Shepherds' Rig Wind Farm

INFINERGY

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Environmental Impact Assessment Report

Non Technical Summary

November 2018

Cover image for illustrative purpose only

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PREFACE

This Non-Technical Summary (NTS) summarises the findings of the Environmental Impact Assessment (EIA) that has been undertaken on behalf of SETT Wind Development Ltd to accompany the section 36 application to build and operate the proposed Shepherds' Rig Wind Farm.

Copies of the EIA Report, including the NTS, can be viewed at the following locations:

- **Dumfries and Galloway Council**
  Development Management
  Kirkbank House
  English Street
  Dumfries
  DG1 2HS

- **Carsphairn Community Council**
  (by prior arrangement)
  Lagwyne Hall
  Carsphairn
  Castle Douglas
  DG7 3TQ

- **Scottish Government Library,**
  41 Victoria Quay,
  Broomhouse Drive,
  Edinburgh,
  EH6 6QQ

The EIA Report 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 a CD containing the full EIA Report are available free of charge (while stocks last) by contacting Infinergy Limited at info@shepherdsrigwindfarm.co.uk or in writing to **Freepost Infinergy Limited** (no stamp or further address details necessary). If required, a hard copy of the entire EIA Report can be provided at a cost of £700, plus P&P.

1. INTRODUCTION

1.1 This Non-Technical Summary (NTS) is a summary of the Environmental Impact Assessment (EIA) Report which accompanies the section 36 application to to construct, operate and decommission up to 19 wind turbines within the Smittons and Craigengillan North plantations near Carsphairn in Dumfries and Galloway. The project is known as Shepherds' Rig Wind Farm (hereafter referred to as the 'Proposed Development').

1.2 As the Proposed 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 Development for an operational period of 25 years.

1.3 This Non-Technical Summary is intended to be read alongside the Section 36 application, EIA Report, and associated application documents for the Proposed Development.

1.4 The Proposed Development is located in northern Dumfries and Galloway within the adminstrative areas of Dumfries and Galloway Council and Carsphairn Community Council. The Site lies approximately 5km to the east of Carsphairn and 14km to the west of Moniaive. Figure 1 shows the location and wider geographical context of the site.

