 m of the surface); or whether the peat may be subject to accelerated decomposition (i.e. through drainage, where water table depths are below 0.3 m depth).
- 11.22. The effect on soils, including peat, will be determined using the general assessment methodology described in Chapter 5, with the emphasis on the functions described above. The sensitivity of the peatland will be assessed

using criteria based on its condition (e.g. whether it has been drained or not), supported vegetation (e.g. peat-forming versus non-peat-forming), and depth. The magnitude of effect will be assessed as described in Chapter 5, tailored to the nature of the receptor where necessary.

- 11.23. The scale of effect will be assessed by combining the sensitivity and the magnitude of change, as outlined in Chapter 5. This is a general approach, or guide, to assessing the scale of effects and specific circumstances will be explicitly considered to justify the result. The matrix will not to be used 'automatically' and as a definite answer.

Baseline Conditions

Solid (Bedrock) Geology

- 11.24. Baseline data for the solid geology underlying the Site have been obtained primarily by desk study and is shown on Sheet 75E Glenbuchat Solid Edition (1995) and Sheet 85E Glenfiddich Solid Edition (1996), of the 1:50,000 series BGS mapping dated. Reference has also been made to the BGS GeoIndex webpage which includes superficial geology.
- 11.25. The mapping shows the Site to be underlain by a relatively complex range of bedrock, comprising:
- Cabrach Sandstone Formation: basal conglomerate overlain by grey micaceous sandstones and beds of coarse conglomerate (Rhynie Group, Lower Devonian)
 - Locally Lower Devonian extrusive igneous Andesite within the Cabrach Sandstone Formation
 - Late-Orogenic (Lower Ordovician)
 - Syn-Orogenic (Lower Ordovician) intrusive rocks
 - Heterogeneous metasedimentary rocks, strongly hornfelsed and partially melted in places (adjacent to the 'thrust' or 'reverse' fault, see below)
 - Metasedimentary rocks of the Dalradian Supergroup - Pelite and Quartzite, Graphitic Pelite
- 11.26. A metamorphic zone boundary is shown, orientated approximately ENE-WSW through the site, approximately through the bealach known as Three Burnshead How.
- 11.27. Multiple faults are present, including a thrust (or 'reverse') fault, in a similar orientation to the metamorphic zone boundary adjacent to the band of heterogeneous metasedimentary rocks.
- 11.28. Foliations within older metamorphic strata are generally shown as vertical or steeply dipping. Bedding within the overlying younger Cabrach Sandstone Formation indicated to be shallower.

11.29. In general summary, ancient sedimentary rocks (Dalradian Supergroup) have been significantly disturbed, and displaced and altered during a mountain-building event (Grampian orogeny) and intruded with igneous rocks. These are overlain locally by younger sandstones (Cabrach Sandstone Formation).

Superficial Geology

11.30. The BGS GeoIndex 1:50,000 scale mapping indicates that superficial deposits are mainly absent from the tops of hills and broad ridges. Devensian Glacial Till deposits, described as a diamicton (heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape), is generally present to the within valley features to the west.

Peat

11.31. The following online sources were utilised to review the baseline conditions for the Site for the purpose of scoping:

- British Geological Survey Geoindex 1:50,000 superficial geology maps
- James Hutton Institute: Land Capability for Agriculture (LCA) 1:50,000 mapping⁸
- James Hutton Institute: Land Capability for Forestry (LCF) 1:250,000 mapping⁹
- James Hutton Institute (2016) 1:25,000 National Soil Map of Scotland¹⁰
- SNH / James Hutton Institute (2016) Carbon and Peatland Map¹¹

11.32. The SNH carbon and peatland map indicates that the site is dominated by peat and carbon-rich soils, including Class 1 and Class 2 peat habitats.

11.33. The Land Capability for Agriculture map shows that the Site has a few pockets of class 4.2 and 5.1, and large areas of class 5.2, 5.3, and 6.3. No prime agricultural land (classes 1 to 3.1) was mapped within or near the Site.

11.34. The Land Capability for Forestry map shows that the Site has some areas of class F5 (land with limited flexibility for the growth and management of tree crops), it is dominated by class F6 (very limited flexibility), and has significant areas of class F7 (land unsuitable for producing tree crops).

11.35. Baseline data will be further augmented through a combination of desk study and a combination of Phase 1 and Phase 2 peat surveys.

⁸ James Hutton Institute (2000) 1:50,000 LCA Mapping, digital dataset, available at: http://map.environment.gov.scot/Soil_maps/?layer=1#

⁹ James Hutton Institute (2000) 1:50,000 LCF Mapping, digital dataset, available at: http://map.environment.gov.scot/Soil_maps/?layer=1#

¹⁰ James Hutton Institute (2016) 1:25,000 National Soil Map of Scotland, digital dataset

¹¹ Carbon and peatland 2016 map online, available at: http://map.environment.gov.scot/Soil_maps/?layer=10#

Key Sensitivities

- 11.36. No recorded sensitive geological sites are present in the study area and no other rare or sensitive geological features have currently been identified. A Geological Conservation Review site is located to the west of the A941 on the Black Water watercourse, for exposures of Dalradian rocks but these are remote from the site and would not be affected.
- 11.37. Geological materials (rock, sand and gravel) would be extracted from borrow pits within the Site for use as construction materials for roads and hardstandings and the impacts will be assessed.
- 11.38. The geological environment within the study area is of limited sensitivity with regards to conservation value and the effect of the Proposed Development will be limited.

Potential Effects and Assessment

Destabilisation of the peat, resulting in an increased risk of peat slide

- 11.39. Peat instability leading to landslide has the potential to be both caused by or to effect development in peatland areas. An assessment of the likely impacts on peatlands and the potential for peat slide risk will be undertaken and included as a Technical Appendix within the EIA-R.

Loss and fragmentation of peatland due to peat disturbance

- 11.40. Excavation of peat during construction of site infrastructure, including access tracks, crane hardstandings, turbine foundations and cable trenches may lead to potential impacts on peat supporting sensitive habitats and performing other important functions, such as carbon sequestration and storage. In addition, introduction of drainage may lead to drying and oxidation of the in-situ peat.

Loss of carbon stores contained within the undisturbed peat that have the potential to be released as CO2 and other GHGs

- 11.41. Disturbance of carbon-rich soils and peat can lead to carbon losses. Carbon effects are discussed in more details in Chapter 20 'Climate Change and Carbon Balance'.

Scoped in Effects

- 11.42. The potential significant effects to be considered during the assessment are:
 - Disturbance of peat and carbon-rich soils, including priority peatland habitat.
 - Peat instability.

- Loss of carbon and carbon sequestration potential (addressed in Chapter 20).

Scoped Out Effects

11.43. The potential effects that are proposed to be scoped out as they would not be potentially significant are:

- Loss of geological resources.
- Loss of agricultural land – due to low capability (classes 4.2 to 6.2) of the agricultural land present within the site and relatively low footprint of the Proposed Development.
- Loss of land suitable for forestry – due to low capability for forestry (classes F5 to F7).

Key Questions

11.44. The following are thought to be the key issues which require consideration by the consultees:

- Do the consultees agree with the proposed methodology and scope of the Geology and Peat assessment?
- Do the consultees have any information that would be useful in the preparation of the Geology and Peat assessment, including details of local quarrying activity or proposed local peatland restoration sites?

12. Hydrology and Hydrogeology

Introduction

- 12.1. The hydrological and hydrogeological assessment will consider the potential effects on:
- Surface Waters and Groundwaters;
 - Flood Risk; and
 - anthropogenic features such as Private Water Supplies (PWS), water Abstractions and Discharges.
- 12.2. The assessment will develop a baseline dataset, assess potential effects through each stage of the Proposed Development and consider potential mitigation and management measures, and assess the significance of residual effects. The assessment will also consider the potential for cumulative effects arising from the Proposed Development and other current or future (known) developments within the same catchment(s).

Baseline

Surface Water Features

- 12.3. There are a number of minor watercourses within the Site, see **Figure 2, Appendix A**. The southern part of the proposed extension area is located within the catchment of the Burn of Bank which flows in a westerly direction towards the River Deveron. The northern part of the Site is located within the catchment of two tributaries of the Burn of Millock; the Burn of Oldyeal and the Garnel Burn, respectively. The Burn of Millock flows in a northerly direction and also flows into the River Deveron further downstream. The Burn of Bank rises as a spring in the northern part of the Site and two other springs, an unnamed one and the Fairye Well, are located in the centre of the Site.
- 12.4. The River Deveron (Black Water to Huntley) is monitored by SEPA under the Water Framework Directive (WFD)¹² as part of SEPA's River Basin Management Plans (RBMP).¹³

Hydrogeology

- 12.5. According to the British Geological Survey (BGS) 1:50,000 mapping, superficial deposits are limited to the southern portion of the Site where

¹² Scotland's Environment partnership (2018) Scotland's Environment [online]. Accessed 02/10/2018. Available at: <http://map.environment.scotland.gov.uk/seweb/map.htm>

¹³ <https://www.sepa.org.uk/data-visualisation/water-environment-hub>

Till is present. The underlying solid geology in the northern portion of the Site is predominantly rocks of the Clashindarroch formation such as pelites formed by metamorphic transformation of clay rich sediments with rare quartzite and psammities. Igneous rocks associated with the Inch pluton can be found in the south-eastern part of the Site. The Cabrach sandstone underlays the south-western portions of the Site. Further information on the geology of the Site can be found in section 11: Geology, Ground Conditions and Peat.

- 12.6. A review of the BGS online Hydrogeology map¹⁴ indicates that the metamorphic and igneous bedrock strata are low productivity aquifers. Groundwater flow is isolated to surface weathered zones and secondary fractures. The Cabrach sandstone is a moderately productive strata which can provide locally important supplies of water within a multi-layered aquifer.

Flood Risk

- 12.7. Although SEPA's indicative flood maps¹⁵ indicate that along the valley of the Burn of Bank there is high likelihood of fluvial flooding, due to the local topography it is very unlikely that the Site would be affected by the fluvial flooding from the burn. There are small areas at risk of surface water flooding, but these areas are likely due to local depressions in the topography. With reference to Groundwater, the local topography of Turbine locations is likely to result in hydraulic gradients that are unlikely to lead to a high risk of Groundwater Flooding.
- 12.8. Due to the elevated topography the Site, the Proposed Development and especially the turbines, are not considered to be at risk from fluvial flooding associated with the Burn of Bank. Likewise, surface water flood risk is considered to be low and a reflection of localised depressions and forestry tracks and therefore does not pose a significant risk to the Proposed Development. In terms of the Proposed Development causing an increase in downstream flooding, it is unlikely there would be significant change in the offsite flood risk due to the Proposed Development. The Proposed Development is unlikely to significantly change the amount of permeable surfaces within the catchment and therefore there would be little to no change at the catchment scale. Also, as the Proposed Development is located at an elevated position away from roads and buildings it is unlikely to alter the flood risk in their vicinity. Any proposed watercourse crossing would be designed to convey a 1:200 year flood event. Therefore, it is proposed that the requirement for a formal Flood Risk Assessment is scoped out of the EIA-R.

¹⁴ www.bgs.ac.uk/research/groundwater/datainfo/hydromaps/home.html

¹⁵ Scottish Environment Protection Agency (2018) Flood Maps [online]. Accessed 02/10/2018. Available at: <http://map.sepa.org.uk/floodmap/map.htm>

Designations

- 12.9. The Site is not in or near a Nitrate Vulnerable Zone¹⁶. The northern part of the Site including a number of turbines are located within a surface water Drinking Water Protected Area (DrWPA)¹⁷ with the whole of the Site situated in a Groundwater DrWPA.

