



**Shepherds' Rig Wind Farm**

**INFINERGY**

harnessing the power of nature

## **Additional Environmental Information (AEI) Report**

Non Technical Summary

October 2019



*Cover image for illustrative purpose only*



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## PREFACE

A section 36 application for the Shepherds' Rig wind farm, comprising 19 wind turbines, was submitted in December 2018. This was accompanied by an Environmental Impact Assessment (EIA) Report.

The application has now been amended by the deletion of two turbines and Additional Environmental Information (AEI) relating to this change has been prepared. The original Non-Technical Summary (NTS) has been updated so that it provides a summary of the EIA Report and the AEI Report. This NTS provides this updated overall summary.

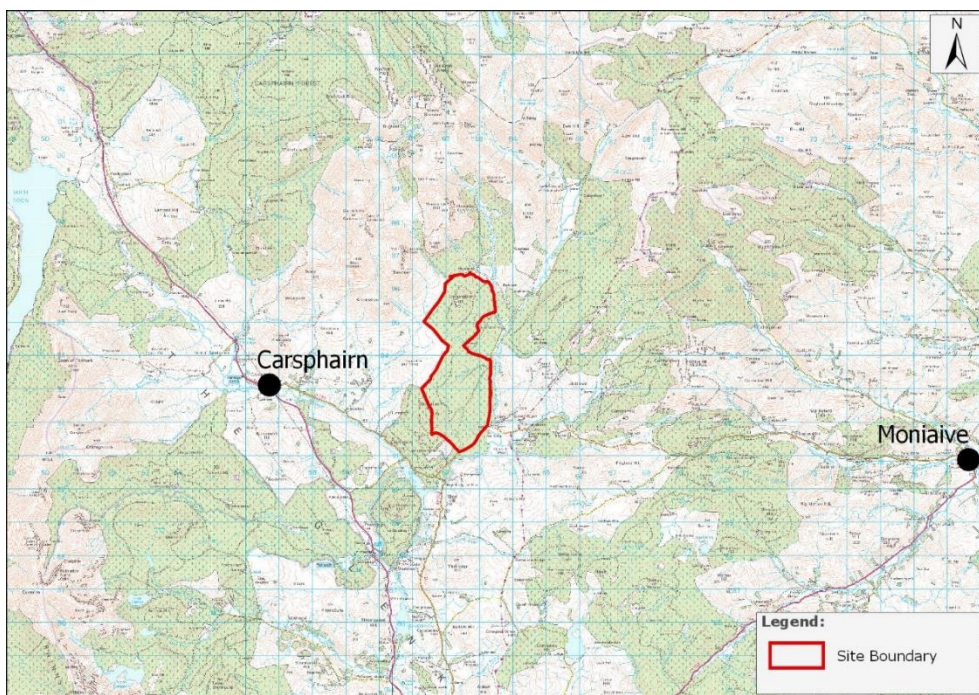
Copies of the EIA Report, AEI Report and the updated NTS, can be viewed at the following locations:

- **Dumfries and Galloway Council**  
Development Management  
Kirkbank House  
English Street  
Dumfries  
DG1 2HS
  
- **Carsphairn Shop and Tearoom**  
Carsphairn  
Castle Douglas  
DG7 3TQ
  
- **Scottish Government Library,**  
41 Victoria Quay,  
Broomhouse Drive,  
Edinburgh,  
EH6 6QQ

The EIA and AEI Reports and the supporting documentation are also available online; please visit the dedicated website at <http://www.shepherdsrigwindfarm.co.uk>, under 'Downloads'. A copy of the NTS and CDs containing the full EIA and AEI Reports are available free of charge (while stocks last) by contacting Infinergy Limited at [info@shepherdsrigwindfarm.co.uk](mailto:info@shepherdsrigwindfarm.co.uk) or in writing to **Freeport Infinergy Limited** (no stamp or further address details necessary). If required, a hard copy of the EIA Report can be provided at a cost of £700, plus P&P and a hard copy of the AEI Report can be provided at a cost of £500, plus P&P.

## 1. INTRODUCTION

- 1.1** An EIA Report (November 2018) was submitted to Scottish Ministers in December 2018 for the Shepherds' Rig Wind Farm. Following the submission, the Energy Consents Unit (ECU) consulted a range of relevant organisations. On receipt of consultation responses, the Applicant considered matters raised and undertook further design and assessment work, reducing the previous 19 turbine layout to a 17 turbine layout.
- 1.2** This Non-Technical Summary (NTS) is a summary of the Environmental Impact Assessment (EIA) Report and Additional Environmental Information (AEI) Report which accompanies the section 36 application for the Shepherds' Rig Wind Farm (hereafter referred to as the 'Revised Development'). The application is to construct, operate and decommission 17 wind turbines within the Smittons and Craigenkillan North plantations near Carsphairn in Dumfries and Galloway.
- 1.3** As the Revised Development exceeds 50 MW, the Applicant is seeking consent from the Scottish Ministers under Section 36 of the Electricity Act 1989 (as amended) along with deemed planning permission under Section 57(2) of the Town and Country Planning (Scotland) Act 1997. Consent is sought for the Revised Development for an operational period of 25 years.
- 1.4** This Non-Technical Summary is intended to be read alongside the Section 36 application, EIA Report, AEI Report, and associated application documents for the Revised Development.
- 1.5** The Revised Development is located in northern Dumfries and Galloway within the administrative areas of Dumfries and Galloway Council and Carsphairn Community Council. The Site lies approximately 5 km to the east of Carsphairn and 14 km to the west of Moniaive. Figure 1 shows the location and wider geographical context of the site.



**Figure 1: Location of the revised Shepherds' Rig Wind Farm development within Dumfries and Galloway**

## 2. THE APPLICANT

- 2.1** SETT Wind Development Limited is a company formed by Infinergy Limited and Boralex LLP.
- 2.2** Infinergy Limited is a UK based renewable energy company with a strong focus on the development of onshore wind energy in Scotland, England and Wales. Infinergy develops wind energy projects from inception through to construction and operation and has offices in Wimborne (England) and in Edinburgh (Scotland). For more information visit <http://www.infinergy.co.uk>
- 2.3** Boralex LLP is a Canadian based independent power provider. Boralex has developed, and now operate, a large portfolio of wind farms, and a number of solar parks, primarily in Canada and France. The company also owns and operates large hydro-electricity projects in Canada. Further information is available at <http://www.boralex.com/projects>

## 3. THE NEED FOR RENEWABLE ENERGY

- 3.1** The Climate Change (Scotland) Act 2009 created the statutory framework for greenhouse gas emission reductions in Scotland by setting a target for net Scottish emissions for the year 2050 to be at least 80% lower than the 1990 baseline level. The Scottish Government has now introduced a new Climate Change (Emissions Reduction Target) (Scotland) Act 2019 with even more ambitious targets than those contained in the 2009 Act, and in doing so, Scotland will become one of the first countries to legislate support for the aims of the Paris Agreement.
- 3.2** The new Climate Change Act 2019 received Royal Assent on 31st October 2019 and seeks to amend only those parts of the 2009 Act that relate to emission reduction targets and associated reporting duties. The detailed proposals and policies for delivering against targets are to be set out in the current and future Climate Change Plans.
- 3.3** In line with advice from the Committee on Climate Change (CCC) on 2 May 2019, in preparing the Climate Change Act 2019, the Scottish Government has set a target date of 2045 for reaching net-zero emissions and raised the ambition of the 2030 and 2040 targets to 70% and 90% emissions reductions respectively.
- 3.4** The CCC's advice is that Scotland can now achieve such a target, provided that the UK-wide ambition is also increased - to net-zero by 2050 - and action is taken in reserved policy areas. The new Climate Change Act 2019 means that Scotland will have the most stringent statutory targets in the world and our contribution to climate change will end, definitively, within a generation.
- 3.5** The Climate Change Plan was laid in Parliament on 28 February 2018 and sets out how Scotland can deliver its target of a 66% emissions reduction, relative to the 1990 baseline for the period 2018-2032. The Climate Change Plan notes that a critical role for the planning system will be to try and accommodate the further development of low emissions energy generation facilities noting that 'we will continue to need to find room for large scale infrastructure such as wind and solar farms, as well as more locally based equipment' (Page 34/35).

- 3.6** The Scottish Energy Strategy (SES) 2017 sets out the Scottish Government's strategy through to 2050. The SES sets two new targets for the Scottish energy system by 2030:
- The equivalent of 50% of the energy for Scotland's heat, transport and electricity consumption to be supplied from renewable sources; and
  - An increase by 30% in the productivity of energy use across the Scottish economy.
- 3.7** The SES goes on to set out what is termed the 'Opportunity' for onshore wind. There is recognition that onshore wind is amongst the lowest cost forms of power generation of any kind which will allow it to contribute to one of the six priorities in the SES which is 'to protect consumers from excessive or avoidable costs' (Pg. 8). It is also recognised as 'a vital component of the huge industrial opportunity that renewables create for Scotland'. These energy and climate change goals mean that onshore wind must continue to play a vital role in Scotland's future - helping to decarbonise our electricity, heat and transport systems, boosting our economy, and meeting local and national demand (Pg. 11).
- 3.8** The Ministerial Foreword to the Onshore Wind Policy Statement (OWPS) 2017 notes that:
- 'our energy and climate change goals mean that onshore wind will continue to play a vital role in Scotland's future – helping to substantively decarbonise our electricity supplies, heat and transport systems, thereby boosting our economy'.*
- 3.9** National planning policy continues to support the principle of wind energy development, subject to the consideration of environmental criteria. The spatial strategy outlined in Scottish Planning Policy (June 2014) provides an indication of areas where wind energy developments will not be permitted and areas where they may be permitted subject to consideration of a number of environmental criteria.
- 3.10** The Development Plan for the Revised Development comprises the Dumfries and Galloway Council LDP2 (2019) which is supportive of the principle of wind energy development. The LDP2 policies require developers to demonstrate that wind energy development proposals will not have unacceptable impacts on people, the natural and water environment, landscape, or the historic, built or cultural environment.
- 3.11** Overall, there is strong policy support for the principle of renewable energy development at all policy levels, subject to the satisfaction of a number of planning and environmental considerations which are considered in detail in the technical chapters of the EIA Report and the AEI. A full assessment of the Revised Development against the applicable plans, policies and strategies is contained within the Updated Planning Statement that accompanies the AEI.