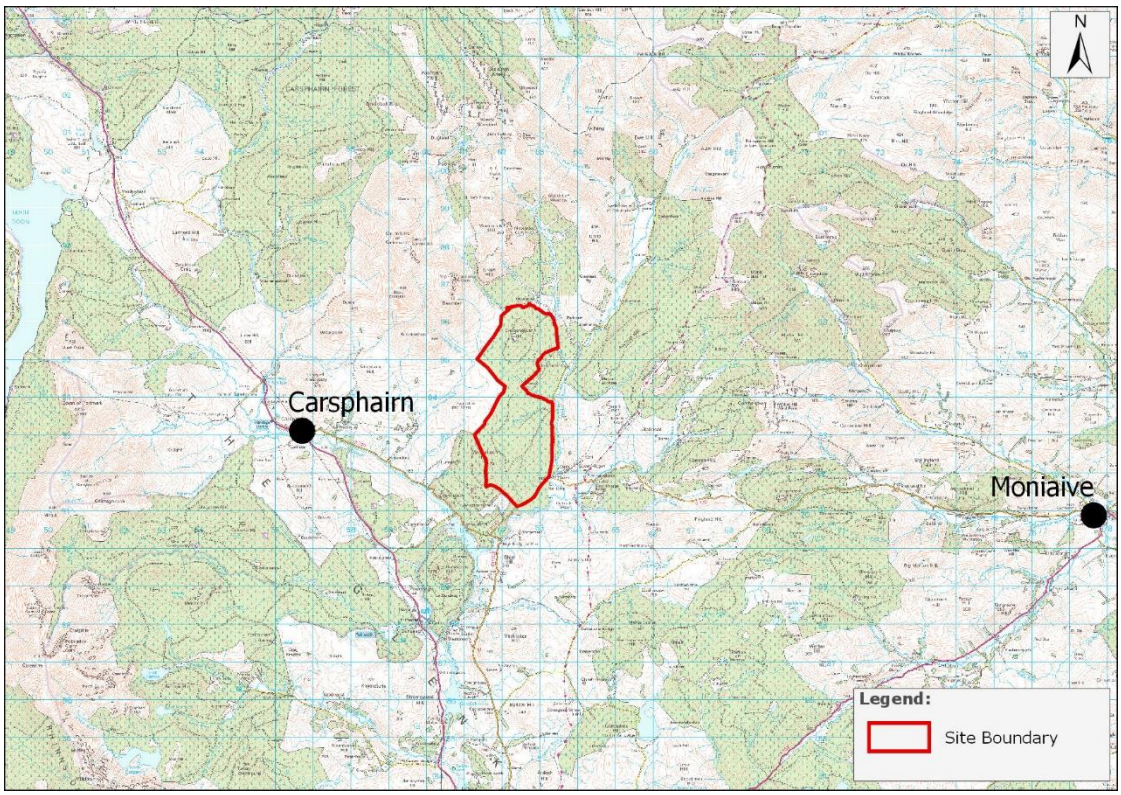


Figure 1: Location of the proposed Shepherds' Rig Wind Farm development within Dumfries and Galloway

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 creates 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.

3.2 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).

3.3 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.
- An increase by 30% in the productivity of energy use across the Scottish economy.

3.4 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 creates 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).

3.5 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'.

3.6 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.

3.7 The Development Plan for the Proposed Development comprises the Dumfries and Galloway LDP (2014) which is supportive of the principle of wind energy development. The LDP 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.

3.8 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 techncial chapters of the EIA Report. A full assessment of The Proposed Development against the applicable plans, policies and strategies is contained within the Planning Statement that accompanies the Section 36 application.

4. SITE SELECTION AND DESIGN EVOLUTION

4.1 The final design of the Proposed Development 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. The final design layout was established in 2018 and comprises 19 turbines, a significantly lower number than the original 45 turbine scoping layout indicated in 2013.

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 of 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 Proposed Development would comprise:

- up to 17 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 Proposed 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.