Methodology

Desk Based Studies

- 12.10. The desk based study will examine the catchments and the conditions of the water resources onsite and downstream of the Site. For the purposes of the assessment the Hydrology and Hydrogeology study area will be a 2km buffer from the construction footprint (including the proposed turbines). It is proposed that the following tasks will be undertaken to ensure the baseline data informs the effect assessment:
- Review of Ordnance Survey (OS) maps to identify surface water features;
 - Review of the Scotland River Basin Management Plan;
 - Review of Scottish Water's asset maps;
 - Identification of the locations and characteristics of catchments, surface water features and springs within and adjacent to the Site;
 - Identification of Water Framework Directive (WFD) classifications and objectives, obtained from the SEPA website for watercourses and waterbodies within and adjacent to the Site;
 - Collation of data and location of abstractions and discharge consents within and adjacent to the Site;
 - Collation of information on climate (including long term average monthly rainfall figures), surface hydrology and flood risk;
 - Identification of hydrogeological conditions and groundwater resources (including groundwater vulnerability and productivity); together with secondary information relating to:
 - Bedrock and superficial geology mapping; and
 - Review of soil mapping.

¹⁶<https://www.gov.scot/binaries/content/documents/govscot/publications/map/2018/08/nitrate-vulnerable-zones-maps>

¹⁷<https://www.gov.scot/publications/drinking-water-protected-areas-scotland-river-basin-district-maps/>

Field Based Survey

- 12.11. A walkover survey will validate the recorded characteristics of watercourses and waterbodies within the Site and in surrounding area, as defined by the surface water catchment. Characteristics that will be recorded include bank height, channel width and depth of water and bank vegetation. A photographic record of the observed watercourses and waterbodies will also be taken. The data from the survey will be used to determine the location and type of any proposed watercourse crossing. A table will be included in the EIA report chapter summarising all proposed watercourse crossings and providing measurements and a photograph of each watercourse or a typical watercourse with the same development area and an indication as to the level of CAR (Controlled Activities Regulations) authorisation required.

Consultation

- 12.12. As part of the desk based study, SEPA will be consulted regarding incidents of flooding, surface water and groundwater quality data and CAR (Controlled Activities Regulations) licenced activities (including Abstractions and Discharges) within the Site and surrounding area. Moray and Aberdeenshire Councils will be contacted regarding the presence of Private Water Supplies (PWS) within or close to the Site.

Water resources legislation, policy and guidance

- 12.13. A qualitative assessment will be undertaken using a combination of professional judgment, legislation and other statutory policy and guidance. Key acts of legislation, policy and guidance, which will be considered in the preparation of this assessment include: Water Framework Directive (2000/60/EC); Priority Substances Directive (2008/105/EC); Groundwater Daughter Directive (2006/118/EEC); Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013; Water Environment (Controlled Activities) (Scotland) Regulations 2011; Water Environment and Water Services (Scotland) Act 2003; Scottish Planning Policy (2014) and National Planning Framework 3 (2014); and Moray Local Development Plan (2015) as well as the draft Moray Local Development Plan (2020).
- 12.14. Various guidance documents will be consulted including, but not limited to, SEPA Guidance Land Use Planning System SEPA Guidance Note 4: Planning guidance on on-shore windfarm developments and Land Use Planning System SEPA Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems and Scottish Natural Heritage *et al* (2010) Good Practice During Wind Farm Construction.

Assessment

- 12.15. The assessment will identify potential effects mainly due to construction of access tracks, watercourse crossings, turbine foundations, cable trenches, compound, substation, converters and storage areas etc. and those resulting in the decommission stage. Some activities also have the

potential to continue having an effect during the operational stage. The potential effects identified include the following:

- Increased Runoff on exposed ground causing erosion and pollution;
- Increase in silt and sediment loads as a result of construction works;
- Disturbance or erosion of bed and banks of watercourses and land drains;
- Increased Runoff from hardstanding areas causing erosion and pollution;
- Increase in downstream flood risk from watercourses crossings;
- Changes to watercourse morphology
- Point source pollution from accidental spillages; and
- Disruption/cut off of natural surface and groundwater pathways.

12.16. The assessment of groundwater abstractions (if applicable) within 100m of an excavation of less than 1m deep (e.g. access tracks) and/or within 250m of excavations of greater than 1m deep (e.g. borrow pits and turbine foundations) will follow the guidance detailed in SEPA's Guidance Notes 31 and 4. Wherever possible the design of the Proposed Development will avoid groundwater abstractions and the respective 100m and 250m standoff distances.

12.17. Wind farm construction will be in accordance with good industry practice and guidance. This includes avoiding hydrologically sensitive areas, retaining hydraulic connectivity across the Site and adopting pollution prevention measures. As a consequence, mitigation measures will be incorporated into the design and will adhere to the implementation of standard best practice, together with bespoke measures that relate to the baseline environment.

12.18. Mitigation measures will be designed to avoid, reduce or offset potential adverse effects and these will feed into the development layout and design. The mitigation section will, if required, provide preliminary hydrological and hydrogeological monitoring proposals, the extent and nature of monitoring will depend on the findings of the baseline surveys and the assessment of effects.

12.19. Effects and cumulative effects that are determined to be major or moderate are considered to have a significant effect on a receptor. The identification of significant effect(s) will then require the implementation of specific mitigation in addition to the good design, pollution prevention measures and mitigation measures contained in a Construction Environmental Management Plan (CEMP) or equivalent. Effects that are identified as minor or negligible are not considered to have a significant effect and no further mitigation, beyond the adoption of good industry practice and guidance, will be required.

Key Questions

12.20. The following are thought to be the key issues which require consideration by the consultees:

- Is the spatial extent of the Study Area for the Hydrology and Hydrogeology assessment considered to be appropriate?
- Are there any other relevant consultees who should be contacted with respect to the Hydrology and Hydrogeology assessment?
- Do the consultees agree that flood risk can be scoped out of the assessment?

13. Noise

Introduction

- 13.1. The noise and vibration assessment will consider the potential effects from the construction, operational and decommissioning stages of the Proposed Development.
- 13.2. The effects of noise and vibration from the Proposed Development will be assessed in accordance with all relevant guidance and standards, and in consultation with the Environmental Health Department of Moray and Aberdeenshire Councils.

Study Area

- 13.3. The following study areas will be considered:
- Construction and decommissioning noise: within approximately 500 m of the proposed locations of wind turbines and development infrastructure.
 - Operational noise: within approximately 3 km of the proposed turbine locations.
 - Cumulative operational noise will be considered for other wind energy developments within approximately 5 km of the proposed turbine locations.
- 13.4. The exact definition of the study area will be confirmed following preliminary noise modelling of the Proposed Development.

Assessment Methodology

Guidance and Standards

- 13.5. This noise assessment will consider current guidance and standards including the following:
- Scottish Government Planning Information (Onshore Wind).
 - The Scottish Government - Planning Advice Note 1/2011 (PAN1/2011): Planning and Noise.
 - ETSU-R-97: The Assessment and Rating of Noise from Wind Farms.
 - A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise.
 - Code of practice for noise and vibration control on construction and open sites (BS5228-1&2:2009+A1:2014)

Scottish Government Planning Information (Onshore Wind)

- 13.6. The Scottish Government's Online Renewables Planning Advice states that when assessing the potential noise impact from onshore wind energy developments ETSU-R-97 should be used. The Planning Advice also identifies the Institute of Acoustics 'Good Practice Guide to the Application of ETSU-R-97' as a significant support document that should be used when undertaking assessment to ETSU-R-97.

PAN 1/2011, Planning and Noise

- 13.7. The guidance within PAN 1/2011 sets out the role of the planning system to adverse effect due to noise. It supports good acoustic design when siting turbines to minimise potential noise impacts. PAN 1/2011 promotes the use of ETSU-R-97 and references an accompanying Technical Advice Note which describes the use of ETSU-R-97, when assessing wind energy developments.

ETSU-R-97: The Assessment and Rating of Noise from Wind Farms

- 13.8. In 1993 the Department of Trade and Industry set up the Working Group on Noise from Wind Turbines (WGNWT) to provide a methodology for wind farm noise assessments, which would consider all relevant factors pertinent to potential noise impact on surrounding communities. The WGNWT comprised independent experts on wind turbine noise, wind farm developers, DTI personnel and local authority Environmental Health Officers. In September 1996, the Working Group published its findings by way of report ETSU-R-97, The Assessment and Rating of Noise from Wind Farms. The aim of the ETSU-R-97 is to provide:

"Indicative noise levels thought to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm development or adding unduly to the costs and administrative burdens on wind farm developers or local authorities".

- 13.9. The document describes a framework for the measurement of wind farm noise and contains noise limits for residential dwellings, which were derived with reference to existing standards and guidance relating to noise emissions from various sources. The limits which are either a margin of 5 dB above the prevailing background noise levels at varying wind speeds, or fixed lower noise limits which are typically adopted when background noise levels are low. The fixed lower noise limits are defined as:

- 35 - 40 dB, $L_{A90,10min}$ during the day, with the limit chosen dependent on the number of affected properties, the effect of the number of kWh(kilowatt-hours) generated and the duration and level of exposure.
- 43 dB, $L_{A90,10min}$ at night, a level chosen to safeguard against sleep disturbance (with an allowance of 10 dB(A) for attenuation through an open window and 2 dB(A) subtracted to account for the use of L_{A90} rather the L_{Aeq}).

- 45 dB, $L_{A90,10min}$ at properties where the occupier has a financial involvement in the Proposed Development, during both the day and night.
- 13.10. The above limits are applicable for the assessment of wind turbine development in isolation and when considering cumulative effects at sensitive receptors.

The Good Practice Guide

- 13.11. In response to a request from the Department of Energy and Climate Change (DECC), the Institute of Acoustics (IOA) set up a noise working group to advance recommendations made in published documents since the release of ETSU-R-97. The IOA published its good practice guide to the application of ETSU-R-97 in May 2013.
- 13.12. The IOA guidance document provides detailed information on collection of background noise data, establishing ETSU-R-97 limits, undertaking noise predictions and cumulative noise issues. The guidance is considered current best practice and has been used throughout the operational noise impact assessment.

BS5228-1&2:2009+A1:2014

Noise

- 13.13. The activities associated with the construction and decommissioning of the Proposed Development will have the potential to generate noise and create an impact on the surrounding area. Guidance on the prediction and assessment of noise from development sites is in BS5228-1+A1:2014.
- 13.14. The noise likely to be generated by construction and decommissioning phases, would be assessed against the ABC Method stated in BS5228-1 when assessing the significance of any potential impact.
- 13.15. The ABC method for determining significance criteria requires the ambient noise levels at existing sensitive receptors to be determined. The ambient noise levels at each existing receptor location are then rounded to the nearest 5dB(A) to determine the appropriate threshold value in accordance with the category value, A B or C, as detailed in Table 13.1.

Table 13.1: Thresholds of Significant Impact from Construction Noise at Residential Receptors in accordance with the ABC Method of BS5228-1

Assessment Category and Threshold Value Period (LAeq)	Threshold Value, in decibels (dB)		
	Category A *1	Category B *2	Category C *3
Daytime (0700 to 1900 hours) and Saturdays (0700 to 1300 hours)	65	70	75
*1 Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than this value.			
*2 Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values.			
*3 Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category B values.			

- 13.16. Given the rural location of the Proposed Development, it is likely that the ambient noise levels would be below category A when considering BS5228-1. Therefore, the lower cut off value of 65 dB (Category A) would be adopted as the noise limit for this construction and decommissioning assessment.