## **4. SITE SELECTION AND DESIGN EVOLUTION**

- 4.1** The design of the Proposed Development as detailed in the EIA Report (November 2018) and submitted in December 2018 was established through an iterative process which included the identification of technical and environmental constraints determined during the EIA process, through consultation with statutory bodies and members of the local community.

**4.2** On receipt of consultation responses, the Applicant considered matters raised and undertook further design and assessment work. The Revised Development layout has been amended as follows:

- The number of turbines has been reduced compared to the earlier proposals from 19 to 17. The two turbines have been removed to reduce the effects on Craigengillan Cairn and Stroanfreggan Craig Fort.
- None of the turbine tip heights have been altered, they remain at 149.9m to tip, with two of the northern turbines at 125m to tip.
- Several turbines on the western side of the site have been re-sited slightly (less than 80m) onto shallower peat.

## **5. SITE AND SURROUNDINGS**

**5.1** The Site is located in northern Dumfries and Galloway, approximately 5 kilometres (km) to the east of Carsphairn, 10 km north of St John's Town of Dalry, and 14 km to the west of Moniaive. Figure 1 shows the location and wider geographical context of the site.

**5.2** The site extends to approximately 752 hectares (ha) and mainly comprises commercial coniferous woodland plantation. The site is bounded to the north and north-east by further forestry, and to the west, east and south-east by open moorland.

**5.3** The site rises from approximately 200 m above ordnance datum (AOD, approximately equivalent to sea level) along Dry Burn (in the southern section of the Site) to 380 m at Marscalloch Hill in the south-western part of the Site and 400m at Craigengillan Hill in the northern part of the site.



## **6. PROJECT DETAILS**

**6.1** The Revised Development would comprise:

- 15 wind turbines with a maximum blade tip height of 149.9 metres (m) and 2 wind turbines with a maximum blade tip height of 125 m,
- associated turbine foundations, wind turbine hard-standings, and crane pads;
- a series of onsite access tracks connecting each of the turbine locations;
- a network of underground cables linking the turbines to an onsite electricity substation and control/maintenance buildings;
- a battery energy storage array located within the onsite electricity substation;
- two borrow working areas;
- an access junction at the existing forestry track into the plantation from the B729 between Muirdrochwood and Smittons;
- a temporary construction compound; and
- operational anemometry mast to measure wind speed and wind direction.

**6.2** The application is for the Revised Development to be operational for 25 years, and at the end of this period, decommissioned.

**6.3** The layout of the site including the wind turbines and associated access tracks is shown in Figure 2.

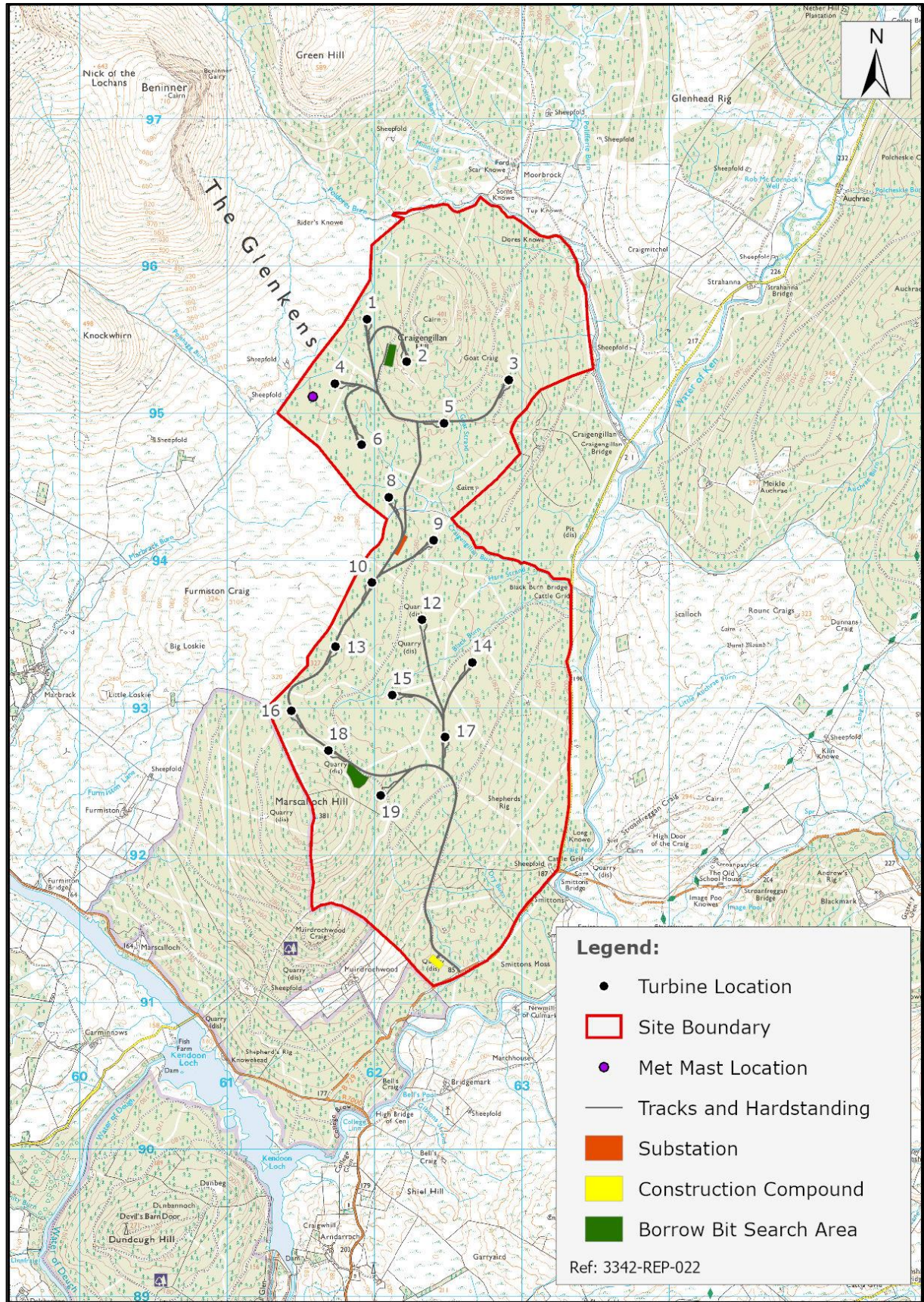


Figure 2: The Revised Development

- 6.4** The EIA and AEI has been based on maximum parameter application wind turbines with tip heights of 149.9 m and 125 m. The candidate turbines that have been used within this assessment envelope are the Vestas V117 4.2 MW and Vestas V105 3.6 MW so that the total maximum installed capacity from all of the wind turbines is 70.2 MW.
- 6.5** Based on these candidate turbines, the Revised Development turbines would have a total estimated installed maximum generation capacity of 70.2 MW with a battery energy storage facility of 6 MW, so that the overall maximum output from the Revised Development would be 76.2 MW.
- 6.6** The Revised Development is not, however, tied to a particular turbine type, as the turbine market is dynamic, with technology changes, predicted performance and price fluctuations driving turbine selection. The final turbine choice will depend on technical and commercial considerations at the time of procurement, although the final turbines would not exceed the proposed maximum parameter tip heights of 149.9m and 125 m.
- 6.7** The Revised Development would be accessed from the existing forestry track off the B729 between Muirdrochwood and Smittons. This will involve upgrading the existing Site entrance junction and the track.
- 6.8** The turbine components which constitute 'abnormal loads' would be delivered by sea to the Port of Ayr and then south via the A77, A713 and to the western end of the B729.
- 6.9** The grid connection for the Revised Development would be via a new onsite substation, which would contain metering equipment and switchgear. The connection between the Site and the wider grid is the responsibility of Scottish Power Energy Networks (SPEN) and would be subject to a separate consent procedure.

#### **Crane Hardstandings**

- 6.10** Each wind turbine requires an area of hardstanding to be built adjacent to the turbine foundation. This provides a stable base on which to lay down turbine components ready for assembly and erection, and to site the cranes necessary to lift the tower sections, nacelle and rotor into place.
- 6.11** Topsoil and any peat would be removed from the area of the crane pad and either laid at the margin, but within the disturbed area or, preferably, transferred directly to the areas to be restored. The area would then be covered with geo-grid overlain with compacted stone to approximately 1,500 mm depth, dependent on ground conditions and load capacity.
- 6.12** The crane hardstanding would be left in place following construction in order to allow for the use of similar plant should major components need replacing during the operation of the wind farm. These could also be utilised during decommissioning at the end of the wind farm's life. The total area of hardstanding at each turbine location, including the turbine foundations and the crane pad would be approximately 1,780m<sup>2</sup>.

#### **On-site Access Tracks**

- 6.13** A total of just under 11 km of on-site access tracks would be required for the Revised Development. It is anticipated that approximately 9 km of new access track including turning heads, and approximately 2 km of existing upgraded forest track is required.

- 6.14** The location of the on-site access tracks is shown in Figure 2.
- 6.15** The design of a particular length of site track will depend on local geological, topographical and drainage conditions. To achieve a track structure that meets the conditions encountered on the site, whilst meeting the primary track design objectives, four different track designs have been developed: rock filled, excavated, floated and widened.

#### **Control Building, Substation and Battery Storage Facility compound**

- 6.16** A compound incorporating a substation and control buildings, would be required on site to provide an interface to the local electricity network. The proposed location of the compound is shown on Figure 2. The compound would include a fenced hardstanding containing electrical equipment, a battery energy storage facility and two single storey control buildings, one Scottish Power control building measuring approximately 18m x 12m x 4.7m and the other a wind farm operator's control building measuring approximately 16m x 11m x 6.3m.
- 6.17** A battery storage facility has also been incorporated to maximise the electricity generated from the wind turbines. The facility would have an approximate maximum electricity storage capacity of 6MWh. The various options open for the use of the battery storage facility are as follows:
- Ramp control: When the local grid network is not able to absorb the additional wind power created by a quick wind speed increase the battery storage facility will catch this extra generation and then store it in the batteries and release back onto the grid when possible;
  - Predictable power: Provide predictable and consistent power to the local grid network. The battery storage facility would have the ability to smooth out any short-term wind peaks and troughs; and
  - Frequency regulation: This allows the wind farm to store energy in the battery storage facility in order to immediately and precisely respond to changes in load, further improving turbine generation flexibility

#### **Underground Cables**

- 6.18** The cables between the turbines and the control building/substation would be underground and would follow the route of the site access tracks. Detailed construction and trenching specifications would depend on the ground conditions encountered at the time, but typically cables would be laid in a trench 1100 mm deep and 700 mm to 1300 mm wide.