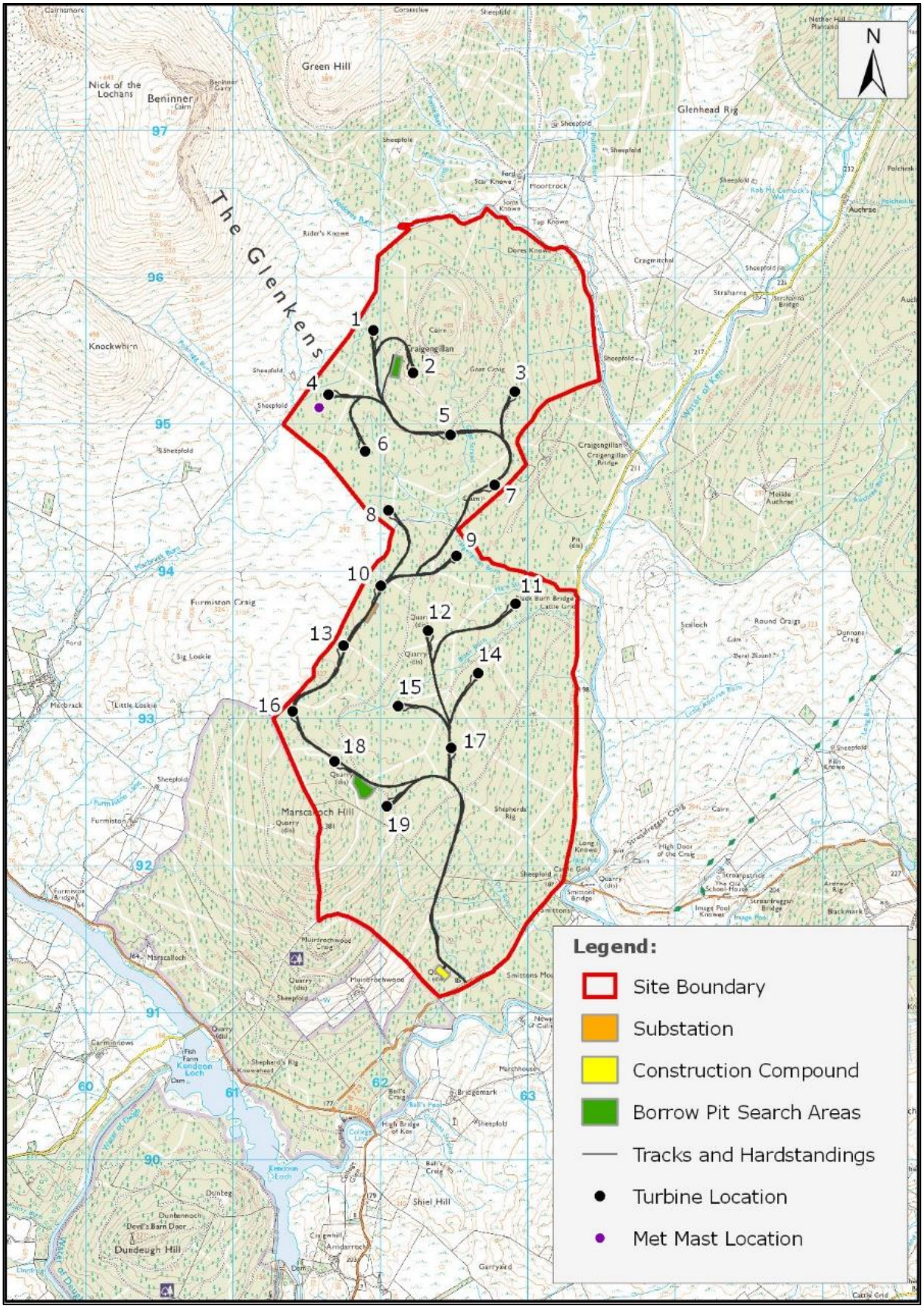


Figure 2: The Proposed Development

6.4 The EIA 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. Based on these candidate turbines, the estimated installed maximum generation capacity from all of the wind turbines together would be 78.6 MW.

6.5 The maximum output from the battery energy storage facility would be 6MW based on current technology, and consequently the overall maximum output from the Proposed Development would be 84.6MW.

6.6 The Proposed 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 Proposed 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 Proposed 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 1,780 m^2.

On-site Access Tracks

6.13 A total of approximately 11 km of on-site access tracks would be required for the Proposed Development. It is anticipated that approximately 8.0 km of new access track including turning heads, and approximately 3.0 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 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 Proposed 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 a Construction Environmental Management Plan (CEMP). An Outline CEMP is included as part of the application and can be found in 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 Proposed 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 includes:

- meeting with ECU on the 21st February 2018;
- meeting with Planning Officers 21st February and 25th 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 Proposed 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 2,700households 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.

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 deign whereby prediction and assessment of effects inform the design of the Proposed Development. The Proposed Development can then be refined in order to avoid or reduce potential environmental effects, where necessary, through the use of mitigation measures.

11.3 The EIA Report has been 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. The key elements in an EIA 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; and
- Preparation and submission of the EIA Report.

12. THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

12.1 Infinergy Ltd has prepared an Environmental Impact Assessment (EIA) Report to identify and report upon the potential for significant environmental effects occurring as a consequence of constructing, operating and decommissioning the Proposed 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 Report:

- 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 Report.

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 Proposed 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 Proposed 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 Proposed 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 Craigengillan 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 Proposed 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 Proposed Development would take place during the construction period, there would be no further development felling during the operational period. In total 55.1 ha would be felled due to the construction of the wind farm. Where possible timber crops would be felled to produce timber for the markets. 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 Proposed Development restocking plan shows which woodlands would be restocked and with which species. No replanting would be carried out on the areas to be felled for the Proposed Development's permanent infrastructure or for habitat management, forest management or forest design purposes. As a result, there would be a net loss of woodland area of 61.1 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 Proposed 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 fall within the locally designated landscape.

13.6 The Proposed Development 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). The majority of the proposed turbines are located within character type 19A, with one of the turbines located within character type 4. The site access and construction compound are located within character type 9.

13.7 The structures of the Proposed 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 Proposed 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.

13.8 As with almost any onshore wind farm development, it is recognised that the Proposed 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 Proposed 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 Proposed Development would give rise to any significant effects in their own right on landscape character or visual amenity.

13.9 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.

13.10 The Proposed Development would result in a direct significant effect on landscape character across two of the character types within which the Site is located: the Ken unit of character type 19A – Southern Uplands with Forest and the Ken unit of character type 4 – Narrow Wooded River Valley. Such significant effects would occur up to 4.5 km to 5 km from the Proposed Development. The structural form of the proposed turbines is such that a high degree of visual permeability would be maintained across the character types, 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 two character types during the lifetime of the Proposed Development.