Vibration

- 13.17. Guidance on the assessment of vibration from development sites is given in British Standard 5228 -2:2009 + A1:2014 "Code of Practice for noise and vibration control on construction and open sites – Part 2: Vibration" (BS5228-2). BS5228-2 indicates that vibration can have disturbing effects on the surrounding neighbourhood; especially where particularly sensitive operations may be taking place.
- 13.18. Therefore, the assessment criteria presented BS5228-2 will be considered as part of the construction and decommissioning assessment. However, it very unlikely that a vibration impact will be identified due to the separation distance between the construction and decommissioning works and the sensitive receptors.

Methodology

- 13.19. To assess the potential noise and vibration impact associated with the construction, operation and decommissioning of the Proposed Development the following approach will be undertaken.
- A review of the local areas, proposed turbine locations and local noise sensitive receptors. Sensitive receptors would be identified by an initial wind turbine noise model, considering any potential cumulative impacts.

- A review of previous assessments undertaken for existing and/or proposed wind farms to consider cumulative noise impacts and existing limits at sensitive receptors.
- Early discussions with Moray and Aberdeenshire Councils' Environmental Health Officers to discuss the assessment approach, especially in regards to cumulative noise, existing limits and requirements for a new noise survey.
- Determination of background sound levels, as a function of site wind speed, at sensitive receptors. Background sound levels and subsequent noise limits may be determined from previous wind farm noise assessments within the local area. Where background sound levels cannot be established from previous assessments at an identified sensitive receptor, baseline noise monitoring may be required.
- Determination of the quiet day and night-time criterion curves for each sensitive receptor location.
- Identification of the candidate turbine, its noise emissions and characteristics.
- Assessment of the potential noise and vibration impact associated with the construction and decommissioning phases of the Proposed Development at sensitive receptors.
- Calculation of noise immissions from the operational phases of the Proposed Development, as a function of wind speed, at sensitive receptors.
- A comparison between operational noise immissions and derived criterion curves at each identified sensitive receptor location.
- All existing and proposed wind turbines will be considered as part of a cumulative impact assessment at each identified sensitive receptor location.

Baseline Conditions

- 13.20. The ETSU-R-97 assessment procedure specifies that noise limits should be set relative to existing background noise levels at the nearest properties and that these limits should reflect the variation in both turbine source noise and background noise with wind speed.
- 13.21. Some properties already have ETSU-R-97 derived noise limits in place, in relation to the existing Clashindarroch and proposed Clashindarroch II wind farms. These limits will be referred to within the noise impact assessment for the Proposed Development and baseline noise monitoring is unlikely to be required at these properties.
- 13.22. As the Proposed Development is located to the south-west of the existing Clashindarroch wind farm, there may be a requirement to establish baseline noise levels at other properties within the local areas. This requirement will be established following a review of the proposed turbine locations, existing noise limits and initial turbine noise predictions in accordance with ETSU-R-97.

Key Sensitivities

- 13.23. The area around the Site already features the existing Clashindarroch wind farm, and a section 36 application has been submitted for a further scheme known as Clashindarroch II. Therefore, cumulative noise is a key issue for the assessment of the Proposed Development.

Potential Effects

- 13.24. Construction noise will consist of noise from the operation of plant and machinery such as cable laying, construction of access tracks where applicable and erecting the wind turbines. Noise will also be caused by delivery vehicles on existing road networks. Noise during decommissioning of the wind turbines will arise from the operation of plant, breaking up the concrete foundation and traffic from the site.
- 13.25. The noise sources considered in the assessment of the operational wind farm are mechanical and aerodynamic noise sources.
- 13.26. Predicted noise levels will be produced for each assessment location represented by the baseline measurements for wind speeds for which source noise data is available; preferably from cut-in to 12ms^{-1} as required by ETSU-R-97. The results will be plotted in the form of noise contours and compared with derived noise limits in assessment charts. Baseline noise data expressed in terms of the L_{A90} measurement index will be plotted against standardised 10m height wind speed for the 'quiet day-time' and 'night-time' hours as a best fit polynomial curve will be plotted through this data to define the 'prevailing' background noise as required by ETSU-R-97. Noise limits will be derived from this according to the requirements of ETSU-R-97 which are set out in section 13.12.
- 13.27. Taking into account the above, the significance of the predicted noise levels on sensitive receptors will be assessed. This assessment will be based on the sound power levels associated with a 'candidate turbine'. There is a wide range of turbines suitable for the Proposed Development and the final choice will only be made should planning permission be granted.
- 13.28. Where predicted operational and construction noise levels are found to exceed the criteria, mitigation measures will be identified and an assessment of residual effects will be carried out following the methodology outlined above.

Scoped Out Effects

Low Frequency Noise and Infrasound

- 13.29. A report in 2006 by Hayes McKenzie concluded that there is no evidence of health effects arising from infrasound or low frequency noise generated by the wind turbines that were tested. In addition, with regards to low frequency noise and infrasound, Bowdler et al. (2009) concludes:

"...there is no robust evidence that low frequency noise (including 'infrasound') or ground-borne vibration from wind farms generally has adverse effects on wind farm neighbours".

Amplitude Modulation

- 13.30. Amplitude Modulation (AM), also referred as Blade Swish in some literature, does not occur with all turbines as this is a function of the aerodynamics of the turbine and the specific conditions on the site. The conditions giving rise to AM are complex, but are believed to be due to a difference in wind speed at the top and bottom of the turbine rotor when in rotation and the aerodynamic noise directivity. The noise character due to this effect has been described as a thumping sound in time with the frequency of the blade rotations.
- 13.31. The noise limits suggested in ETSU-R-97 take into account the fact that all wind turbines exhibit the character of noise, described as blade swish, to a certain extent. The DTI Report "The Measurement of Low Frequency Noise at Three UK Windfarms" (W/45/00656/00/00 dated 2006), concluded that 'the common cause of complaints associated with noise at all three wind farms is not associated with low frequency noise, but is the audible modulation of the aerodynamic noise, especially at night'. It suggests that 'it may be appropriate to re-visit the issue of Aerodynamic Modulation (AM) and the means by which it should be assessed'.
- 13.32. In April 2012, RenewableUK funded extensive theoretical and experimental investigations into the modulation of noise from wind turbines. This included the subjective response to AM, its annoyance and ways to mitigate against it.
- 13.33. The document identifies two types of AM, Normal AM (NAM) and Other AM (OAM). The document states "NAM was defined as that element of AM which was capable of being fully described in terms of 'standard' models of trailing edge noise, whilst OAM was defined as being any form of AM lying outside the definition of NAM." The research into OAM has shown that the effect tends to exist in mainly downwind conditions. The document also states that the primary source generation mechanism for OAM is local stall on the blades.
- 13.34. In August 2016, the Institute of Acoustics Amplitude Modulation Working Group (IOA AMWG) issued its final report "A Method for Rating Amplitude Modulation in Wind Turbine Noise", presenting details of a metric to rate amplitude modulation near operational wind farms. A useful definition of AM is given as:

"periodic fluctuations in the level of audible noise from a wind turbine (or wind turbines), the frequency of the fluctuations being related to the blade passing frequency of the turbine rotor(s)"

- 13.35. The metric is complex and involves extensive measurements as well as data analysis and signal analysis in order to come up with a rating of AM for each 10 minute period of a survey. It does not apply to this assessment as the proposed wind development is not operational which would be

required to apply the method. The method applies for testing operating wind turbines.

- 13.36. Also in August 2016, WSP- Parsons Brinckerhoff issued their report "Wind Turbine AM Review – Phase 2 Report" (WTAMR) , commissioned by the Department of Energy and Climate Change, presenting a review of research into the effects of and response to AM. The recommendations from this report state:

"It is 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 work undertaken by the Institute of Acoustics, and enforcement action judged by Local Authority Environmental Health Officers based on the duration and frequency of occurrence."

- 13.37. The WTAMR report was criticised by members of the IOA AMWG and fell short of proposing acceptable wording for a condition. Some members wrote an article in the IOA Bulletin of November/December 2017 in order to suggest a planning condition. The suggested conditioning mechanism rely on penalty system similar to the one described for tonal noise in the original ETSU-R-97 guidance.

Ground Borne Vibration

- 13.38. A report prepared by Keel University identified that ground-borne vibration from wind turbines can be detected using sophisticated instruments several kilometres from a wind farm. However, the report clearly shows that, although vibration may be detectable using sophisticated instruments, the magnitude of the vibration is below the level of human and does not pose any risk to human health.

Key Questions

- 13.39. The following are what are thought to be the key issues which require consideration by the consultees:
- Are consultees content with the proposed methodology and scope of assessment?
 - Do the consultees have details of any other wind energy developments in the locality which it considers may raise significant cumulative noise issues?
 - Are consultees content to scope out Low Frequency Noise and Infrasound, Amplitude Modulation, Ground Borne Vibrations?

14. Traffic and Transport

Initial Access Considerations

- 14.1. An initial access review has been undertaken which indicates that the turbine components could be delivered to site from the Port at Dundee, then via the A90 to Aberdeen, the A96 to Huntly, the A920 to Dufftown and then using tilting blade techniques from the north along the A941. It is possible that local access into the Site could be taken from a new junction on the A941 near Redford at the southern edge of the site.
- 14.2. The access route will be used for the delivery of construction materials, abnormal loads and staff engaged with the construction phase of the Proposed Development. Upon completion, the access junction will be used to provide service access to the site.
- 14.3. A detailed abnormal load route survey report will be prepared to review the feasibility of access option to identify the optimum access solution. A suitable access junction design will be prepared and will feature appropriate visibility arrangements and will be designed to accommodate all proposed loads.
- 14.4. A review of the potential consequences that improvement works on the A96 may have on access to the site will be considered should these coincide with project timescales.

Survey and Assessment Methodology

- 14.5. The following policy and guidance documents will be used to inform the Transport & Access Chapter:
 - Transport Assessment Guidance (Transport Scotland, 2012);
 - The Guidelines for the Environmental Assessment of Road Traffic (Institute of Environmental Assessment (IEA), 1993);
 - SPP (Scottish Government, 2014);
 - Aberdeenshire Council Local Transport Strategy (AC);
 - Aberdeenshire Local Development Plan (AC); and
 - Moray Council Local Development Plan (MC).
- 14.6. The Guidelines for the Environmental Assessment of Road Traffic (IEMA 1993) sets out a methodology for assessing potentially significant environmental effects. In accordance with this guidance, the scope of assessment will focus on:
 - Potential impacts (of changes in traffic flows) on local roads and the users of those roads; and
 - Potential impacts (of changes in traffic flows) on land uses and environmental resources fronting these roads, including the relevant occupiers and users.

-
- 14.7. The main transport impacts will be associated with the movement of general HGV traffic travelling to and from the site during the construction phase of the Proposed Development.
- 14.8. Each turbine is likely to require between 11 and 13 abnormal loads to deliver the components to site. The components will be delivered on extendable trailers which will then be retracted to the size of a standard HGV for the return journey.
- 14.9. Detailed swept path analysis will be undertaken for the main constraint points on the route from the port of entry (likely to be Dundee) through to the site access junction to demonstrate that the turbine components can be delivered to site and to identify any temporary road works which may be necessary.
- 14.10. Once operational, it is envisaged that the level of traffic associated with the proposed wind farm would be minimal. Regular monthly or weekly visits would be made to the wind farm for maintenance checks. The vehicles used for these visits are likely to be 4x4 vehicles and there may also be the occasional need for an HGV to access the wind farm for specific maintenance and/or repairs. It is considered that the effects of operational traffic would be negligible and therefore no detailed assessment of the operational phase of the Proposed Development is proposed.
- 14.11. The traffic generation levels associated with the decommissioning phase will be less than those associated with the development phase as some elements such as access roads would be left in place on the site. As such, the construction phase is considered the worst case assessment to review the impact on the study area. An assessment of the decommissioning phase would therefore not be undertaken, although a commitment to reviewing the impact of this phase would be made immediately prior to decommissioning works proceeding.
- 14.12. The following rules taken from the guidance would be used as a screening process to define the scale and extent of the assessment:
- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%); and
 - Rule 2: Include any other specifically sensitive areas where traffic flows are predicted to increase by 10% or more.
- 14.13. Increases below these thresholds are generally considered to be insignificant given that daily variations in background traffic flow may fluctuate by this amount. Changes in traffic flow below this level predicted as a consequence of the Proposed Development will therefore be assumed to result in no discernible environmental impact and as such no further consideration will be given to the associated environment effects.
- 14.14. The estimated traffic generation of the proposed wind farm development will be compared with baseline traffic flows, obtained from existing traffic survey data, in order to determine the percentage increase in traffic.