#### **Grid Connection**

- 6.19** It is likely that the wind farm would be connected into the national transmission system in the vicinity of Holm Hill near the A713, approximately 7 km to the north-west of the Site, via a new pole mounted overhead 132 kV line.
- 6.20** This grid connection arrangement is, however, a preliminary estimate at this stage, and the link would be the subject of further appraisal work and a separate application by Scottish Power Energy Networks.

## **7. CONSTRUCTION PHASE DETAILS**

- 7.1** The construction period for the Revised Development would be approximately 21 months in duration.
- 7.2** The starting date for construction activities will largely be dependent upon the date that consent might be granted and grid availability; subsequently, the programme would be influenced by constraints on the timing and duration of any mitigation measures confirmed in the individual technical chapters or by the consent decision.
- 7.3** Construction activities have been assumed to take place between 07:00 to 19:00 hours on weekdays and 07:00 to 18:00 on Saturdays. No work would be undertaken on Sundays or public/bank holidays.
- 7.4** It would be the responsibility of the main construction contractor to prepare and implement a Construction Environmental Management Plan (CEMP). An Outline CEMP is included as EIA Report Volume 4 Appendix 4.1
- 7.5** The CEMP would incorporate the following:
- Pollution Prevention Plan;
  - Drainage Management Plan;
  - Traffic Management Plan;
  - Site Waste Management Plan;
  - Stakeholder Management Plan;
  - Habitat Management Plan;
  - Peat Management Plan;
  - Peat Landslide Hazard and Risk Assessment; and
  - Geotechnical Risk Register.

## **8. OPERATION**

- 8.1** During operation, general servicing is required. Each turbine manufacturer has specific maintenance requirements, but typically, routine maintenance or servicing of turbines is carried out twice a year, with a main service at twelve monthly intervals and a minor service at 6 months. In the first year, there is also an initial three month service after commissioning

## **9. DECOMMISSIONING**

- 9.1** The Revised Development has been designed with an operational life of 25 years. At the end of the operational period, it would be decommissioned and the turbines dismantled and removed. Any alternative to this action would require consent from Dumfries and Galloway Council.
- 9.2** During decommissioning, the bases would be broken out to below ground level. All cables would be cut off below ground level, de-energised, and left in the ground. Access tracks would be left for use by the landowner. No stone would be removed from the Site. The decommissioning works are estimated to take six months. This approach is considered to be less environmentally damaging than seeking to remove foundations, cables and roads entirely.

## 10. PUBLIC CONSULTATION

- 10.1** Infinergy has undertaken a programme of public consultation to set out the plans for the proposed Shepherds' Rig Wind Farm.
- 10.2** The company acknowledges the important role that consultation has to play and has sought to involve the local community in the proposed plans.
- 10.3** Consultation has formed an integral role throughout the EIA process, including at the following key stages:
- pre-scoping - obtaining initial feedback on the Proposed Development;
  - scoping and public exhibitions - identification of key issues;
  - technical assessments - collecting baseline information from relevant organisations and confirming survey methodologies;
  - informing site design - communication with local communities and consideration of baseline information; and
  - discussing opportunities for mitigation and enhancement.
- 10.4** Pre-application consultation undertaken included:
- meeting with ECU on the 21st February 2018;
  - meeting with Planning Officers 21st February and 25<sup>th</sup> September 2018; and
  - meeting with Case Officer 18th March 2018.
- 10.5** The applicant has undertaken a number of activities to ensure that local residents can access and participate in the pre-application consultation process for the Revised Development. This has included:
- creation of a project website;
  - provision of a freephone telephone enquiry number;
  - email address and freepost mail address;
  - issuing a newsletter to over 2,700 households within the wider locality in July 2013 and 1770 within 15 km of the site in August 2018 and
  - holding two rounds of public exhibitions, in July 2013 at the Lagwyne Hall in Carsphairn and the Glencairn Memorial Institute in Moniaive and in September 2018 at the same venues.
- 10.6** There were around 120 people that attended the first exhibition and 55 the second. This included some of the nearest neighbours of the application site, local residents, members of local interest groups and the respective community councils. During the events, attendees were invited to fill out a feedback form, - in total 44 feedback forms were completed. At the Community Open Days, members of the project development team were on hand to explain the proposals and answer any questions. Questionnaires were also handed out for attendees to provide feedback on the proposed plans.
- 10.7** Following submission of the EIA Report in December 2018, 50 public responses were received by the ECU in relation to the scheme with the most common concern being perceived negative changes on the local landscape.

## **11. THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS**

- 11.1** Environmental Impact Assessment (EIA) is a process that aims to ensure that permissions for developments with potentially significant effects on the environment are granted only after the assessment of likely significant environmental effects has been undertaken. The assessment must be carried out following consultation with statutory consultees, other interested bodies and members of the public.
- 11.2** EIA is an iterative process of assessment and design whereby prediction and assessment of effects inform the design of the Revised Development. The Revised Development can then be refined in order to avoid or reduce potential environmental effects, where necessary, through the use of mitigation measures.
- 11.3** An EIA Report (November 2018) was prepared following a systematic approach to EIA and project design. The process of identifying environmental effects is both iterative and cyclical, running in tandem with the iterative design process. Following submission of the EIA Report, the scheme was further refined and Additional Environmental Information (AEI) has now been submitted. The key elements in the EIA and AEI are:
- Iterative project design, taking feedback from consultation and applying it to the Development design process on an ongoing basis throughout the EIA process;
  - Scoping and ongoing consultation, including consideration of responses and how these should be addressed as part of the EIA;
  - Technical environmental impact assessments;
  - Preparation and submission of the EIA Report;
  - Post-submission consultation and project design; and
  - Preparation and submission of the AEI Report.

## **12. THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORTS**

- 12.1** Infinergy Ltd has prepared an Environmental Impact Assessment (EIA) Report and Additional Environmental Information (AEI) to identify and report upon the potential for significant environmental effects occurring as a consequence of constructing, operating and decommissioning the Revised Development. Measures are identified that can be put in place to avoid, reduce or mitigate those effects.
- 12.2** Following introductory chapters 1 to 6, the following environmental topics are assessed in the EIA and AEI Reports:
- Forestry;
  - Landscape and Visual;
  - Ecology;
  - Ornithology;
  - Cultural Heritage;
  - Geology and Peat;
  - Hydrology and Hydrogeology;
  - Noise;
  - Traffic and Transport;

- Aviation;
- Socio-Economics, Tourism and Recreation;
- Shadow Flicker;
- Telecommunications and Utilities;
- Health and Safety; and
- Climate Change and Carbon Balance

**12.3** A summary of the baseline conditions, the proposed mitigation and the resulting residual effects for each environmental topic assessed is provided in the following section of this NTS. Full details can be found within Chapters 7 through to 21 of the EIA and AEI Reports.

## **13. SUMMARY OF ENVIRONMENTAL EFFECTS**

### **Forestry**

- 13.1** In the UK there is a strong presumption against permanent deforestation unless it addresses other environmental concerns. In Scotland such deforestation is dealt with under the Scottish Government's "Control of Woodland Removal Policy". The purpose of the policy is to provide direction for decisions on woodland removal in Scotland. The Revised Development lies within existing commercial forestry plantations, which are privately owned and managed. Areas of forestry would require to be cleared for the construction and operation of the Revised Development. The forestry proposals have been developed to identify areas of forest to be removed, including habitat management works; identify those areas which may or may not be planted as part of the Revised Development; and describe management practices for the forestry works.
- 13.2** The Forestry Study Area extends to approximately 820.5 hectares (ha) and contains two separate commercial forest blocks under separate ownership. To the north is Craigenkillan North Forest covering 297.1 ha, and to the south, Smittons Forest covering 523.4 ha. The combined forestry study area contains a range of woodland types and age classes due to recent restructuring. The forest is comprised largely of commercial conifers with small areas of mixed broadleaves. There is an active felling and restocking programme underway across the study area with areas of ground currently felled awaiting restock.
- 13.3** The wind farm felling plan shows which parts of the forest would be felled as a result of the Revised Development and when this felling would take place. In this case considering technical and environmental constraints, a 2.5 ha (90 m radius) keyhole was adopted around each turbine location within woodland for construction, operation and environmental mitigation, with 10 m buffers for other infrastructure and 30 m corridor for road lines. No additional felling would be required for wind yield or turbine performance purposes. All felling for the Revised Development would take place during the construction period, there would be no further development felling during the operational period. In total 39.4 ha would be felled earlier than planned due to the construction of the wind farm. Forestry waste arising from the felling would be treated in a manner which produces the best environmental outcome taking into account the guidance and conditions prevailing at the time of the crop clearance.



- 13.4** The Revised Development restocking plan shows which woodlands would be restocked and with which species. The majority of the crops felled would be restocked except areas required for the Revised Development's permanent infrastructure or for habitat management. As a result, there would be a net loss of woodland area of 53.4 ha. In order to comply with the criteria of the Scottish Government's Control of Woodland Removal Policy, off-site compensation planting would be required.