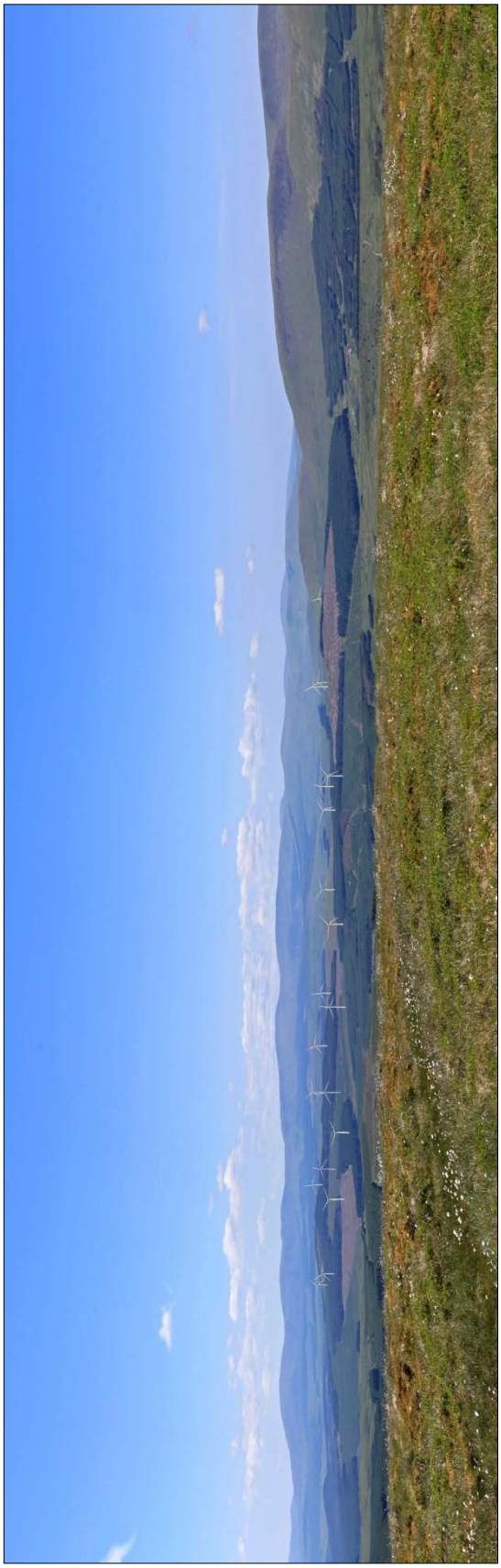
13.11 In addition, it is recognised that the Proposed Development would have a significant indirect effect in some adjoining character types. Within character type 9 – Upper Dale (Valley), it is assessed that significant effects on landscape character would extend up to 4.5 km from the proposed turbines. 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.

13.12 In relation to visual effects, it is accepted that the Proposed 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.

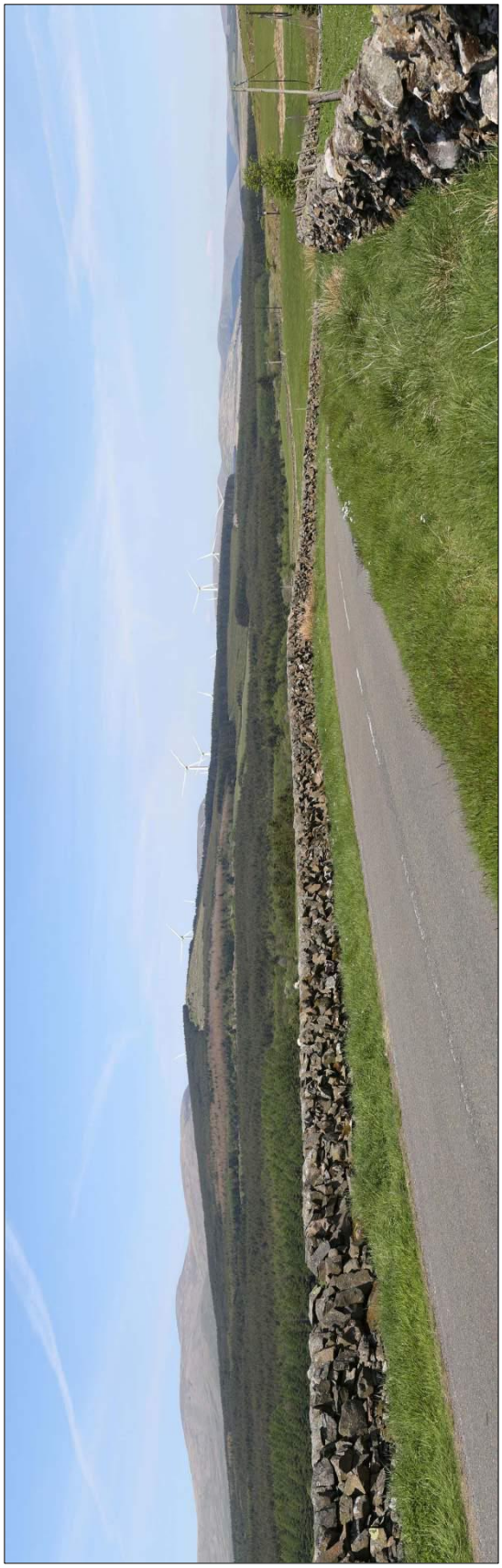
13.13 There would be a significant visual effect experienced at 15 of the 22 representative viewpoints as follows:

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

13.14 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 Proposed 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.



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.

13.15 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 Craigengillan and Strahana Farm.

13.16 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 Proposed Development. However, again such views would not result in the properties becoming an unattractive place to live.

13.17 The nearest settlements to the Proposed 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 Proposed Development will not be visible from Moniaive.

13.18 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 Proposed 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 be also be some limited significant effects experienced from Core Path 23 at Dundeugh 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.

13.19 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 Proposed Development becomes an increasingly smaller element in the wider views available from the route.

13.20 In terms of effects upon the local road network, there will be significant visual effect upon receptors on the B7000 as they travel a relatively short distance in a northerly direction between White Hill and Arndarroch. 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.

13.21 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 Proposed 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.

13.22 The cumulative assessment has considered the effects of the Proposed Development in relation to three scenarios:

- Scenario 1 - assumes that other consented (but as yet unbuilt) wind farms are operational;
- Scenario 2 - extends this further to assume that all schemes in planning are also operational with the exception to Longburn; and
- Scenario 3 - assumes all schemes in planning are operational, including Longburn.

13.23 A brief assessment has also been made with regards to the cumulative effect of the Proposed Development with four schemes that are currently at the scoping stage. It is acknowledged that the cumulative situation within the assessment study area is constantly changing and therefore the 1st July 2018 was used as an effective "cut off" date after which no further research was undertaken on the evolving status of wind energy development in the study area.

13.24 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 Proposed 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 Proposed Development would be located in a part of the landscape where the existing Wether Hill scheme is also present, albeit at slightly greater distance, and combined visibility of the wind farms would be generally limited to the highest hill summits. The Proposed 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.

13.25 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 Proposed 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 Proposed 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.

13.26 For all other landscape character units/types considered within the LVIA, the Proposed 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.

13.27 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.

13.28 For Scenario 3, the addition of the Proposed Development to the landscape immediately west of Longburn would reinforce the existing characteristics of the area, and it is likely to be perceived as almost an extension to Longburn in longer distance views. Overall the additional cumulative effect upon landscape character would be no greater than moderate to moderate/minor and not significant.

13.29 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 Proposed Development in its own right. The effects of the introduction of the Proposed Development within a landscape that features the consented schemes alongside existing wind farms would not be notable different to the effects already reported within the main part of the LVIA.

13.30 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.

13.31 In considering Scenario 3 where the Proposed Development would be located in close proximity to the proposed Longburn development, in general, where visible, the Proposed Development would reinforce the presence of turbines in views rather than introduce turbines into any views which are currently unaffected by turbines.

13.32 In considering specific visual receptors, the properties located within 2 km to the east of the Proposed Development will experience views of Longburn alongside successional views of the proposed turbines. 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, and the Longburn turbines are also likely to be prominent from these properties giving rise to a significant effect on these properties in its their own right. The addition of the proposed turbines would increase the magnitude of change at these properties, and in the context of Longburn, the effects would be significant. In combination, the two schemes would result in a major effect on these properties, but the overall effect would not be so overbearing as to render the properties an unattractive place to live.

13.33 Turning to sequential effects upon the Southern Upland Way, B729, B7000, and A713, in Scenario 1, the addition of the Proposed 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, but the existing smaller scale Wether Hill and Windy Standard turbines would be seen at relative close proximity, both in succession and in combination with the Proposed Development, thus reinforcing the existing character of the landscape within the southern fringes of the Southern Uplands.

13.34 The Proposed 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.

13.35 In relation to sequential effects upon the local road network, the existing wind farms in the landscape are seen intermittently and at relative distance from the B729, B7000, and A713.. The Proposed Development would give rise to significant visual effects in its own right when seen from the route as already discussed within the main part of the LVIA, but the cumulative magnitude of change would be low and thus any additional effects would not be significant.