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- 14.15. Potentially significant environmental effects will then be assessed where the thresholds as defined above are exceeded. Suitable mitigation measures will be proposed, where appropriate.
- 14.16. It is not anticipated that a formal Transport Assessment will be required as these are not generally considered necessary for temporary construction works.
- 14.17. Due to the current Covid-19 situation, traffic flows will have been significantly affected. The traditional approach of obtaining traffic survey data for use in the assessment from new Automatic Traffic Count (ATC) surveys would not be appropriate.
- 14.18. As an alternative, traffic flow data from the Department for Transport (DfT) UK review website would be used along with other publicly available traffic flow data for the A941, A920, A96 and A95. The exact location of count locations will be agreed with once the access strategy has been confirmed.
- 14.19. Traffic accident data would be obtained from Crashmap UK for the study network to inform the accident review for the immediate road study area.

Potential Significant Effects

- 14.20. The assessment will consider the potential effects associated with construction and operation of the Proposed Development as detailed below.
- 14.21. The key issues for consideration as part of the assessment will be:
- The temporary change in traffic flows and the resultant, temporary effects on the study network during the construction phase;
 - The physical mitigation associated with the delivery of abnormal loads;
 - The design of new access infrastructure; and
 - The consideration of appropriate and practical mitigation measures to offset any temporary effects.
- 14.22. The potential effects of these will be examined in detail. The decommissioning phase of the Proposed Development is proposed to be screened out from the assessment.

Approach to Mitigation

- 14.23. Standard mitigation measures that are likely to be included in the assessment are:
- Production of a Construction Traffic Management Plan;
 - The design of suitable access arrangements with full consideration given to the road safety of all road users;
 - A Staff Sustainable Access Plan; and
 - A Framework Abnormal Load Transport Management Plan.

Consultation Proposals

- 14.24. Consultation with the following stakeholders will be undertaken:
- Moray Council Roads and Transport Officers;
 - Aberdeenshire Council Roads and Transport officers;
 - Transport Scotland; and
 - Various consultees responsible for reviewing the possible effects of abnormal loads on road structures, including Network Rail and the trunk road agents. These consultations will be undertaken using Highways England ESDAL consultation system.

Key Questions

- 14.25. The following are what are thought to be the key issues which require consideration by the consultees:
- That the proposed methodology is acceptable?
 - That the methods proposed for obtaining traffic flow data are acceptable?
 - That the use of Low National Road Traffic Forecasts (NRTF) is acceptable for the whole of the study?
 - What developments should be included as committed developments within the baseline traffic flows in the assessment, noting that these should have planning consent at the time of scoping?
 - Details of any upgrades or network changes that may be undertaken to the study area network within the next five years?
 - Contact details for roads officers dealing with the application during potential lockdown restrictions.

15. Aviation

- 15.1. This section assesses the potential impact of the proposed Clashindarroch Wind Farm Extension on aviation and sets out the proposed methods for assessing aviation in the EIA Report.
- 15.2. An initial feasibility assessment has been carried out with consideration given to the potential impact on civil and military aviation interests and the relevant aviation stakeholders. This assessment was undertaken by means of desktop study methods, including review of the relevant aviation policy and legislation documents, and prior experience of dealing with statutory aviation bodies.

Baseline

- 15.3. The Proposed Development is located immediately adjoining the existing Clashindarroch Wind Farm and adjacent to the Clashindarroch II Wind Farm which is a live Section 36 application. As such, the potential impacts on aviation of the Clashindarroch Wind Farm Extension will be very similar to those identified in the Clashindarroch II Environmental Impact Assessment Report 2019.

Potential Sources of Impact

- 15.4. The development of wind turbine sites has the potential to cause a variety of negative effects on aviation. These effects are widely publicised and the primary concern is one of safety. A full explanation of the impact of wind turbines on aviation is contained in Civil Aviation Publication 764 (Policy and Guidelines on Wind Turbines) however, in general terms, turbines can affect aviation in the following ways:
- Physical obstacles: Turbines can present physical obstacles at, or close to, an aerodrome, or to aircraft flying at low level;
 - Air Traffic Control (ATC) and Air Defence (AD) radar systems: Turbines can generate unwanted returns on Primary Surveillance Radar (PSR) displays and in some cases, affect the performance of the radar system itself;
 - Communications, Navigation and Surveillance (CNS) equipment. A wide range of systems (ILS, VOR/DME, and Direction Finders) together with air-ground communications facilities, can potentially be affected by wind turbine developments.
- 15.5. Desktop studies have identified the civil and military aviation receptors that will potentially be affected by the proposed Clashindarroch Wind Farm Extension. These receptors are as follows:
- Aberdeen International Airport ATC Primary Surveillance Radar (PSR);
 - Inverness Airport ATC PSR;
 - Ministry of Defence (MoD) Buchan Air Defence Radar;
 - MoD RAF Lossiemouth ATC PSR;
 - National Air Traffic Services En-Route PLC (NERL) radar systems;

- Allanshill ATC PSR;
- Perwinnes ATC PSR;
- UK Military Low Flying System; and
- Civil Aviation Authority (CAA) Aviation Lighting.

Method of Assessment

- 15.6 In line with other EIA topics, the assessment of effect significance will be derived from combining the sensitivity (defined as very high, high, medium, low or negligible) of the receptor with the magnitude (defined as high, medium, low or negligible) of the effect to produce an overall significance rating. However, with respect to impacts on civil and military aviation, given the safety critical function of aviation receptors, any predicted effect upon aviation stakeholders which results in restricted activities, or has the potential to affect aviation or navigation abilities, is regarded as significant. Consequently, the threshold for distinguishing whether an effect is not significant will be when the magnitude is assessed as being negligible.
- 15.7 The general approach to wind farm development is to avoid adverse effects on aviation and, if this cannot be achieved, find technical mitigation solutions to resolve the issues.

Consultation

- 15.8 Consultation will be carried out at the earliest opportunity with the following aviation stakeholders and will continue throughout the planning process in order to resolve any potential aviation objections:
- Aberdeen Airport;
 - Highlands and Islands Airports Ltd for Inverness Airport;
 - MoD; and
 - NERL.

Mitigation

- 15.9 Depending on the pre-planning and scoping responses from the various aviation stakeholders, the applicant will commence detailed consultation on mitigation options such that any adverse impact on aviation operations can be alleviated.

References and Standard Guidance

- 15.10 The following guidance and industry standards on the potential effects of wind turbines on aviation will be used in undertaking the aviation assessment:
- Civil Aviation Publication (CAP) 168 Licensing of Aerodromes;
 - CAP 493 Manual of Air Traffic Services Part 1;
 - CAP 738 Safeguarding of Aerodromes;
 - CAP 764 Policy and Guidelines on Wind Turbines;
 - CAP 774 UK Flight Information Services;

- CAP 793 Safe Operating Procedures at Unlicensed Aerodromes;
- Military Aviation Authority (MAA) Air Traffic Management (3000 series) Regulatory Instructions;
- MAA Low Flying Manual.
- UK Military Aeronautical Information Publication (AIP);
- UK AIPs; and
- Civil Aviation Authority (CAA) 1:500,000 Visual Flight Rules (VFR) Charts.

Key Questions

15.5. The following are thought to be the key issues which require consideration by the consultees:

- Have the correct civil and military aviation potential receptors been identified ?
- Are there any other aviation consultees that should be involved?

16. Socio-Economics, Tourism and Recreation

Introduction

- 16.1. The socio-economics, tourism and recreation assessment will include consideration of local tourism and recreation activity, employment generation and any indirect or induced effects from the Proposed Development.

Baseline Description

- 16.2. The assessment will include a description of the current socio-economic baseline within the local area. This will include a summary of performance data for each study area and a description of the relevant tourism and recreation assets that will be covered in the assessment.
- 16.3. The baseline description will cover and compare three study areas:
- Local Area, comprising of the electoral ward of Speyside Glenlivet;
 - Moray; and
 - Scotland.
- 16.4. The economic impacts will be quantified for Moray and Scotland.
- 16.5. The socio-economic baseline will cover;
- the demographic and economic profile of the local area within the context of the regional and national trends, including employment and economic activity;
 - the industrial structure of the local area within the context of the regional and national economies;
 - the role of the tourism sector in the local and regional economy; and
 - wage levels within the regional economy compared to the regional and national level.

Relevant Guidance and Legislation

- 16.6. There is no specific legislation or guidance available on the methods that should be used to assess the socio-economic impacts of a proposed onshore wind farm development. The proposed method has however been based on established best practice, including the used in UK Government and industry reports on the sector. In particular this assessment will draw from two studies by BiGGAR Economics on the UK onshore wind energy sector, a report published by RenewableUK and the Department for Energy and Climate Change (DECC) in 2012 on the direct and wider economic benefits of the onshore wind sector to the UK economy (BiGGAR

Economics, 2012) and a subsequent update to this report published by RenewableUK in 2015 (BiGGAR Economics, 2015).

- 16.7. There is also no formal legislation or guidance on the methods that should be used to assess the effects that wind farm development may have on tourism and recreation interests. The proposed method would consider individual attractions and tourism facilities to assess if there could be any effects from the Proposed Development.
- 16.8. Effects will be considered based on the guidance from Guidelines for Environmental Impact Assessment¹⁸ and a Handbook for EIA¹⁹.
- 16.9. It is also important that the socio-economic, tourism and recreation chapter takes account of the relevant local and national policy objectives. The most relevant are expected to include national and local economic and tourism strategies, including;
- Scotland's Economic Strategy;
 - Moray Economic Strategy 2019 – 2029;
 - Tourism Scotland 2020 (Or updated if published prior to assessment being undertaken); and
 - Tourism in Moray: The Strategy for Tourism Development in Moray

Proposed Scope of Assessment

- 16.10. It is anticipated that the contents of the assessment chapter will include:
- introduction, including scope of assessment and methodology;
 - economic development and tourism strategic context;
 - baseline socio-economic, tourism and recreation context;
 - socio-economic assessment;
 - tourism and recreation impact assessment;
 - proposed measures and actions to maximise local economic and community impacts;
 - proposed measures and actions to mitigate any harmful effects (if required); and

18 Institute of Environmental Management and Assessment (IEMA) (2004) Guidelines for Environmental Impact Assessment.

19 Scottish Natural Heritage (SNH) (2003) A Handbook for Environmental Impact Assessment, Appendix 5: Guide to Outdoor Access Assessment.