### Landscape and Visual

- 13.5** The Revised Development is located on land largely covered with coniferous forest within the Southern Uplands of Dumfries and Galloway approximately 5 km to the east of Carsphairn. The site does not fall within a National Scenic Area or National Park but does partly fall within the Galloway Hills Regional Scenic Area. Five of the westernmost turbines just are within the locally designated landscape.
- 13.6** The Site straddles three Landscape Character Types as described in the Dumfries and Galloway Wind Farm Landscape Capacity Study (2017), namely: character type 19a – Southern Uplands with Forest, character type 4 – Narrow Wooded River Valley, and character type 9 – Upper Valley (Dale). All of the proposed turbines are located within character type 19A.
- 13.7** It has been noted within the AEI, that in 2019, SNH published landscape character information which includes mapping and descriptions which supersede the earlier documents (SNH Landscape Character Assessment (LCA) 1998) and also upon which the Dumfries and Galloway Wind Farm Landscape Capacity Study bases its landscape and visual sensitivity assessment for wind turbine/wind farm developments. In introducing the updated information, SNH sets out that since the studies undertaken in the 1990s, there have been digital technological advances; production of additional datasets; and changes in development patterns and pressures. However, it also sets out that *'where current proposals or projects have analysis based on the 1990s LCA dataset, that should still be used'* and also that where there are *'topic specific landscape capacity or sensitivity studies, they would take precedence for informing that development type'*.
- 13.8** A review of the SNH LCA 2019 relevant to the study area has been undertaken and identifies that the SNH LCA 2019 uses the same spatial character areas as the earlier assessment. The updates within the SNH LCA 2019 provide additional information to that which formed part of the preceding character document. It is identified that wind development now comprises a key characteristic within the following Landscape Character Types of the 2019 SNH character assessments:
- Southern Uplands with Forest (LCT 178);
  - Upper Dale (LCT 160);
  - Southern Uplands (LCT 177); and
  - Foothills with Forest (LCT 176).
- 13.9** However, as set out within the EIA Report (November 2018) and by SNH, the Dumfries and Galloway Wind Farm Landscape Capacity Study remains the principal document against which effects upon landscape character of wind development within Dumfries and Galloway should be made.

- 13.10** The Revised Development have been designed to avoid any existing notable landscape features within the Site, and as such, there would be no effect on any existing elements of the landscape which positively contribute to landscape character. The design of the Revised Development is the result of a considered iterative process which has sought to minimise landscape and visual effects whilst achieving the technical and commercial requirements to ensure project viability.
- 13.11** As with almost any onshore wind farm development, it is recognised that the Revised Development would give rise to some localised significant effects on landscape character and visual amenity. These effects would arise primarily as a result of the introduction of the wind turbines and met mast into the landscape. The majority of the ground level components of the Revised Development are located within the existing plantation which would screen or backcloth these structures depending on the direction of view. It is not considered that these components of the Revised Development would give rise to any significant effects in their own right on landscape character or visual amenity.
- 13.12** In the main part of the Landscape and Visual Impact Assessment, the baseline against which the scheme is considered includes other wind farms which are operational but not those which are consented or the subject of a planning application. This accords with the requirements of applicable guidance, and in this scenario, the following observations have been made.
- 13.13** The Revised Development would result in a direct significant effect on landscape character across the character type within which the Site is located: the Ken unit of character type 19A – Southern Uplands with Forest. Such significant effects would occur up to 4.5 km to 5 km from the proposed turbines. The structural form of the proposed turbines is such that a high degree of visual permeability would be maintained across the character type, and the existing sense of openness within the Southern Uplands would not be greatly altered by the introduction of the turbines. The proposed turbines are relatively slender structures which would not obstruct the longer distance views when experienced from any direction. Whilst undeniably tall structures, the scale of a large proportion of the underlying landscape is medium to large and is dominated by coniferous plantation and upland grassland, creating a simple landscape pattern. Within this context, the proposed turbines would not diminish the overall scale of the local landscape, although in the immediate vicinity of the turbines, the presence of the turbines would be clearly dominant. It is therefore recognised that the introduction of the turbines and the movement of the blades when operating will be highly prominent, becoming a characterising influence on the character types during the lifetime of the Revised Development.

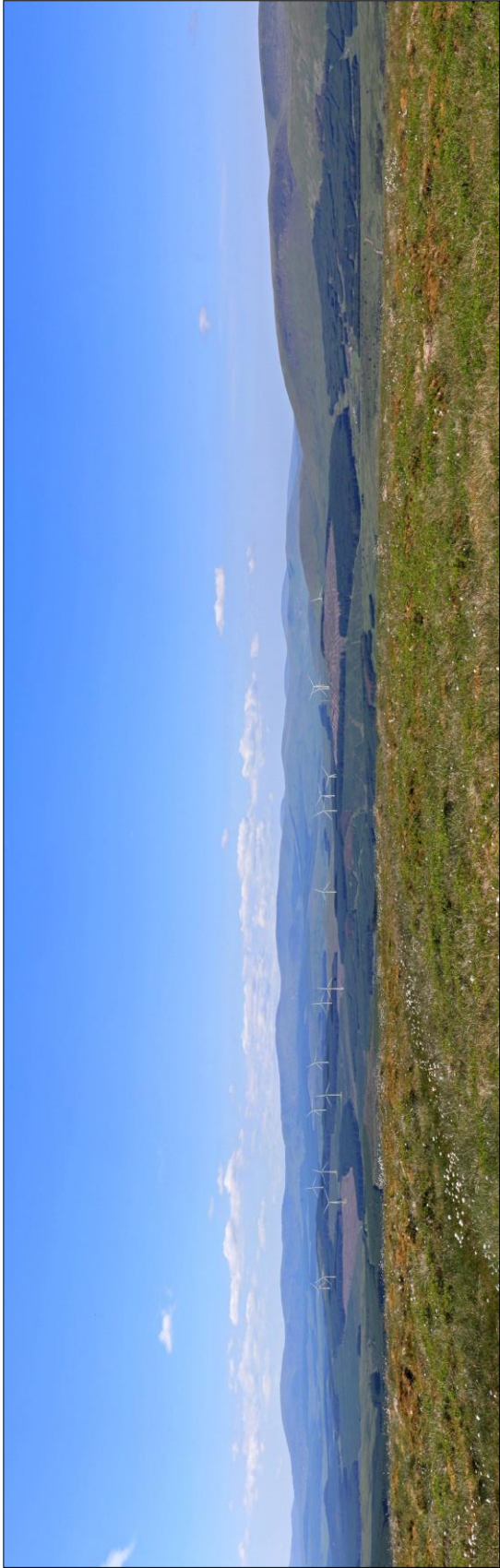
**13.14** In addition, it is recognised that the Revised Development would have a significant indirect effect in some adjoining character types. Within character type Ken unit of character type 4 – Narrow Wooded River Valley and character type 9 – Upper Dale (Valley), it is assessed that significant effects on landscape character would extend up to 4.5 km to 5 km from the proposed turbines. There would also be indirect significant effects within character type 19 up to 4.5 km and indirect significant effects within character type 18A Foothills with Forest up to 4 km from the proposed turbines. In relation to visual effects, it is accepted that the Revised Development would be visible from various nearby properties and settlements as well as the surrounding road network, public footpaths and recreational spaces. However, it has been assessed that the significant effects on visual amenity would be localised to within approximately 7 to 8 km of the proposed turbines.

**13.15** There would be a significant visual effect experienced at 15 of the 22 representative viewpoints as follows:

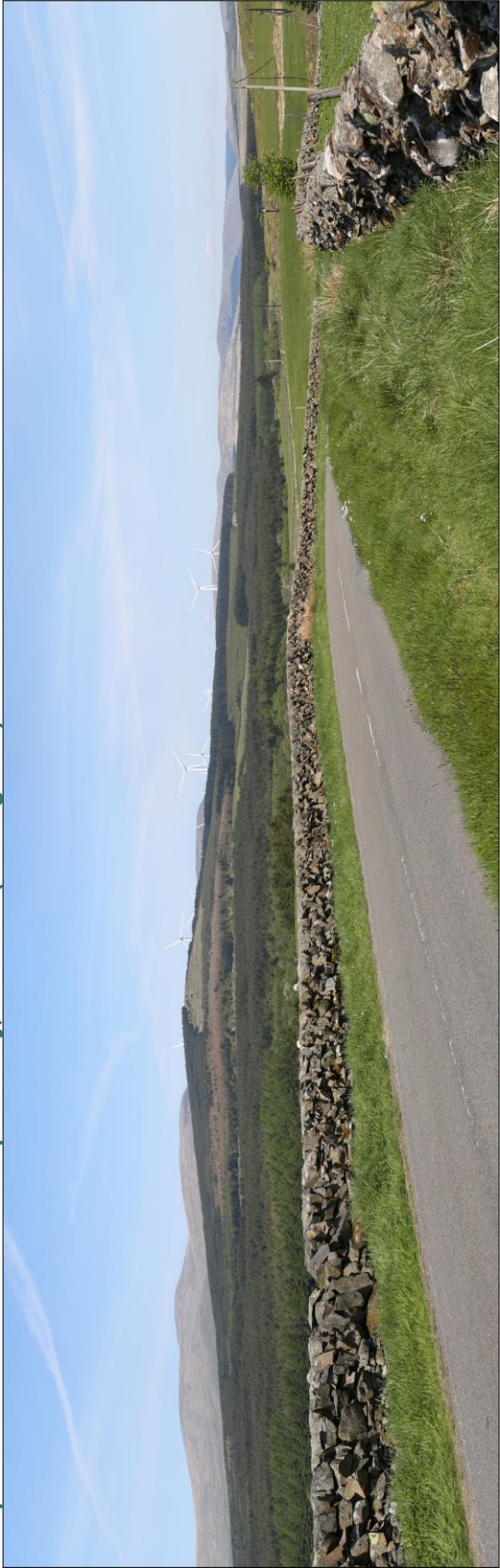
- Viewpoints 1-7;
- Viewpoints 10 - 12;
- Viewpoints 14 - 16; and
- Viewpoint 19 and 20.

**13.16** It should be noted that there is a high proportion of viewpoints from which there would be significant effects due to the constrained nature of the ZTV, influenced by surrounding hill summits and valley locations. A large proportion of the viewpoints are located within 10 km of the Revised Development as this area has the greatest amount of ZTV coverage. Viewpoints located at closer proximity to the proposed turbines are inevitably going to be locations from where receptors are more likely to experience significant effects.

**Shepherds' Rig Wind Farm**



**Viewpoint 10: View from Southern Upland Way, Benbrack (Striding Arch)**



**Viewpoint 11: View from B7000 north of East Arndarroch**

Note: Images for illustrative purposes only. For accurate representation and further details please view the A1 photomontages in the LVIA which will be Figures 8.46c and 8.47c.

- 13.17** There are 13 properties within 2 km of the proposed turbines, all of which have been assessed within a Residential and Visual Amenity Study (RVAS). The RVAS concludes that of the 13 properties assessed, there will be significant visual effects experienced at two of the dwellings and/or their associated garden curtilages, namely Craigenjillan and Strahana Farm.
- 13.18** It is recognised that certain other residential properties scattered within the local landscape, situated between c. 2 km and 5 km of the proposed turbines, largely located to the east, south-east and west, would experience some significant visual effects as a result of the Revised Development. However, again such views would not result in the properties becoming an unattractive place to live.
- 13.19** The nearest settlements to the Revised Development are located at distance from the Site, and as such, visual effects experienced from within Carsphairn and St John's Town of Dalry will not be significant. The Revised Development will not be visible from Moniaive.
- 13.20** When considering the Core Paths and other footpaths located within the detailed study area, there will be significant effects experienced from Core Path 182/Path DS15 as the route passes between Knockgray Park and the Site. There will also be close proximity views of the Revised Development from the path on the felling of the plantation at the western Site boundary. Significant visual effects will also be experienced from route DS16 in the vicinity of Moorbrock north of the Site, and route DS17 as it passes through the Ken Valley to the east of the Site. There will also be some limited significant effects experienced from Core Path 23 at Dundough Hill, Core Path 199 as it passes over open grassland near to Butterbole Bridge, and the Bardennoch Pack Trail as it passes between Bardennoch Hill and Carsphairn.
- 13.21** In relation to the Southern Upland Way, the greatest visual effects will occur within 4 to 5 km of the proposed turbines, where there will be major to moderate localised effects which are significant. Beyond distances of 5 km, ZTV coverage becomes intermittent, coniferous forest curtails views towards the Site, and the Revised Development becomes an increasingly smaller element in the wider views available from the route.
- 13.22** In terms of effects upon the local road network, there will be a significant visual effect upon receptors on the B7000 as they travel a relatively short distance in a northerly direction between White Hill and Ardarroch. There will also be significant visual effects upon users of the B729 between Knockgray Park and Guttery Glen, and Lorg Road up to a distance of 4 km to the north of the Site. Further significant effects would also occur for a relatively short distance as receptors travel along the A713 between Carsphairn and Bardennoch. However, such effects are inevitable due to the close proximity of the roads to the Site.

- 13.23** Turning to the effects upon the Galloway Hills Regional Scenic Area in which a small part of the Site is located, it is acknowledged there will be some localised significant effects, both direct and indirect, upon landscape character experienced from a relatively small part of the RSA, in the vicinity of Cairnsmore of Carsphairn. There will also be some significant visual effects experienced from the RSA looking east and north-east towards the Revised Development up to a distance of c. 8 km. The assessment has also considered views towards the RSA from the landscape beyond its boundary, where there will also be some significant visual effects limited to a small part of the landscape to the east and south-east of the Site. However, despite the identified significant effects upon views and landscape character, there will not be any significant effects upon the special qualities of the Galloway Hills nor its reason for designation.
- 13.24** The cumulative assessment has considered the effects of the Revised Development in relation to two scenarios:
- Scenario 1 - assumes that other consented (but as yet unbuilt) wind farms are operational; and
  - Scenario 2 - extends this further to assume that all schemes in planning are also operational.
- 13.25** It is acknowledged that the cumulative situation within the assessment study area is constantly changing and therefore the 12<sup>th</sup> September 2019 was used as an updated effective "cut off" date to that used within the EIA Report (November 2018) after which no further research was undertaken on the evolving status of wind energy development in the study area.
- 13.26** The cumulative assessment within the LVIA has been updated within the AEI to reflect the inclusion of the consented Glenshimmeroch Wind Farm within the Scenario 1 baseline.
- 13.27** In relation to effects upon landscape character in Scenario 1, overall it is considered that the combined effect of the wind farms considered will not be significant. With regards to the Carsphairn unit of character type 19, the addition of the Revised Development to the landscape to the south-east would extend the presence of turbines in a southerly direction, away from the main cluster of wind farms to the north-west through to the north-east. However, the Revised Development would be located in a part of the landscape where the existing Wether Hill and Glenshimmeroch schemes are also present, albeit at slightly greater distance, and combined visibility of the wind farms would be generally limited to the highest hill summits.
- 13.28** In light of the additional visibility of the Glenshimmeroch Wind Farm within the landscape to the south east of the Site, it is considered that there would also be a combined high magnitude of change on part of the 18A - Foothills with Forest landscape.
- 13.29** When the totality of landscape effect is considered, there would be localised significant effects on character types 18A and 19A, with some localised significant indirect effects upon character type 19 and 9.
- 13.30** Overall, the significant cumulative effects upon landscape character would not arise as a direct result of the introduction of the Revised Development, but rather the introduction of turbines further south within the landscape.

- 13.31** The Revised Development would not introduce turbines into part of the landscape where they do not already exist; therefore, the overall magnitude of change would be medium to low giving rise to a moderate to moderate/minor effect that is not significant.
- 13.32** With regards to the Carsphairn unit of character type 19A, it is one of the primary locations for existing and consented wind farms within the detailed study area. The existing Windy Standard I and II wind farms and the consented South Kyle and Benbrack schemes are located within this unit. The addition of the Revised Development to the wider landscape away from this concentration of wind farms will not give rise to any significant cumulative effects, as there is an overall lack of intervisibility between this character type and the Revised Development due to topographical variation and presence of plantation. Combined visibility of these schemes would be limited to the highest peaks within the local landscape, from which wind energy development is already a characteristic of the landscape.
- 13.33** For all other landscape character units/types considered within the LVIA, the Revised Development would be perceived as being located within the part of the landscape where wind farms are already concentrated. The clustering of wind farms within the Southern Uplands will be located at relative distance from character types 21, 21A and 18A and intervisibility of the wind farms will vary relative to topography and presence of dense vegetation. In light of the additional visibility of the Glenshimmeroch Wind Farm within the landscape to the south east of the Site, it is considered that there would also be a combined high magnitude of change on part of the 18A - Foothills with Forest landscape, in addition to that identified previously.
- 13.34** When the totality of landscape effect is considered, there would be localised significant effects on character types 18A and 19A, with some localised significant indirect effects upon character type 19 and 9.
- 13.35** The cumulative assessment within the LVIA has been updated within the AEI to reflect changes to the Scenario 2 baseline within which the Wether Hill Extension has since been withdrawn, but that of Troston Loch is considered alongside Windy Standard III and Margree schemes.
- 13.36** Overall, the significant cumulative effects upon landscape character would not arise as a direct result of the introduction of the Revised Development, but rather the introduction of turbines further south within the landscape.
- 13.37** In relation to cumulative landscape character effects in Scenario 2, it is considered that there would be a combined medium magnitude of change upon character type 19 and the Ken unit of character type 19A, but such effects would not be significant due to the location of the schemes within the varied Upland landscape, where plantation is extensive to serve to screen the presence of turbines. The Southern Uplands is also a landscape where wind energy development has become characteristic of the area over and above other landscapes within Dumfries and Galloway, and this will be continued to be reinforced.
- 13.38** The inclusion of Troston Loch Wind Farm within the baseline would further reinforce the presence of Wind Farms within the 18A - Foothills with Forest landscape and would thereby appear as a larger group within views from higher ground, yet a group which would remain visually separate from that of the Revised Development.

- 13.39** In light of the additional visibility of Troston Loch in the Scenario 2 baseline, it is considered that the combined high magnitude of change on part of the 18A - Foothills with Forest landscape, which is identified for Scenario 1, would be reinforced by the addition of Troston Loch within the Scenario 2 baseline.
- 13.40** When the totality of landscape effect is considered, there would be localised significant effects on character type 18A, with some localised significant indirect effects upon character type 19A, from which wind development would be visible within the wider landscape to the south east, south and west. However, these effects would occur in any event in the absence of the Revised Development should the other proposed schemes be granted consent. The effects identified for the Shepherds' Rig Revised Development which are identified for the scheme in its own right, do not increase when set within the Scenario 2 baseline.
- 13.41** Turning to cumulative visual effects in Scenario 1, although there will be significant visual effects experienced by residential receptors and users of rights of way and local road network within the local landscape to the Site, such effects arise from the introduction of the Revised Development in its own right. The effects of the introduction of the Revised Development within a landscape that features the consented schemes alongside existing wind farms would not be notably different to the effects already reported within the main part of the LVIA. Although, in terms of the overall totality of effects, there would be a notable increase for a short section of the Southern Upland Way to the south of the Shepherds' Rig site, due to the close proximity of the route to the Glenshimmeroch scheme.
- 13.42** In Scenario 2, it is considered that there would be a combined medium magnitude of change upon character type 19 and the Ken unit of character type 19A, but such effects would not be significant due to the location of the schemes within the varied Upland landscape, where plantation is extensive to serve to screen the presence of turbines. The Southern Uplands is also a landscape where wind energy development has become characteristic of the area over and above other landscapes within Dumfries and Galloway, and this will be continued to be reinforced. The inclusion of Troston Loch Wind Farm within the baseline would further reinforce the presence of Wind Farms within the 18A - Foothills with Forest landscape and would thereby appear as a larger group within views from higher ground, but be a group which would remain visually separate from that of the Revised Development. The combined high magnitude of change on part of the 18A - Foothills with Forest landscape, which is identified for Scenario 1, would be reinforced by the addition of Troston Loch within the Scenario 2 baseline.
- 13.43** In considering specific visual receptors, the properties located within 2 km to the east of the Revised Development will experience views of Shepherds' Rig alongside successional views of other wind farms. The proposed turbines would give rise to some localised significant effects on properties located within the Ken Valley and off the B729 in close proximity to the Site.