- summary of findings and conclusions

Potential Impacts

- 16.11. The issues that will be considered in this assessment will include the potential socio-economic, tourism and recreation effects associated with the Proposed Development.
- 16.12. An economic impact analysis will be undertaken using the methodology developed by BiGGAR Economics; which has been used to assess over 100 onshore wind farms across the UK. The potential socio-economic effects that will be considered are:
- temporary effects on the regional and/or national economy due to expenditure during the construction phase;
 - permanent effects on the regional and/or national economy due to expenditure associated with the ongoing operation and maintenance of the Proposed Development;
 - permanent effects as a result of any additional public expenditure that could be supported by the additional tax revenue that would be generated by the Proposed Development during the operational phase; and
 - permanent effects on the local economy that could be supported by any community funding and/or shared ownership proposals during the operational phase of the Proposed Development.
- 16.13. The link between onshore wind energy developments and the tourism sector has been a subject of debate. However, the most recent research has not found a link between tourism employment, visitor numbers and onshore wind development. For example, in 2017 BiGGAR Economic published an updated study that considered 28 wind farms constructed between 2009 and 2015 and the trends in tourism employment in the areas local to these developments. The analysis found that there was no relationship between the development of onshore wind farms and tourism employment at the level of the Scottish economy, at the local authority level nor in the areas immediately surrounding wind farm developments.
- 16.14. Nevertheless, the tourism sector is an important contributor to the Scottish economy, and particularly this area of Moray, and so there is merit in considering whether the Proposed Development will have any effect on the tourism sector. This assessment will consider the potential effects that the Proposed Development could have on tourism attractions, routes, trail and local accommodation provider. This will consider the implications of any effects identified for the tourism sector in the local area and wider region.

Key Questions

- 16.15. The following are thought to be the key issues which require consideration by the consultees:
- Are the study areas identified appropriate?

- Are there additional potential effects that need to be included in the assessment?

17. Shadow Flicker

Introduction

- 17.1. Under certain daylight conditions the relative position of the Earth and Sun can cause shadows to be cast from wind turbines. These shadows move as the turbine blades rotate and as the sun tracks across the sky. When observed from inside a building and viewed through a narrow aperture such as a window, the effect created may appear as a flickering of light and shadow known as shadow flicker.
- 17.2. Following a preliminary assessment of the Proposed Development, it is considered that the shadow flicker effects have the potential to be significant and therefore it is proposed to scope in the requirement for a shadow flicker chapter, as part of the EIA report.

Baseline

- 17.3. There are currently turbines to the east of the site. The closest properties are to the north west and south west. To the north west properties within Newtown of Corinacy and Oldtown of Corinacy are within 10 rotor diameters (assuming a rotor diameter of 162m). There are a number of individual properties to the west and south west that are within 10 rotor diameters of the southern turbines.
- 17.4. There are no properties that are both within 10D of this application and the existing Clashindarroch wind farm. In any event, any planning permission for existing turbines will have included a planning condition that ensures any turbines at risk of causing shadow flicker will be shut down when the conditions indicate a receptor may be at risk. Therefore, it is assumed that none of the potential receptors are currently receiving any impacts from shadow flicker.

Methodology

- 17.5. Guidance is available for the assessment of shadow flicker effects both in the UK and internationally. The shadow flicker assessment considers the guidance contained within:
- Scottish Planning Policy (paragraph 169, 2014);
 - Scottish Government Onshore Wind Turbines Planning Advice (2014);
 - Review of Shadow Effects from Wind Turbines in Scotland (2017);
 - Update of the UK Shadow Flicker Evidence Base (2011); and
 - Wind Energy Development Guidelines (2006) (Irish Guidance).
- 17.6. Most current guidance suggests an assessment of effects should be undertaken for buildings located within 10 times the turbine rotor diameter

(10RD) as it is considered unlikely that adverse impacts will be experienced beyond this distance.

Assessment

- 17.7. A visual inspection of aerial imagery identified a number of dwellings within 10RD of the Proposed Development. The properties that are located within 10RD of the wind turbines are located to the north west within Newtown of Corinancy and Oldtown of Corinancy, and also individual properties to the south west. Therefore, we propose, that a shadow flicker chapter is scoped into of the forthcoming EIA-R.
- 17.8. If shadow flicker effects were to be reported following the construction of the turbines it would be possible for the Applicant to implement mitigation by switching off the 'problem' turbines during the period of time where shadow flicker effects are being caused. The likelihood of the effects occurring beyond 10RD are minimal and therefore properties beyond this distance will not be included within the assessment, but should it occur the mitigation proposed will not cause a significant impact on the annual electricity generation of the Proposed Development.

Key Questions

- 17.9. The following are what are thought to be the key issues which require consideration by the consultees:
- Do consultees agree that the area assessed for shadow flicker effects is sufficient?
 - Are there any receptors within the vicinity of the Proposed Development that consultees feel should be assessed further?

18. Telecommunications and Utilities

Introduction

- 18.1. Wind farms have the potential to interfere with electromagnetic signals passing above ground. This can potentially affect television reception, fixed telecommunication links and other network signals. They can also, in rare instances, directly impact upon existing utilities below ground.

Baseline

- 18.2. A preliminary search of the OFCOM Spectrum Information Portal has been undertaken and this has established that there are telecommunication links to the north and south of the site boundary. These links do not pass through or over the suggested locations of the wind turbines. However, it is important to mention that not all fixed links may be included within Ofcom's portal.

Assessment Methodology

- 18.3. A wind turbine can potentially interfere with an electromagnetic transmission either by emitting an electromagnetic signal itself, or by physically interfering with other electromagnetic signals.
- 18.4. The distance between a turbine and a link which could result in interference can vary. Where there is a risk of interference it is industry-standard practice to calculate the Fresnel zones surrounding the link. A Fresnel zone is a 3D cylindrical ellipsoid region of space, that exists between a transmitter and receiver, surrounding the link centreline. Concentric Fresnel zones represent regions of diminishing signal strength. It is commonly accepted that a turbine should be located beyond the second Fresnel zone, to minimise the risk of electromagnetic interference.
- 18.5. There is no overarching guidance relating to the assessment of electromagnetic interference (EMI) effects.
- 18.6. A more detailed examination of the OFCOM portal information will be undertaken at an early point. In accordance with industry standard practice, consultation will be undertaken with OFCOM and telecommunication providers to determine whether there would be any effects on the links identified nearby or other links not included in the portal information.
- 18.7. If microwave or other telecommunication links are identified though the consultation process, the Applicant will seek to modify the design of the proposed wind farm to avoid creating any disruptive EMI effects. Should this not be possible, mitigation measures will be investigated in order to ensure the continued operation of the identified links. Alternative mitigation measures may involve agreement with the network operators.

- 18.8. To assess any potential impacts on utilities a desk-based study will be undertaken. A consultation with gas, electricity and water suppliers will take place to aid with the identification of any utilities infrastructure that may be impacted by the Proposed Development.

Key Questions

- 18.9. The following are thought to be the key issues which require consideration by the consultees:
- Do consultees agree that the assessment method of determining telecoms is sufficient?
 - Are consultees in agreement with the use of industry standard practice in the absence of overarching guidelines?

19. Health and Safety

Introduction

- 19.1. The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 require that consideration must be given to the vulnerability of a Proposed Development to the risk of major accidents and disasters.

Baseline

- 19.2. The site occupies a remote, largely west-sloping hillside, to the east of the A941. Notwithstanding the right to roam, there are two existing tracks in the vicinity of the proposed turbine locations, and these are not believed to be open to public access. It is anticipated that very few members of the public will be in close enough proximity to the turbines to experience any level of risk. The landowners and staff associated with the wind farm will be full appraised of safe working practices.

Assessment

- 19.3. The developer will take all necessary measures to limit the risk to health and safety during the construction, operation and eventual decommissioning of the wind turbines. A Construction Environmental Management Plan will be prepared which will outline the actions to be taken to reduce the risks to those working on the site during the construction phase. These measures will include ensuring all workers have the correct Personal Protective Equipment and risk assessments being carried out. Only suitably qualified workers will be allowed to work at height or in high voltage areas. Activity will be carried out in line with all appropriate guidance from HSE, industry bodies and the government.
- 19.4. It is likely that at some point during construction there will be inclement weather conditions which could include heavy rain, gale-force winds and even snowfall. Suitable precautions will be taken to ensure that activities undertaken in any extreme weather conditions are safe and will not jeopardise the safety of personnel or property, or the general public. The site's location makes the risk of other natural disasters, such as tornados, volcanic eruptions and earthquakes, remote. The risk of the site flooding will be covered within the hydrology and hydrogeology chapter of the EIA report and adequate precautions will be taken during construction.
- 19.5. Once operational, the wind turbines will be programmed to shut down if wind speeds reach too high a high level (typically 25m/s). This reduces the risk of the turbines being damaged, but also reduces risks to any people who are in the vicinity in such conditions. This risk may become more prevalent as extreme wind conditions increase due to climate change.
- 19.6. One risk to those working within the wind farm and the surroundings could potentially be ice throw. As ice forms round the blades and can then

dislodge as temperatures increase and the blades start to rotate. There are several options to mitigate the risk of ice throw from turbines. Modern wind turbines can be fitted with winter-kits which include heating elements for the turbine blades, preventing the formation of ice. Even without these features sensors can be fitted to detect the imbalance on blades arising from the formation of ice. This enables the turbines to be shut down before significant volumes have formed eliminating the danger to anyone or anything on the ground.

Key Questions

- 19.7. The following are thought to be the key issues which require consideration by the consultees:
- Does the Council agree that health and safety should be scoped into the EIA?
 - Does the Council agree that the approaches identified above should be expanded upon in the EIA so that the risks to people and property are suitably managed and controlled?

20. Climate Change and Carbon Balance

Introduction

- 20.1. Climate Change is undeniable and will have major implications for life on our planet for years to come. It is important that any Proposed Development should seek to minimise the negative impacts associated with Climate Change.
- 20.2. There are two aspects that must be considered in relation to Climate Change:
- The effect of the Proposed Development on the Climate (this is assessed through consideration of the carbon balance); and
 - The effect of Climate Change on the Proposed Development

Carbon balance

- 20.3. Carbon balance is defined as the difference between the carbon costs of a wind farm development and the carbon savings attributable to the wind farm, i.e. the impact of the Proposed Development in terms of the Greenhouse Gas (GHG) emissions against the savings through substitution of other sources of electricity, such as coal or other fossil fuels.
- 20.4. The main sources of GHG emissions from the Proposed Development will likely include: soil organic carbon, turbine lifecycle, and backup electricity generation. The emissions from the turbine lifecycle and backup generation are largely beyond the control of the Applicant. In contrast, the emissions from soil organic carbon are dependent on many factors under the Applicant's control.
- 20.5. This section sets out the scope of studies and surveys that have and will be carried out to gather baseline information required to calculate the carbon balance and the proposed methodology for undertaking the calculation.

Assessment Methodology

- 20.6. The carbon balance assessment will be undertaken using the latest version of the Scottish Government's web-based Carbon Calculator Tool: Calculating Carbon Savings from Wind Farms on Scottish Peatlands²⁰ and the associated technical guidance²¹. This is commonly referred to as the Carbon Calculator.

²⁰ <https://www.gov.scot/WindFarmsAndCarbon>

²¹ Calculating Potential Carbon Losses & Savings from Wind Farms on Scottish Peatlands - Technical note - Version 2.10.0 (or as amended at the time of the assessment) Available at: <https://www.gov.scot/publications/carbon-calculator-technical-guidance/>

Baseline Conditions

Carbon Balance

- 20.7. The baseline data on emissions for soil organic carbon required for the carbon balance calculations will be collated during the Phase 1 and Phase 2 peat surveys. The baseline available from published sources is briefly described in section 11: Geology and Peat.
- 20.8. Unless site specific values are provided by the turbine manufacturer, the calculation of turbine lifecycle emissions will use the default values set out in the Scottish Government's web based Carbon Calculator Tool²⁰. Similarly, data regarding backup electricity generation and other parameters of the assessment such as depth to water table and the extent of drainage around drainage features, will be taken from the default values within the Carbon Calculator.

Climate

- 20.9. The second part of the assessment will consider the effect of Climate Change on the Proposed Development. The baseline in this assessment is therefore the future climate conditions over the life-time of the project. This will be established from historic and current weather records from the Met Office.

Potential Effects and Assessment

Carbon Balance

- 20.10. The Proposed Development has the potential to affect the peat and carbon-rich soils through excavation and drainage, which in turn may result in significant carbon emissions. The Carbon Calculator determines the carbon emission savings and the Carbon Payback Period of wind farms and explores the potential implications under different scenarios of developments and assumptions about the site i.e. expected, best case and worse case scenarios. It considers the following potential carbon savings and carbon costs associated with wind farms:
- GHG savings (when compared to emissions from different power sources).
 - GHG emissions due to production, transportation, erection, operation and decommissioning of the wind farm.
 - Emissions from backup power generation.
 - Foregone sink due to loss of carbon-fixing potential of the peatland as a result of disturbance and drainage.
 - Loss and/or saving of carbon stored in peatland (by peat removal or changes in drainage).
 - Carbon saving due to improvement of habitat.

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- Loss and/or saving of carbon-fixing potential as a result of any forestry clearance.
 - Carbon gains due to proposed habitat improvements such as peat restoration.
- 20.11. The methodology provides a balance of total carbon savings, including the impacts described above, and carbon losses over the life of the wind farm. It estimates the Carbon Payback Period for the wind farm based on the source of power being displaced (i.e. the time needed to generate carbon savings equivalent to the amount of carbon lost).
- 20.12. The carbon balance will be calculated for the optimised layout of the Proposed Development, following the design freeze and Phase 2 peat survey.

Climate

- 20.13. In order to complete the assessment, Climate Projections from the Met Office (UKCP18) will be used to determine the expected Climate variation over the lifetime of the project.
- 20.14. The implications of the changes to the climate to the survivability and operation of the windfarm will be considered. This part of the assessment will be discursive in nature.

Key Questions

- 20.15. The following are what are thought to be the key issues which require consideration by the consultees:
- Do consultees agree that the proposed methodology for assessing the carbon balance and climate change impacts is sufficient and appropriate?

21. Cumulative Effects

- 21.1. At the time of writing it is known that there are several other operational wind farms and a number of wind energy proposals in the area. The methodology adopted for assessing the cumulative effects of wind energy developments will be in accordance with advice from SNH. Cumulative effects, which are the combined effects of two or more wind energy developments, will, where appropriate, be considered for each technical area assessed within the EIA Report.
- 21.2. The extent of any cumulative assessment relative to each technical assessment will be agreed during the consultation process and can include both existing and proposed wind farm developments and other forms of development. The potential landscape and visual effects, for example, which relate to the intervisibility of an individual wind farm development scheme, will be much more wide ranging than noise effects which will be limited to receptors in the more immediate vicinity of the Proposed Development.
- 21.3. In relation to some of the technical assessments, specific guidance and policy exists advising that effects associated with existing wind farm developments should be considered cumulatively.
- 21.4. An initial list of cumulative sites located within 20 km of the Site is provided in **Appendix C**.

Appendix A – Figures

- Figure 1 Site Location
- Figure 2 Scoping Turbine Layout
- Figure 3 Landscape Designations
- Figure 4 Blade Tip Zone of Theoretical Visibility (ZTV) with Viewpoints
- Figure 5 Cumulative Developments
- Figure 6 Vantage Point Locations and Viewsheds
- Figure 7 Raptor Survey Area
- Figure 8 Breeding Wader Survey Area
- Figure 9 Black Grouse Survey Area
- Figure 10 Heritage Assets in the Inner Study Area
- Figure 11 Designated Heritage Assets in the Outer Study Area

Appendix B – Consultation

- 1.1. The process of identifying environmental effects is both iterative and cyclical, running in tandem with the iterative design process. Consultation forms an integral role throughout the EIA process.

Scoping Consultation

- 1.2. Infinergy is fully committed to a thorough engagement process aiming to ensure that communities are consulted and informed of developments during, and beyond, the EIA process on all projects. This is achieved by a variety of methods as appropriate including public exhibitions, meetings and circulars. Public consultation will be incorporated into the iterative design process and recorded in appropriate sections of the EIA Report. Planning Advice Note (PAN) 3/2010 on Community Engagement provides advice on how communities should be properly engaged in the planning process and forms a basis for potential activities.
- 1.3. Comments are specifically invited on:
- The proposed content of the EIA Report;
 - Assessment methods;
 - Additional data sources; and
 - Additional consultees.
- 1.4. In terms of the proposed content of the EIA Report, it should be emphasised that one of the aims of this scoping report is to scope out any issues which are known not to be significant from further consideration and to highlight and focus on the main issues which should be assessed within the EIA Report.
- 1.5. This scoping report will be submitted to the Energy Consents Unit at the Scottish Government with a request for a formal EIA scoping opinion. The suggested scoping consultees are listed below:

Draft List of Consultees

- Moray Council
- Scottish Natural Heritage
- Cairngorms National Park Authority
- Scottish Environment Protection Agency
- Historic Environment Scotland
- Dufftown and District Community Council
- Strathbogie Community Council
- Tap O’Noth Community Council
- Defence Infrastructure Organisation
- National Air Traffic Services

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- Aberdeen Airport
 - Highlands and Islands Airports (Inverness Airport)
 - Civil Aviation Authority – Airspace
 - Aberdeenshire Council
 - Aberdeenshire Council Archaeology Service;
 - Royal Society for the Protection of Birds
 - The River Deveron District Salmon Fishery Board
 - Fisheries Management Scotland
 - Transport Scotland
 - Scotways
 - Joint Radio Council
 - BT Radio Network Protection
 - Scottish Forestry
 - Crown Estate Scotland
 - Marine Scotland Science
 - Visit Scotland
 - Mountaineering Scotland
 - Scottish Water
 - British Horse Society

Public Consultation

- 1.6. As part of the consultation process, the Applicant will engage with the local community in order to inform local people about the proposals, to explain the development and its likely effects, to take on board any feedback, concerns or issues and to answer any questions.
- 1.7. The following further pre-application community involvement activity is proposed:
 - The creation of a dedicated project website with information about the project and providing two-way communication channels for feedback, including a project email address, Freephone and Freepost details;
 - Placement of an advert in local paper(s) announcing the project with reference to the project website for further information and including information on community engagement events;
 - Community newsletter(s) to be distributed in a yet to be determined consultation zone, providing project information, ways to get in touch with the project team and an invitation to any consultation event(s); and
 - Public exhibitions – Infinergy will decide on the location and timing of (a) public exhibition(s).

- 1.8. The EIA Report will include a summary of the pre-application public consultation carried out. In addition, a pre-application consultation report will be prepared which will detail all of the pre-application public consultation undertaken. This would be submitted alongside the application.

Appendix C – Cumulative Sites

Cumulative Wind Farms within 20 km		
Operational		
Clashindarroch Wind Farm	18 Turbines – 110m to blade tip	0km to the east
Dorenell Wind Farm	59 Turbines – 126m to blade tip	6km to the west
Hill of Towie I	21 Turbines – 100m to blade tip	15km to the north
Edintore	6 Turbines – 125m to blade tip	16km to the north
Cairnborrow	5 Turbines – 100m to blade tip	12km to the north-east
Dummuies	7 Turbines – 80m to blade tip	16km to the north-east
Glens of Foudland	20 Turbines – 78m to blade tip	20km to the north-east
Kildrummy	8 Turbines – 105m to blade tip	9km to the south
Cairnmore Farm	3 Turbines – 81m to blade tip	11km to the south-east
Planning Permission Granted/ Under Construction		
Hill of Towie II	16 Turbines – 125m to blade tip	14km to the north
Application Submitted		
Clashindarroch II	14 Turbines – 180m to blade tip	0km to the east

Appendix D – Visible Turbine Lighting Assessment: Criteria and Methodology

Introduction

- 1.1. The primary source of best practice for Landscape and Visual Impact Assessment (LVIA) in the UK is 'The Guidelines for Landscape and Visual Impact Assessment', 3rd Edition (GLVIA3) (Landscape Institute and the Institute for Environmental Management and Assessment, 2013). The assessment criteria to inform the assessment of effects of visible turbine lighting has been developed in accordance with the principles established in this best practice document. It should however be acknowledged that GLVIA3 establishes guidelines not a specific methodology. The preface to GLVIA3 states:

'This edition concentrates on principles and processes. It does not provide a detailed or formulaic 'recipe' that can be followed in every situation – it remains the responsibility of the professional to ensure that the approach and methodology adopted are appropriate to the task in hand.'

- 1.2. The assessment criteria set out below have therefore been developed specifically for this appraisal to ensure that the methodology is fit for purpose.
- 1.3. The purpose of an LVIA when undertaken in the context of an Environmental Impact Assessment (EIA) is to identify any likely significant landscape and visual effects arising as a result of the proposals. An LVIA should consider both:
- ***effects on the landscape as a resource in its own right (the landscape effects); and***
 - ***effects on specific views and visual amenity more generally (the visual effects).***
- 1.4. It is recognised that in some circumstances, it may be possible for turbine lighting to result in a significant effect on the character of the surrounding landscape. For example, if the proposed wind energy development is located within or in close proximity to a designated dark sky area, or is remote from existing sources of visible lighting, such as residential areas, commercial or industrial sites, or major roads.
- 1.5. For wind energy developments which are not located in such areas, it is considered that there would be no potential for significant effects on landscape character to arise from visible turbine lighting of the type proposed. This is because in these areas the character of the landscape during low natural light levels is already in part characterised by the presence of artificial lighting. Therefore, the addition of visible turbine lighting would not have the potential to bring about a fundamental change to the characteristics of the landscape.

-
- 1.6. The proposed wind farm lies away from recognised dark sky areas, within a surrounding landscape context which contains some existing sources of artificial light. However, it is understood that an assessment of the potential for significant effects on landscape character should be undertaken, due to the location of the site itself within an area which is less characterised by the presence of visible light. Therefore, criteria are set out below for the assessment of both landscape character and visual effects.
 - 1.7. For a daytime assessment, one assesses the worst-case situation (i.e. clear full visibility as if a perfect day). A daytime assessment can therefore describe the full extent of that clear visibility, or lack of it, as a moment in time. For this study, it is not just the reverse. What is required is an understanding of low light level conditions which seeks to cover all the periods, both evening; dawn; gloomy winters day and after dark, in which the lights will to some degree be visible. This also seeks to cover the period just after it begins to get dark; the period just before it actually gets dark; the period in the middle as it moves from one to the other and the time after it is dark but a moonlit night affords some view of the landscape.
 - 1.8. If one described a situation in detail, (e.g. just before sunset with the setting sun still illuminating part of the landscape; part going into deep shadow; a ridgeline in silhouette; the mid-ground in semi-darkness and a partially lit foreground because the street lights had just come on) this would be a snapshot in time for that viewpoint. Half an hour earlier it would have been different, as it would half an hour later, or at dawn, and that is before the matter of how it would have looked on another day earlier or later in the year is considered. Whether the description was looking east at sunset, or east at dawn would also radically change the description of what was seen and its impact. The report shall try to capture a single assessment that represents a typical judgement for the location in low light conditions, but not a specific set of conditions.
 - 1.9. Such an assessment that was more specific would become very much larger, with the need to visit viewpoints at multiple times and in a range of light conditions, including dawn and dusk, to get the east - west, sunset - sunrise element. This could lead to multiple written descriptions and assessments for each location for both visual amenity and character effects.

Nature (Sensitivity) of Landscape Character

- 1.10. The nature or sensitivity of landscape character reflects its susceptibility to change and any values associated with it. It is essentially an expression of a landscape's ability to accommodate a particular type of change. It varies depending on the physical and perceptual attributes of the landscape including but not necessarily limited to: scale; degree of openness; landform; existing land cover; landscape pattern and complexity; the extent of human influence in the landscape; the degree of remoteness/wildness; perception of change in the landscape; the importance of landmarks or skylines in the landscape; intervisibility with and influence on surrounding areas; condition; rarity and scenic quality of

the landscape, and any values placed on the landscape including any designations that may apply. Additionally, for a consideration of landscape character during low light levels, a key further consideration is the extent to which existing artificial light sources are present in the landscape during low natural light levels.