- 13.44** Turning to sequential effects upon the Southern Upland Way, B729, B7000, and A713, in Scenario 1, the addition of the Revised Development to views experienced from the Southern Upland Way would introduce a further wind farm within a localised part of the landscape that does not currently feature turbines. However, the existing smaller scale Wether Hill and Windy Standard turbines would be seen at relatively close proximity, and the consented Glenshimmeroch Wind Farm introduces wind development approximately 5 km to the south east of the site, roughly equidistant between the existing Wether Hill and Blackcraig Hill wind farms. Wind development would be visible from the route both in succession and in combination with the Revised Development, thus reinforcing the existing character of the landscape within the southern fringes of the Southern Uplands and 18A - Foothills with Forest landscape character, seen in the context of this pattern of turbines extending from north to south over approximately 15 km. This will be appreciable particularly from the Southern Upland Way as it passes over open higher ground.
- 13.45** The Revised Development would introduce significant visual effects upon the route in its own right due to the proximity of the Site to the footpath, but the cumulative effects would not be significant.
- 13.46** In terms of the overall totality of effects on the Southern Upland Way; however, this would be notably increased for a short section to the south of the Shepherds' Rig site, due to the close proximity of the route to the Glenshimmeroch scheme at that point and whereby overall, the Revised Development would appear in succession and in combination with other wind farms, this would reinforce the identification of wind farms as an existing key characteristic within the updated (SNH LCA 2019) Southern Uplands with Forest (LCT178) and Foothills with Forest (LCT176) character types.
- 13.47** In relation to sequential effects upon the local road network, the existing wind farms in the landscape are seen intermittently from the A713 and B729, B700. The Revised Development would give rise to significant visual effects in its own right when seen from these routes as already discussed within the main part of the LVIA and AEI, but the cumulative magnitude of change would be low and thus any additional effects would not be significant and the overall effect would reinforce the presence of turbines within this outlying forested landscape beyond the Water of Ken Valley.
- 13.48** In Scenario 2, the proposed Windy Standard III and Troston Loch wind farms would further reinforce the visual presence of turbines within the Southern Upland landscape. The Revised Development would be seen in the context of a concentration of turbines, particularly from the Southern Upland Way as it passes over open higher ground. There are likely to be some significant sequential visual effects upon views from the Southern Upland Way, but these would occur in the absence of the Revised Development. The significance of introducing the Revised Development into this baseline scenario would not be notably greater than that assessed above, and no additional significant effects are predicted. In terms of the overall totality of effects on the route; however, this would be increased for the short section to the south of the Shepherds' Rig Site, due to the increase in the number of turbines which would be visible from those locations.

- 13.49** Along the A713, the proposed Margree turbines would be visible south of St Johns Town of Dalry in association with the consented Knockman Hill turbines and the existing Blackcraig scheme and the Troston Loch scheme may also be visible, appearing beyond those of Glenshimmeroch, closer to the route. However, the Revised Development would reinforce the presence of turbines within this outlying forested landscape beyond the Water of Ken Valley. Within this context the addition of the Revised Development, at distance from this cluster of turbines would not appear out of character. The turbines of the Revised Development would appear as a distinctly separate wind farm located at distance to the other schemes. The overall effect on the A713 would not be significant.
- 13.50** The sequential experience from the B729 and B7000 in this scenario would be limited as there is limited intervisibility between and the proposed schemes and the two roads. The removal of the now withdrawn Wether Hill Extension scheme from the scenario would reduce the potential effect upon the B729 to some degree, but the addition of the Troston Loch scheme would increase the visibility of turbines to the south of the route from some sections of the B729. The addition of the Revised Development, in the same part of the view as existing or consented schemes, would not give rise to significant cumulative effects.
- 13.51** Such effects would be limited to a short section to the south of the B729 only. In all other scenarios, the Revised Development would simply reinforce the existing visual experience from the routes, as it would be seen in parts of the view that already feature turbines.
- 13.52** Finally, in relation to cumulative effects upon the Galloway Hills Regional Scenic Area, considering Cumulative Scenario 1, there would be no significant effects upon character types 19A and 19 when compared to the situation prior to the introduction of any of the consented turbines in the landscape. With the addition of Glenshimmeroch Wind Farm within the Scenario 1 baseline, there would be an increased potential for cumulative effects on the RSA. However, wind energy development is already a characteristic of the landscape beyond the RSA, and any significant effects arising as a result of the introduction of the Revised Development to the landscape would arise because of the scheme in its own right rather than due to cumulative effects.
- 13.53** With the addition of Troston Loch to the Scenario 2 baseline, there would be a slightly increased potential for cumulative effects on the RSA, by virtue of an increase in the number of wind turbines appearing within the landscape to the east of the RSA; however, those of Margree and Troston Loch will appear further from the RSA than the consented Glenshimmeroch Wind Farm. There would be no additional significant cumulative effects on the Galloway Hills RSA. Any significant effects upon the RSA will arise as a result of the Revised Development in its own right.
- 13.54** It is noted that whilst the reported effects are considered to be long term, they are not ultimately permanent, and upon decommissioning the Revised Development, the effects are almost entirely reversible. Therefore, there would be no permanent or irreversible effects on landscape character or visual amenity, and these residual effects would not be significant.

- 13.55** It is noted that localised significant effects on landscape character and visual amenity are inevitable as a result of commercial wind energy development anywhere in the UK. Whilst the LVIA and AEI identified some significant landscape and visual effects, it is considered that the landscape has the capacity to accommodate the effects identified, particularly when the consented, but as yet unbuilt, wind farms are considered in the baseline.
- 13.56** Wind turbines give rise to a wide spectrum of opinions, ranging from strongly adverse to strongly positive, with a wide range of opinions lying somewhere between these two positions. Some people view wind turbines as incongruous or industrial structures whilst others view them as aesthetically pleasing, elegant structures, and a positive response to climate change.
- 13.57** However, in considering the effects of the Revised Development, a precautionary approach has been adopted, and it is therefore assumed that the effects identified will be adverse in nature even though it is recognised that for some people the impacts could be perceived to be beneficial.

## Ecology

- 13.58** The scope of the ecological assessment was determined through a combination of desk study to identify existing biological data relating to the site and surrounding area, baseline surveys, and consultation with relevant nature conservation organisations and stakeholders.
- 13.59** An Extended Phase 1 Habitat Survey of the Site was undertaken in April 2018 following standard Joint Nature Conservation Committee (JNCC) survey methodology. This survey was aimed at classifying and mapping natural and semi natural habitats, as well as to identify habitat suitable to support for protected species. No habitats of conservation interest, groundwater dependent terrestrial ecosystems, or sensitive botanical species were recorded. The site is dominated by coniferous plantation woodland, including large areas which have been recently felled and restocked.
- 13.60** Specific surveys were also undertaken for a range of protected species within up to 250m of the Site. No evidence of badger, water vole or pine marten were recorded; however, evidence of otter, and red squirrel were recorded.
- 13.61** Low levels of bat activity and moderate species diversity was recorded across the Site. Bat species recorded were predominantly soprano pipistrelle and common pipistrelle, as well as Daubenton's bat, Brown Long eared Bat, and species belonging to the *Myotis* genus. Leisler's bat and noctule bat activity was also recorded, albeit at very low levels of activity.
- 13.62** Habitat suitable for salmonid spawning was recorded at eight of the nine watercourses surveyed; however, fish fauna survey found Atlantic salmon to be absent. Resident brown trout fry and parr were recorded, albeit in predominantly low densities. The non-native invasive species North American signal crayfish was recorded within the Site.
- 13.63** The most tangible effect during the construction stage of the Revised Development will be direct habitat loss due to the construction of new infrastructure; however, no significant effects are predicted.
- 13.64** No significant operational, decommissioning or cumulative effects are predicted as a result of the Revised Development.

- 13.65** It is concluded, overall, that the likely effects of the Revised Development on ecology are not significant.

### **Ornithology**

- 13.66** Baseline field surveys for the Revised Development were carried out between October 2012 and August 2013, and April 2017 and March 2018.
- 13.67** Desk based studies, consultation, and two years of bird surveys have been undertaken to assess the potential impacts of the Revised Development on breeding, wintering and migrating birds. Potential impacts associated with construction, operation and decommissioning, together with the risk of bird collision with turbines, were also assessed. All survey work and assessments followed contemporary guidance produced by Scottish Natural Heritage.
- 13.68** The Site is of low conservation value in terms of breeding and wintering birds when considered in the context of the Southern Uplands and Inner Solway Natural Heritage Zone.
- 13.69** No raptors were found breeding within the Site; however, foraging goshawk, red kite, hen harrier, osprey, and merlin were observed at very low frequencies in and around the Site.
- 13.70** Habitat loss arising from the construction of tracks, borrow pits and turbine bases is unlikely to result in adverse impacts upon any bird species. Any impacts are likely to be negligible and not significant. Population reductions due to habitat loss, displacement and/or collision mortality are also likely to be minimal. Any impacts are likely to be negligible and not significant for all bird species.
- 13.71** Surveys allowed for the collection of flight path data on species that may forage or simply fly over substantial parts of the Site. Flight activity by species with high ornithological value, such as goshawk, red kite and hen harrier, was found to be limited, during the two years of ornithological survey. Using a 500m diameter buffer around each proposed turbine, flight maps were combined with survey effort and flight height to estimate the number of flights that were likely to pass within the "at risk" volume of the turbines during the course of a year. However, as so few at risk flights have been recorded, collision risk estimates were very low.
- 13.72** The contribution of adverse effects accrued by the Revised Development to regional populations will be undetectable and so cumulative effects of the Development with other existing and planned wind farm developments in the region are judged as being unlikely to have a significant effect on existing bird populations. Overall, it is concluded that construction and operation of the Revised Development would not have a significant effect on birds under the terms of the EIA Regulations.
- 13.73** It is concluded, overall, that the likely effects of the Revised Development on all bird species are not significant.

## Cultural Heritage

- 13.74** The EIA Report (November 2018) and the AEI have considered the potential for the Revised Development to cause likely significant effects upon heritage assets within and outwith the Site.
- 13.75** The assessments have been undertaken in accordance with all relevant legislation and policy relating to the historic environment, as well as technical guidance issued by Historic Environment Scotland (HES). Consultation was undertaken with Dumfries and Galloway Council (DGC) and HES. The assessments were informed by site visits and the baseline established through the preparation of an Archaeological Desk-based Assessment.
- 13.76** The assessments established that there will be no significant (in terms of the EIA Regulations) construction effects on known archaeological remains within the Revised Development boundary. There is potential for construction disturbance of historic field boundary walls throughout the Site. However, mitigation in the form of a programme of archaeological recording (the details of which are to be agreed with DGC) will ensure that any effects remain non-significant in EIA terms.
- 13.77** It is unlikely that any significant previously undiscovered remains survive with the Development boundary, and the risk of direct impacts upon any such remains is considered to be low. It is considered that this risk can be mitigated by the implementation of a programme of archaeological work leading to the preservation by record of any unknown surviving remains. The details of such a programme would be agreed with DGC.
- 13.78** The EIA Report (November 2018) predicted a significant (in EIA terms) operational effect on the settings of the Scheduled Monument Craigengillan Cairn (SM2238) and the non-designated Little Auchrae settlement (MDG11404, identified as being of national importance in the Historic Environment Record).
- 13.79** However, mitigation embedded in the Revised Development has resulted in the deletion of two turbines (T7 and T11) and the relocation of seven others (T4, T6, T8, T9, T10, T13, and T16). The deletion of T7 and T11 and the relocation of T9 was agreed following consultation with HES in July 2019.
- 13.80** This redesign has reduced the operational effects upon Little Auchrae farmstead to non-significant levels. The redesign, accompanied by proposed mitigation in the form of forestry management, has also reduced predicted operational effects on Craigengillan Cairn to non-significant levels.
- 13.81** The EIA Report (November 2018) identified potential cumulative effects arising from the possible construction of Longburn Wind Farm. In May 2019, Longburn was refused planning permission on appeal (PPA-170-219) and is no longer a material consideration in the assessment of cumulative effects upon the cultural heritage baseline.
- 13.82** As detailed in paragraph 11.7.17 of the EIA Report (November 2018), cumulative effects are considered in cases where an effect of more than negligible significance has been predicted on the setting of a heritage asset as a result of the Revised Development. No setting effects of more than negligible significance have been predicted, and therefore no significant cumulative effects will occur as a result of the Revised Development.