- 1.11. In this assessment, the nature or sensitivity of landscape character shall be considered with reference to published landscape character areas/types. Information regarding the key characteristics of these character areas/types shall be extrapolated from relevant published studies. Together with on-site appraisal, an assessment of landscape sensitivity to visible wind turbine aviation lighting shall be undertaken, employing professional judgement.
- 1.12. The nature or sensitivity of landscape character shall be described as very high, high, medium, low or very low.

Nature (Sensitivity) of Visual Receptors

- 1.13. The nature or sensitivity of a visual receptor group reflects their susceptibility to change and any values associated with the specific view in question. It varies depending on a number of factors such as the occupation of the viewer, their viewing expectations, duration of view and the angle or direction in which they would see the site. Whilst most views are valued by someone, certain viewpoints are particularly highly valued for either their cultural or historical associations and this can increase the sensitivity of the view. The following criteria are provided for guidance only and are not exclusive:
 - **Very Low Sensitivity – People engaged in industrial and commercial activities, or military activities, who would be unlikely to have any particular expectation of their wider night time view.**
 - **Low Sensitivity - People at their place of work (e.g. offices); shoppers; users of trunk/major roads and passengers on commercial railway lines (except where these form part of a recognised and promoted scenic route). The primary interest of such receptors would not generally be on the dusk/night time view.**
 - **Medium Sensitivity - Users of public rights of way and minor roads which do not appear to be used primarily for recreational activities or the specific enjoyment of the landscape; recreational activities not specifically focused on the landscape (e.g. football). Such receptors may have some interest in their dusk/night time view of the wider landscape, but generally their primary concern would be their immediate landscape context;**

- ***High Sensitivity – Residents at home; users of caravan parks, campsites and ‘destination’ hotels; tourist attractions open after daylight hours with opportunities for views of the landscape (but not specifically focused on a particular vista); users of public rights of way or minor roads which appear to be used for recreational purposes or the specific enjoyment of the landscape during dusk/night time (often likely to be in close proximity to residential areas).***
- ***Very High Sensitivity - People at recognised vantage points (often with interpretation boards) which are designed to take in a dusk/ night time view, people at tourist attractions with a focus on a specific view which is available at dusk/ night time, visitors to historic features/estates where the setting is important to an appreciation and understanding of cultural value and can be visited and appreciated during dusk/night time.***

- 1.14. It is important to appreciate that it is the visual receptor (i.e. the person) that has a sensitivity and not a property, public right of way or road. Therefore, a large number of people may use a motorway during dusk/ night time, for example, but this does not increase the sensitivity of the receptors using it. Conversely, a residential property may only have one person living in it but this does not reduce the sensitivity of that one receptor.
- 1.15. Where judgements are made about the sensitivity of assessment viewpoints, the sensitivity rating provided shall be an evaluation of the sensitivity of the receptor represented by the viewpoint and not a reflection of the number of people who may experience the view.
- 1.16. It is also important not to confuse the concept of visual sensitivity with the perception of wind turbines. It is acknowledged that some people consider wind turbines to be unattractive, but many people also enjoy the sight of them. This matter is therefore not a factor when determining sensitivity.

Nature (Magnitude) of effects on Landscape Character

- 1.17. The magnitude of effect on landscape character from visible lighting during low light periods is influenced by the resulting alteration to the physical and perceptual characteristics of the landscape. Professional judgement shall be used as appropriate to determine the magnitude using the following criteria as guidance only. In doing so, it is recognised that usually the landscape components in the immediate surroundings, including any visible lighting, have a stronger influence on the sense of landscape character than distant features whilst acknowledging the fact that more distant features can have an influence on landscape character as well.
- Very Low Magnitude of Change – No notable introduction of new visible lighting into the landscape; resulting in negligible change to

the key physical and/or perceptual attributes of the landscape during the low light period.

- Low Magnitude of Change - Introduction of a minor new extent of visible lighting into the landscape; resulting in a minor alteration to the key physical and/or perceptual attributes of the landscape during the low light period.
- Medium Magnitude of Change - Introduction of some notable new visible lighting into the landscape; resulting in some notable change to the key physical and/or perceptual attributes of the landscape during the low light period.
- High Magnitude of Change - Introduction of major new visible lighting into the landscape; resulting in a major change to the key physical and/or perceptual attributes of the landscape during the low light period.
- Very High Magnitude of Change - Introduction of dominant new visible lighting into the landscape; resulting in a profound change to the key physical and/or perceptual attributes of the landscape during the low light period.

Nature (Magnitude) of effects on views and visual amenity

1.18. Visual effects are caused by the introduction of new elements into the views of a landscape, or the removal of elements from the existing view. In this case the effects would be brought about by the addition of visible lighting.

1.19. Professional judgement shall be used to determine the magnitude of impacts using the following criteria as guidance only:

- **Very Low Magnitude of Change - No change or negligible change in views;**
- **Low Magnitude of Change - Some change in the view that is not prominent but visible to some visual receptors;**
- **Medium Magnitude of Change - Some change in the view that is clearly notable in the view and forms an easily identifiable component in the view;**
- **High Magnitude of Change - A major change in the view that is highly prominent and has a strong influence on the overall view.**
- **Very High Magnitude of Change – A change in the view that has a dominating or overbearing influence on the overall view.**

1.20. Using this set of criteria, determining levels of magnitude is primarily dependant on how prominent the lighting associated with the Proposed Development would be in the landscape, and what may be judged to flow from that prominence or otherwise.

1.21. For clarification, the use of the term ‘prominent’ relates to how noticeable the lighting associated with the Proposed Development would be. This is affected by how close the viewpoint is to the Proposed Development but

not entirely dependent on this factor. Other modifying factors include: the focus of the view, visual screening and the nature and scale of other landscape features and visible lighting within the view. Rather than specifying crude bands of distance at which the turbines will be dominant, prominent or incidental to the view etc, the prominence of the turbines in each view is described in detail for each viewpoint or receptor group taking all the relevant variables into consideration.

Consideration of the Duration and Reversibility of effect

- 1.22. Prior to the publication of GLVIA3, LVIA practice had evolved over time in tandem with most other environmental disciplines to consider significance principally as a function of two factors, namely: the sensitivity of the receptor and the magnitude of the effect (the term 'magnitude' being a word most commonly used in LVIA and most other environmental disciplines to describe the size or scale of an effect).
- 1.23. The flow diagram on page 39 of GLVIA3 now suggests that the magnitude of effect is a function of three factors (the size/scale of the effect, the duration of the effect and the reversibility of the effect). This however is somewhat problematic in the context of assessing wind energy development. This is because wind energy developments are generally consented for a time limited period and are largely reversible at the end of their operational period. Whilst this is a material consideration in the planning balance it does not however reduce the scale of the effect during the period in which the scheme is operational (i.e. the 'magnitude' of the effect in the traditional and commonly understood sense of the word). In this regard, it would be incorrect to report a lesser magnitude of change to the view during the operational phase as a result of the time limited period of the effect, or the relative reversibility of the effect.
- 1.24. The approach proposed to be taken in this assessment is therefore to consider magnitude of effect solely as the scale or size of the effect in the traditional sense of the term 'magnitude'.

Level of effect

- 1.25. The purpose of an LVIA when produced in the context of an EIA is to identify any significant effects on landscape and visual amenity arising from the Proposed Development.
- 1.26. The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 do not define a threshold at which an effect may be determined to be significant. In certain other environmental disciplines there are regulatory thresholds or quantitative standards which help to determine the threshold of what constitutes a significant effect. However, in LVIA, any judgement about what constitutes a significant effect is the judgement of a competent and appropriately qualified professional assessor.

- 1.27. The level (relative significance) of the landscape and visual effects is determined by combining judgements regarding sensitivity of the landscape or the viewer, the magnitude of change, duration of effect and the reversibility of the effect. In determining the level of residual effects, all mitigation measures are taken into account.
- 1.28. The level (relative significance) of effect shall be described as Major, Major/Moderate, Moderate, Moderate/Minor, Minor, Slight/No Effect or No Effect. No Effect may also be recorded as appropriate where the effect is so negligible it is not even noteworthy.
- 1.29. In the assessment, those effects described as Major, Major/Moderate and in some cases Moderate may be regarded as significant effects as required by the EIA Regulations. These are the effects which the authors of the LVIA consider to be most material in the decision making process.

Production of the Zone of Theoretical Visibility (ZTV) Plan

- 1.30. A Zone of Theoretical Visibility (ZTV) illustrates the extents from which a feature (in this case the visible lighting from several wind turbines) would theoretically be visible within a defined study area.
- 1.31. ZTVs are generated assuming a 'bare ground' terrain model. This means that the ZTVs presented are generated from topographical data only and they do not take any account of vegetation or the built environment, which may screen views of the Proposed Development. They are, as such, a 'worst case' zone of visual influence and considerably over-emphasises the actual visibility of the scheme. In reality trees, hedges and buildings may restrict views of the Proposed Development from many of the areas rendered as within the ZTV.
- 1.32. A further assumption of ZTVs is that climatic visibility is 100% (i.e. visibility is not impeded by moisture or pollution in the air). In reality, such atmospheric conditions are relatively rare. Mist, fog, rain and snow are all common weather occurrences, which would regularly restrict visibility of the lighting associated with the Proposed Development from some of the areas within the ZTV; this being an incrementally more significant factor with distance from the site. Atmospheric pollution is not as significant as it is in other parts of the country but is still present and would also restrict actual visibility on some occasions, again more so with distance from the site.
- 1.33. A ZTV shall be generated using specialist computer software package 'WindFarm' by ReSoft Ltd. The programme uses topographical height data (OS Terrain 50) to build a terrain model. The programme then renders the model using a square grid to illustrate whether the turbine lighting would be visible in each 50m x 50m square on the grid for a specified distance in every direction from the site.
- 1.34. A digital ZTV shall be prepared to illustrate the theoretical visibility of the turbine lighting for a radius of 10km around the site. It should be noted that when light travels from its source it diminishes in intensity, limiting the area that its source can illuminate, a process known as 'light

attenuation' or 'fall-off'. Therefore, whilst the ZTV would not illustrate any reduction in intensity it should be recognised that the aviation lighting would diminish in intensity with distance from the wind farm.

- 1.35. It should be noted that there are several limitations to the use of ZTVs. For a discussion of these limitations please refer to Visual Representation of Wind farms – Version 2.2 (SNH February 2017). In particular, it should be noted that the ZTV plan shall simply illustrate theoretical visibility and will not imply or assign any level of significance to those areas identified as being within the ZTV. A ZTV is a tool to assist the Landscape Architect to identify where the turbine lighting would potentially be visible from, however the assessment of landscape and visual effects shall not rely solely on the ZTV and in all cases professional judgement shall be used to evaluate the significance of effects.

Production of the Dusk Period Visualisations

Introduction

- 1.36. SNH Guidance, Visual Representation of Wind Farms, Version 2.2, February 2017, considers the matter of visible turbine lighting at paragraphs 174 to 177. This highlights that 'Where an illustration of lighting is required, a basic visualisation showing the existing view alongside an approximation of how the wind farm might look at night with aviation lighting may be useful'. It goes on to note that 'This is only likely to be required in particular situations where the wind farm is likely to be regularly viewed at night (e.g. from a settlement, transport route) or where there is a particular sensitivity to lighting (e.g. in or near a Dark Sky Park or Wild Land Area)'. It is also clear that '**Not all viewpoints will need to be illustrated in this way**'.
- 1.37. The following section provides background information in relation to the Dusk Period Visualisations which it is proposed are prepared to illustrate the visible lighting proposed as part of the wind farm. The text explains how the photography shall be taken and how the visualisations are to be prepared and presented. It includes instructions for how it is expected that the visualisations should be viewed and explains the limitations of the visualisation material.

Viewpoints to be Illustrated with Dusk Period Visualisations

- 1.38. The starting point for consideration for which locations should be illustrated with dusk period visualisations was the locations proposed as assessment viewpoints for the main daytime period visual assessment. Of these viewpoints a review was then undertaken in order to establish which were likely to be representative of visual receptors during low light conditions. In this regard, viewpoints at distances of beyond 10km from the site were discounted, along with viewpoints at hill summits and on long distance footpaths which would be unlikely to be visited after daylight hours.
- 1.39. Following this review, it is considered that the following viewpoints would be most appropriate for the production of Dusk Period Visualisations in addition to daytime visualisations:
- Viewpoint 2: Minor Road near Boghead; and

- Viewpoint 5: Minor Road near Cabrach Parish Church;

Dusk Period Photography

- 1.40. SNH advises that 'The visualisation should use photographs taken in low light conditions, preferably when other artificial lighting (such as street lights and lights on buildings) are on, to show how the wind farm lighting will look compared to the existing baseline at night. It is only necessary to illustrate visible lighting, not infrared or other alternative lighting requirements'. It goes on to note that 'We have found that approximately 30 minutes after sunset provides a reasonable balance between visibility of the landform and the apparent brightness of artificial lights, as both should be visible in the image. It is important that the photographs represent the levels of darkness as seen by the naked eye at the time and the camera exposure does not make the image appear artificially brighter than it is in reality. It can also be helpful to note the intensity of other lights in the area to enable comparison (e.g. television transmitters) as this can aid the assessment process'.
- 1.41. In this context, the following text explains how the baseline photography shall be taken for each viewpoint to be illustrated with a visualisation.
- 1.42. Each viewpoint to be illustrated with a visualisation shall be visited during the 'dusk period' and photographs taken at regular intervals as the light levels decrease across the dusk period. In particular, we shall seek to gather photographs during the period where street lighting and other light sources of visible light in the baseline are illuminated, but the landform remains partially visible. The ambient light conditions shall be recorded during each round of photography with a light meter to seek to ensure consistency across the visualisations prepared.
- 1.43. Baseline photographs of the existing view shall be taken using a high quality Canon 5D Mark II digital camera with a Canon EF 50mm f/1.4 USM lens. In accordance with SNH guidance, this camera shall have a full frame digital sensor.
- 1.44. As far as possible, photographs shall be taken in good weather and clear visibility conditions.
- 1.45. Neutral density graduated filters shall be used as appropriate at some viewpoints to balance the exposure within some scenes – typically where there is a contrast between bright sky and darker landform. Other than this no other filters shall be used during the photography.
- 1.46. Photographs shall be captured in high resolution JPEG format and as RAW metadata files.
- 1.47. At each viewpoint the camera shall be mounted on a levelled tripod at a height of approximately 1.5m above ground level (providing an approximation of average adult eye level).

- 1.48. The camera shall be set up on a panoramic rotating head and photographs taken at 30 degree increments of rotation from left to right.
- 1.49. In each case the camera focus shall be locked on the distant horizon (infinity). In doing so the photographs are in each case focussed on the Proposed Development site whilst very close objects in the foreground may in some cases be out of focus. This approach is in line with best practice photography techniques. The exposure shall be set correctly for the centre of the development site and then locked off so that it remained constant as the camera is rotated through the panorama.

Stitching of Panoramas and Post-Photographic Processing

- 1.50. Each of the panoramic images presented for the Photographic Record and used for the Visualisations shall be comprised of three single frame photographs stitched together and then cropped down to a particular horizontal and vertical field of view.
- 1.51. The panoramic baseline photographs which illustrate a 90 degree horizontal angle of view shall be stitched in cylindrical projection as per the SNH guidance.
- 1.52. The photomontages which show a 53.5 degree horizontal field of view shall be based on the same single frame panoramic photographs but stitched in planar projection in accordance with the SNH guidance.
- 1.53. In some cases a degree of post photography processing of the raw image files may be undertaken to enhance the quality of the baseline photographs. As stated in the SNH guidance:

'Photographic processing involves judgements - there is no process by which a 'pure' photograph can be produced without the application of human decision-making, from exposure timing to the specification of the camera, and whether this is applied manually or automatically.....'

'In reality there is no way to avoid a photograph being enhanced as this is an integral part of photography and photomontage production.'

- 1.54. The extent of image enhancement undertaken in the production of the any photomontages will however be limited to that which would conventionally occur in a darkroom to improve the clarity of an image, and will not in each case change the essential character of the image. Overall, a minimum of post-photography image enhancement will take place and during the stitching process none of the photographs shall be distorted in terms of scaling (other than that which is an inherent and unavoidable product of stitching photography in planar projection).

Production of Wirelines and Photomontages

Wirelines

- 1.55. A wireline visualisation (sometimes also referred to as a wireframe visualisation) is a computer generated 3D outline of a particular structure (in this case a wind farm) placed on top of a 3D ground terrain model, which again is represented by a wireline. No rendering is given to any of the surfaces.
- 1.56. The wireline images of the proposed turbines (as well as any other cumulative turbines modelled) will be generated utilising the actual dimensions of the proposed turbines and a model of the structures placed in position over a ground terrain model generated from Ordnance Survey Terrain 50 DTM data.
- 1.57. The coordinates of the viewpoints will be recorded using a Global Positioning System (GPS) in the field. Checks on these coordinates will be made with reference to Google Earth. These coordinates will be used to set up viewpoints in the model from which to view the turbines. The wirelines will be generated using specialist computer software package 'WindFarm' by ReSoft Ltd.
- 1.58. The wireline images are generated on a bare ground model and therefore do not take account of any vegetation or the built environment between the viewpoint and the Proposed Development. As such, they represent a worst case view.
- 1.59. For each of the viewpoints which are illustrated with a Visualisation, a wireline will be presented to scale beneath a baseline photograph to illustrate the view. The wireline images illustrate the anticipated scale and position of the turbines in relation to the terrain.

Dusk Period Photomontages

- 1.60. In simple terms, a photomontage is the superimposition of a rendered, photorealistic, computer generated model of a development (in this case a wind farm with visible lighting) on to a baseline photograph to illustrate how it will appear in the surrounding landscape context.
- 1.61. The production of the photomontages shall begin with the generation of a 3D digital ground terrain model and wireline images of the turbines, using ReSoft Ltd WindFarm software (as described above). The model of the structures is then rendered, and the lighting levels set appropriate to the date, time and orientation on which the photograph was taken.
- 1.62. Using world coordinates in the computer modelling programme, the photographic viewpoints for which a photomontage is to be prepared is replicated such that a view is set up looking at the structures from exactly the same location as where the baseline photograph was taken from. The view from the model is then superimposed over the original photograph and edited as necessary in Adobe Photoshop to give a final photomontage. Several known landmarks in the far distance of the baseline photographs

are recorded on site using a GPS and used to check that the positioning and scale of the structures is correct.

- 1.63. Whilst every effort shall be made to ensure the accuracy of the photomontages, it must be appreciated that no photomontage could ever claim to be 100% accurate as there are a number of technical limitations in the model relating to the accuracy of information available from Ordnance Survey and from the GPS. In particular, it should be recognised that baseline photographs on which photomontages are based can, at best, only ever be a 'flattened' 2D representation of what the eye sees in 3D on site. A photograph will never capture as much detail as the eye would see in the field, it therefore follows that a photomontage can never truly capture the sense of perspective and detail which would be possible in reality.
- 1.64. Additionally, it has been established during the field work undertaken for previous similar studies that dusk period photographs of visible lighting do not always capture the extent to which the eye perceives light sources during the dusk period. Often photography will appear to show the lighting to be more recessive than it is actually perceived in the field. The photomontages therefore do not seek to replicate the manner in which a dusk period photograph would capture the aviation lighting, rather they seek to replicate the manner in which the lighting is perceived when it is viewed in the field.
- 1.65. In some cases, the visibility of the turbines may also be slightly digitally enhanced to ensure that they are visible when printed out.
- 1.66. Each of the photomontages should be viewed from the stated viewing distance to give an accurate representation of what the Proposed Development will look like. However, the photomontages are simply a tool to assist the Landscape Architect in their assessment of effects. The assessment of visual effects does not rely solely on the accuracy of the photomontages as it is ultimately professional judgement which is used to evaluate the significance of effects.

Presentation of the Visualisation Sheets

- 1.67. For each Dusk Period Viewpoint Visualisation, the following visualisation sheets shall be presented:
Sheet 1: Baseline Photograph of the Existing Dusk Period View and Cumulative Wireline of the Proposed Scheme and all other Operational or Proposed Wind Farms
- 1.68. The baseline photograph is an unedited existing dusk period view from the viewpoint. The image illustrates a 90 degree horizontal field of view and a 25 degree vertical field of view. This image is presented in cylindrical projection and the principal viewing distance (the distance at which one should view the image to obtain a geometrically accurate impression) is 500mm when the image is curved through the same radius.
- 1.69. A cumulative wireline image of the Proposed Development, and all other operational and proposed wind farms is set out directly beneath the

corresponding baseline view. This image also presents a 90 degree horizontal field of view. This sheet presents the information required of the 'Baseline Panorama and Wireline' as set out in Annex C of the SNH guidance. Both of these images are presented in cylindrical projection and the principal viewing distance (the distance at which one should view the image to obtain a geometrically accurate impression) is 500mm when the image is curved through the same radius.

Sheet 2: Dusk Period Photomontage of the Proposed Scheme

- 1.70. This sheet provides an enlarged and cropped dusk period photomontage of the Proposed Development. The image illustrates a 53.5 degree horizontal field of view and an 18 degree vertical field of view. It is presented in planar projection. As such the image should be viewed on a flat surface. The principal viewing distance (the distance at which one should view the image to obtain a geometrically accurate impression) is 812.5mm. This sheet presents the information required of the 'A1 Panorama' as set out in Annex C of the SNH guidance.
- 1.71. The dusk period photomontage shall include for other proposed cumulative sites which would require visible lighting.

Limitations of the Visualisations

- 1.72. Annex A of 'Visual Representation of Wind Farms, Version 2.2 (SNH, February 2017) sets out a summary of the key limitations of visualisations and recommends that these are set out for each windfarm application. The following text is therefore reproduced from Annex A of the aforementioned SNH guidance:

'Visualisations of wind farms have a number of limitations which you should be aware of when using them to form a judgement on a wind farm proposal. These include:

- *A visualisation can **never show exactly** what the wind farm will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;*
- *The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but **can never be 100% accurate**;*
- *A static image cannot convey turbine movement, or flicker or reflection from the sun on the turbine blades as they move;*
- *The viewpoints illustrated are representative of views in the area, but cannot represent visibility at all locations;*
- *To form the best impression of the impacts of the wind farm proposal these images **are best viewed at the viewpoint location shown**;*
- *The images **must** be printed at the right size to be viewed properly (260mm by 820mm);*
- *You should hold the images **flat at a comfortable arm's length**. If viewing these images on a wall or board at an exhibition, you*

should stand at arm's length from the image presented to gain the best impression.

- *It is preferable to view printed images rather than view images on screen. If you do view images on screen you should do so using a normal PC screen with the image enlarged to the full screen height to give a realistic impression. Do not use a tablet or other device with a smaller screen to view the visualisations described in this guidance'.*
- It should also be noted that the quality of all printed visualisations is also dependent on the printing methods, paper and ink used.



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