- 13.83** No other significant (in terms of the EIA Regulations) operational effects have been predicted.
- 13.84** Since publication of the EIA Report a number of modifications have been made to the design with the intention of reducing potential cultural heritage setting effects. This has included the deletion of two turbines and the relocation of another seven turbines, with the aim of reducing the significance of operational effects upon Craigengillan cairn (SM1094), Stroanfreggan Craig, fort (SM1095) and Little Auchrae farmstead (MDG11404).
- 13.85** The changes represent a tangible improvement, particularly the deletion of T7 and T11 which were previously the closest (and most visible) turbines to Craigengillan cairn (SM1094). The changes are considered successful in reducing the significance of operational effects upon the heritage assets assessed in this AEI.
- 13.86** In terms of the EIA regulations, there will be no significant construction or operational effects arising from the Revised Development.

### Geology and Soils

- 13.87** British Geological Survey mapping information on superficial soils indicates the majority of the site to be vacant of superficial soils, with zones of till in the eastern and southern areas, and peat in the north-west. Solid geology mapping indicates Caradoc aged rocks comprising Portpatrick Formation Wacke. A geological fault is recorded within the southern site area orientated south-west to north-east through Muirdochwood. National Soils Map of Scotland indicates the northernmost part of the site to primarily be within an area of peaty gleys, with peaty podzols present in the upper regions of Craigengillan Hill, and blanket peat in the north-west site area.
- 13.88** Peat probing was carried out within the Revised Development site. Phase 1 probing comprised 100 m x 100 m grid to inform the layout design and to support the Peat Slide Risk Assessment and Peat Management Plan. During preparation of the EIA Report (November 2018), Phase 2 focused on the proposed infrastructure and involved 50 m intervals along the centre line of the tracks with probes at 25 m on either side of the tracks to provide a corridor for micro-siting and 10 m intervals at turbines. As part of the AEI (October 2019), additional Phase 2 data was collected through peat probing at the new turbine locations, associated spurs, and a new section of track associated with the Revised Development.
- 13.89** With exception of localised areas of peat greater than 0.5 m in the central site area, peat greater than 0.5 m depth existed mainly across the western site area, close to the Revised Development Site Boundary. Within this area, peat was recorded at depths up to 4.5 m. The deep peat was recorded within flatter topography. The wider area and within the corridors of the proposed development infrastructure, peat was shallow or not present. The risk of peat instability was identified as locally low, but mainly negligible.

- 13.90** The Revised Development moved the position of turbines that were previously in deep peat, where feasible. The new turbine locations for T4, T6, T8, T9, T10, T13, and T16 were subject to peat probing which confirmed that the turbines would be placed in shallower peat depths and T9, T10, T13 and T16 being in peat depths of less than 1.0m. T4, T6 and T8 were located within area of peat depths ranging from 1.0-2.0m, 1.0-1.5m and 0.5-1.5m respectively. Locating turbines in shallower peat has reinforced the low and negligible peat slide risk hazard as well as reduced the risk of peat disturbance.
- 13.91** During construction, operation and decommissioning of the Revised Development, a number of established good practice measures will be put in place to minimise peat disturbance, peat stability, and loss and compaction of soils.
- 13.92** With effective and well managed mitigation measures in place, no significant residual effects on geology and peat are predicted as a result of the Revised Development.

### Hydrology and Hydrogeology

- 13.93** The effect of the Revised Development on hydrological and hydrogeological receptors has been considered for the construction, operation and decommissioning phases of the Revised Development.
- 13.94** The hydrological and hydrogeological assessment for the Revised Development was based on a desk study, site surveys, and consultation with Dumfries and Galloway Fisheries Trust, Dumfries and Galloway Council, Marine Scotland, Scottish Water and SEPA.
- 13.95** There are no statutory designated sites within the study area that are hydrologically connected to the Revised Development.
- 13.96** None of the Revised Development infrastructure has been assessed as being at risk from flooding.
- 13.97** Three PWS are located within the catchments of the Revised Development infrastructure. It is considered that these receptors could potentially be affected by the Revised Development.
- 13.98** Measures including absorbent spill pads / kits and other measures highlighted within the Outline Construction and Environmental Management Plan (CEMP) will effectively limit uncontained release of chemicals to minor fugitive releases. These would be minimised through best practice construction methods such as vehicle speed limits and regular vehicle and machine maintenance.
- 13.99** The Revised Development is located within the catchment of a Scottish Water Drinking Water Protected Area (DWPA). Carsfad Loch is located on the Water of Ken 5.3 km south of the Revised Development, and raw water is pumped from Carsfad Loch to Lochinvar water treatment works.
- 13.100** Construction of the Revised Development has the potential to result in chemical pollution, erosion and sedimentation, impediments to flow, acidification of watercourses, changes in groundwater flow and increase in run-off and flood risk. Similar effects have been assessed for the operation and decommissioning of the Revised Development.

**13.101** Embedded mitigation measures are included in the Outline Construction and Environmental Management Plan (CEMP) which comprise good practice methods and works that are established and effective measures to which the Developer will be committed through the development consent.

**13.102** With the embedded mitigation measures in place the Revised Development has been assessed as having the potential to result in effects of negligible significance.

### Noise

**13.103** Ten potentially noise sensitive receptors were identified around the Revised Development. Noise levels were measured at seven of these locations to be representative of the nearest sensitive receptors. The survey was carried out in accordance with the method specified in ETSU-R-97.

**13.104** Construction noise will be limited in duration and confined to working hours as specified by Dumfries and Galloway Council and can be adequately controlled through use of embedded good practice measures and secured by planning condition.

**13.105** Operational noise has been assessed in accordance with ETSU-R-97 and in line with current best practice. It has been shown that the Revised Development would comply with the requirements of ETSU-R-97 at all receptor locations.

**13.106** Noise during decommissioning will be of a similar nature to that of construction and will be managed through best practice or other guidance or legislation relevant at the time.

**13.107** The cumulative effects of the Revised Development in conjunction with the nearby Windy Rig, Windy Standard and Wether Hill Wind Farms were taken into consideration in the above assessment, in accordance with ETSU-R-97 and the Good Practice Guide.

**13.108** The noise assessment concludes that predicted noise levels will be below the apportioned limits, and the effect of noise is considered to be not significant.

### Traffic and Transport

**13.109** This chapter evaluates the effects of vehicle movements to and from the Site associated with the construction, operation and decommissioning phases of the Revised Development.

**13.110** The main potential transportation impacts would be associated with the movement of abnormal loads, heavy goods vehicles (HGVs), light goods vehicles (LGVs), and cars to and from the site during the construction phase. It is considered that the increase in overall traffic flow and HGV flow may have an effect on pedestrian amenity at three sensitive receptors identified in the study.

**13.111** Traffic associated with operation of the Revised Development is limited to maintenance and is expected to be insignificant in comparison to traffic generated during construction.

**13.112** Prior to decommissioning of the Revised Development, a traffic assessment would be undertaken and appropriate traffic management procedures agreed with the relevant authorities at the time.



- 13.113** Cumulative effects were assessed, and it was found that there is sufficient residual capacity on each of the roads within the study area to accommodate the predicted increase in traffic which may occur in the cumulative scenario.
- 13.114** This assessment identified a potential for significant effects to occur in regards to pedestrian amenity. Recommended mitigation measures have been provided, with detailed mitigation to be specified in the Traffic Management Plan. As a result, all residual effects of the Revised Development on traffic and transport are considered at maximum low, and not significant.

### Aviation

- 13.115** The Revised Development has been assessed from an aviation perspective and the wind turbines will have no residual effect on any military or civil aviation airport, communications, and navigation or surveillance systems. National Air Traffic Services (En Route) Ltd (NERL) have determined that a single turbine will be visible to the Great Dun Fell radar, and have stated that simple single cell blank should enable any objection to be removed.

### Socio-Economics, Tourism and Recreation

- 13.116** A review of the impacts on the economies of Dumfries & Galloway and Scotland as a result of the Revised Development, in both its construction and development and operation and maintenance phases, has been undertaken. It was estimated that these impacts would support over 150 job years in Dumfries and Galloway and 425 job years across Scotland during the development and construction phases. While the Revised Development is operational, it was estimated that it would support 43 jobs in Dumfries and Galloway, and 69 jobs across Scotland. It was concluded that these impacts would be positive with a negligible significance.
- 13.117** A range of national and regional tourist attractions, including local core paths and heritage trails, located close to the Revised Development were identified. It was concluded that the characteristics of these attractions will not be affected by the Revised Development, and there would be no impact on the behaviour of visitors/tourists that use these attractions. The significance of the impacts is expected to be negligible.
- 13.118** The Southern Upland Way (SUW) passes within close proximity to the Revised Development, approximately 740 m from the site boundary at its closest point. The Revised Development will be visible from the SUW. Many hikers, choose to walk shorter sections of the SUW, and the Revised Development would be located in the section between St John's Town of Dalry to Sanquhar. This includes other wind farm developments which are visible along the route. There is no reason to think that the visibility of this particular wind farm, in this section of the SUW, will have any additional positive or negative impact on the existing number of individuals choosing to walk this route. Therefore, the impact is assessed as negligible.

**13.119** The potential impact of the Revised Development on the closest accommodation providers were also assessed. For all 23 providers that are located between 5 km and 15 km from the Revised Development, it is expected that there will be 'very little' or 'no' impact on the behaviour of visitors, and the significance of the impact is expected to be negligible. The tourism accommodation that is located nearest the site is the self-catering accommodation, named River Ken Cottage, located along the Water of Ken, approximately 2 km to the east of the Site. The Zone of Theoretical Visibility (ZTV) analysis shows that the majority of turbines will be visible from this site. The empirical evidence on this topic would suggest that there is no data to suggest that wind farms have negative effects on tourism providers, in addition BiGGAR Economics has not encountered any such establishments in over ten years of working on wind energy projects. The significance is expected to be low.

**13.120** Overall, there are no significant effects predicted upon socio-economics, tourism and recreation as a result of the Revised Development.

### Shadow Flicker

**13.121** Shadow flicker may occur under certain combinations of geographical position and time of day, when the sun passes behind the rotors of a wind turbine and casts a shadow over neighbouring properties. As the blades rotate, the shadow flicks on and off which is an effect known as shadow flicker. The effect occurs inside buildings, where the flicker appears through a window opening.

**13.122** Shadow flicker is known to occur beyond 10 rotor diameters, as reflected in the Review of Light and Shadow Effects from Wind Turbines in Scotland. However, based on the Scottish Government Online Guidance, the study area around each proposed turbine location within a distance of ten rotor diameters was mapped, as properties within this area are assumed to be most at risk of shadow flicker effects (1050 m for Turbines 1 and 3, and 1170 m for the remaining turbines).

**13.123** Two properties, Craigengillan and Craigengillan Cottage, have been identified within 1170 m of the proposed turbine locations.

**13.124** The theoretical maximum hours per annum, and likely hours per annum were predicted at both of these properties. In practice, the predictions are likely to be an over-estimation of the effects, as both properties are surrounded by woodland.

**13.125** Scottish Guidance does not provide thresholds of exposure to shadow flicker, and as such mitigation measures are proposed to reduce or remove effects should they arise in practice to protect residential amenity.

**13.126** Potential mitigation measures, as detailed in the EIA Report, include control at receptor, control on pathway, and control at source. Should a complaint regarding shadow flicker be received, and an investigation confirms occurrence, then mitigation measures will be implemented to prevent re-occurrence. Application of appropriate mitigation will ensure that effects are minimised or removed entirely.

## Telecommunications and Utilities

**13.127** Consultation undertaken with the telecommunications consultees highlighted that the Revised Development will not interfere with telecommunications and electromagnetic signals. One link was identified within 3 km of the Site, but as it is located over 100 m away from the nearest turbine, there will be no resulting effects. Therefore, there are no significant effects predicted upon telecommunications as a result of the Revised Development.

## Health and Safety

**13.128** This chapter considers the potential effects of the Revised Development upon health and safety, including major accidents and natural disasters.

**13.129** Due to its location, the Revised Development is not prone to natural disasters. Whilst adverse weather conditions, most notably high windstorms, ice producing conditions and lightning strikes, do occur within Scotland, wind turbines are designed to withstand extreme weather conditions. Brake mechanisms, vibration sensors, and lightning protection measures are installed on turbines allowing them to be operated under optimal conditions and inhibited during extreme weather events.

**13.130** The risk of construction accidents, as they relate to human health and safety, will be detailed and managed in the CEMP, which will be prepared as a condition of the Revised Development.

**13.131** The overall risk to health and safety, including major accidents and disasters, is considered negligible.

## Climate Change and Carbon Balance

**13.132** The predicted future climatic baseline conditions are highly unlikely to affect the operation of the Revised Development. The Revised Development will have a positive effect on carbon savings and a significant positive effect, when considered cumulatively, with UK-wide renewable energy deployment.

**13.133** The Revised Development will not significantly influence climate change, and the Revised Development will have a positive cumulative effect with regards to reduction in carbon emissions when considering the UK-wide electricity generation mix. As such, the effect of the Revised Development on climate change is not significant.

**13.134** An updated carbon balance assessment for the Revised Development was generated using the methodology and carbon calculator provided in Calculating Carbon Savings from Wind Farms on Scottish Peatlands – A New Approach, as recommended by the Scottish Government. Based on this guidance, the Revised Development has an expected payback time of 2.4 years when compared to grid-mix electricity generation. The CO<sub>2</sub> 'payback time' is the period of windfarm operation required until there is a net saving of CO<sub>2</sub>.

## 14. CONCLUSION

- 14.1** The Revised Development would consist of 17 wind turbines, 15 of which would have a maximum tip height of 149.9 m, and two would have a maximum tip height of 125m. The Revised Development turbines would have a total installed maximum capacity of 70.2 MW with a battery energy storage facility of 6 MW, so that the overall maximum output from the Revised Development would be 76.2 MW. The operational life of the development would be 25 years.
- 14.2** In order to design the Revised Development, the Applicant has pursued a detailed and iterative EIA process, taking into account environmental and technical considerations. This has been carried out with the support of a team of experienced environmental and technical specialists.
- 14.3** The EIA process to support the Revised Development involved detailed surveys, studies and assessments to determine any potential effects that would result as a consequence of the construction, operation and decommissioning phases of the development. Through careful design, in response to the findings of the EIA Report and AEI, and with the Applicant's commitment to mitigation measures identified as necessary, the results of the EIA demonstrate that the Revised Development would not have any unacceptable long-term residual effects on the surrounding environment.
- 14.4** The Applicant has engaged with the local community throughout the EIA process to explain its components and potential effects as well as to obtain feedback and an understanding of any key concerns or issues that the community may have.
- 14.5** The Revised Development is a positive response to the targets set for renewable energy generation by successive EU and UK Governments, in order to help tackle climate change, energy security and energy poverty. As such, the generation potential would provide a meaningful contribution to renewable energy targets, while reducing CO<sub>2</sub> emissions and playing a positive role in the diversification of the UK's energy mix.

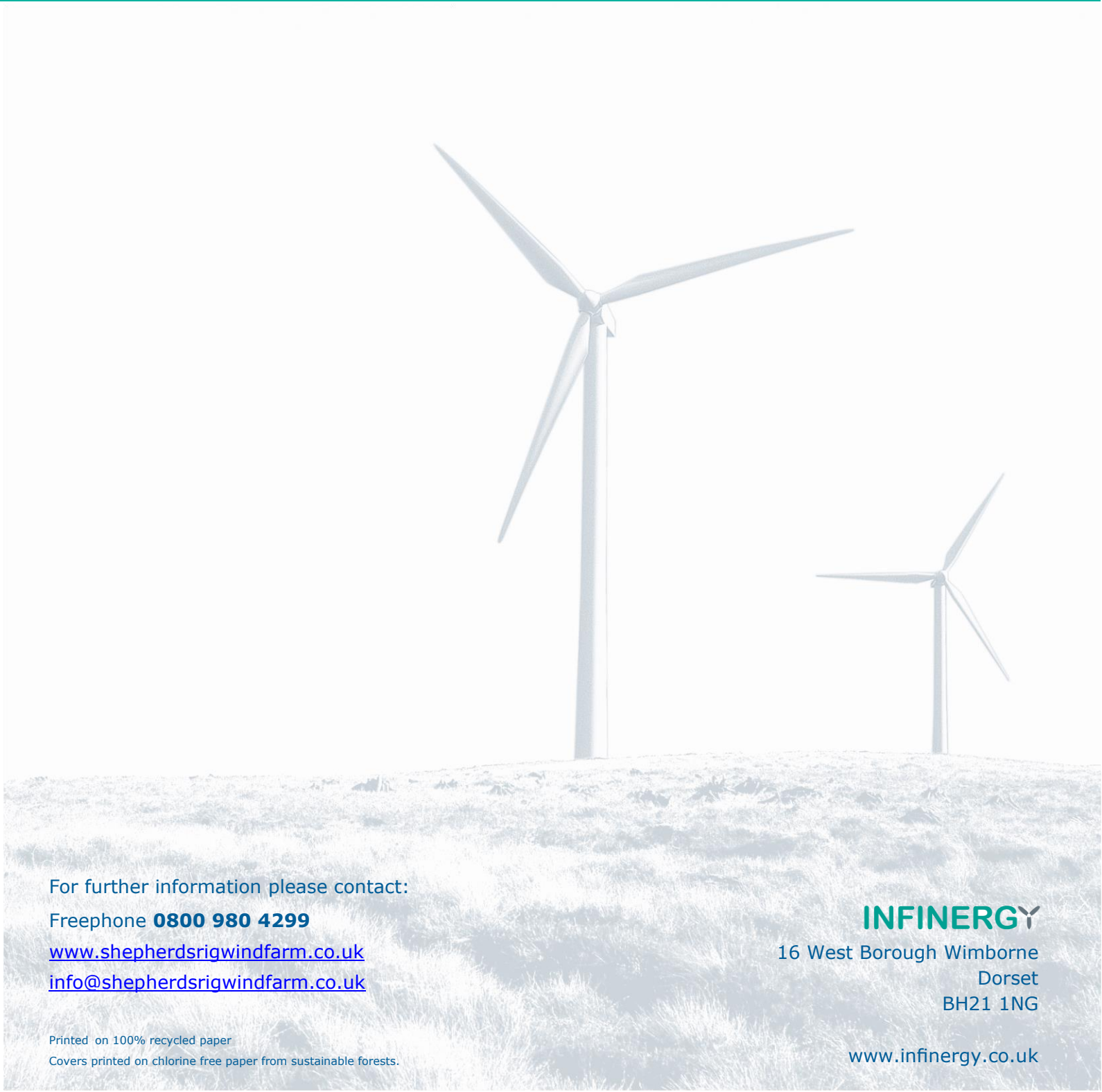
## 15. COMMENTING ON THE APPLICATION

- 15.1** Please note: If you wish to make any comments on the section 36 application, these must be made in writing directly to Energy Consents, using the following address and quoting case reference: ECU0000075

Energy Consents Unit  
Scottish Government  
5 Atlantic Quay  
150 Broomielaw  
Glasgow  
G2 8LU

- 15.2** Alternatively, comments to the consents unit can be made online at <http://www.energyconsents.scot> or by emailing [representations@gov.scot](mailto:representations@gov.scot) and quoting case reference: ECU0000075.





For further information please contact:

Freephone **0800 980 4299**

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