13.36 In Scenario 2, the proposed Wether Hill Extension and Windy Standard III wind farms would further reinforce the visual presence of turbines within the Southern Upland landscape.. 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 Proposed Development. The significance of introducing the Proposed Development into this baseline scenario would not be notably greater than that assessed above, and no additional significant effects are predicted.

13.37 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. However, this would simply reinforce the presence of turbines within this outlying forested landscape beyond the Water of Ken Valley. Within this context the addition of the Proposed Development, at distance from this cluster of turbines would not appear out of character.

13.38 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 addition of the Proposed Development, in the same part of the view as existing or consented schemes, would not give rise to significant cumulative effects.

13.39 In relation to Scenario 3, there would be localised significant sequential effects brought about by the introduction of the Proposed Development into a landscape where the proposed Longburn wind farm is also present alongside all other consented and proposed schemes considered as part of the assessment. Such effects would be limited to a short section of the B729 only. In all other scenarios, the Proposed 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.

13.40 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. 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 Proposed Development to the landscape would arise because of the scheme in its own right rather than due to cumulative effects.

13.41 In relation to Cumulative Scenario 2 it is acknowledged that there would be some moderate cumulative effects upon the Galloway Hills RSA, but such effects are not considered to be significant as wind energy development is already a characteristic of the landscape immediately beyond the RSA boundary to the north and north east.

13.42 In the case of Scenario 3, where Longburn is also present in the landscape, the Proposed Development would appear in close proximity to, but as a clearly separate development to Longburn, extending the horizontal array of turbines to the north-east, particularly when seen from the north-eastern fringes of the RSA. 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 Proposed Development in its own right.

13.43 It is noted that whilst the reported effects are considered to be long term, they are not ultimately permanent, and upon decommissioning the Proposed 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.

13.44 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 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.

13.45 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.

13.46 However, in considering the effects of the Proposed 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

13.47 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.

13.48 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 indentify 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.

13.49 Specific surveys were also undertaken for a range of protected species withn 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.

13.50 Low levels of bat activity and moderate species diversity was recorded across the Site. Bat species recorded were premoniantly 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 activty was also recorded, albeit at very low levels of activity.

13.51 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.

13.52 The most tangible effect during the construction stage of the Proposed Development will be direct habitat loss due to the construction of new infrastructure; however, no significant effects are predicted.

13.53 No significant operational, decommissioning or cumulative effects are predicted as a result of the Proposed Development.

13.54 It is concluded, overall, that the likely effects of the Proposed Development on ecology are not significant.

Ornithology

13.55 Baseline field surveys for the Proposed Development were carried out between October 2012 and August 2013, and April 2017 and March 2018.

13.56 Desk based studies, consultation, and two years of bird surveys have been undertaken to assess the potential impacts of the Proposed 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.

13.57 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.

13.58 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.

13.59 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.

13.60 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.

13.61 The contribution of adverse effects accrued by the Proposed 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 Proposed Development would not have a significant effect on birds under the terms of the EIA Regulations.

13.62 It is concluded, overall, that the likely effects of the Proposed Development on all bird species are not significant.

Cultural Heritage

13.63 The assessment has considered the potential for the Proposed Development to cause likely significant effects, both direct and indirect, upon heritage assets within the Site and at range beyond it.

13.64 The assessment has taken in to account relevant legislation and policy relating to the historic environment, as well as technical guidance issued by Historic Environment Scotland. Consultation was undertaken with Dumfries and Galloway and Historic Environment Scotland. The assessment was informed by site visits and the baseline established through the prepration of an Archaeological Desk-based Assessment.

13.65 The assessment established that there is no significant effect on known archaeological remains within the Proposed Development boundary, and it is unlikely that significant undiscovered (buried or otherwise unrecorded) remains survive with the Development boundary and under the proposed footprint which might receive any direct impact. It is considered that this potential can be mitigated by the implementation of a scheme of archaeolgical work leading to the preservation by record of any unknown surviving remains. This scheme would be agreed with Dumfries and Galloway and Historic Environment Scotland, as appropriate.

13.66 There would be a significant potential effect on the setting of Craigengillan Cairn (SM2238), as the foresty plan provides for the felling of the coup in which the clearing containing the cairn is currently situated. This would open up views which currently do not exist and include the whole of the Proposed Development. However, it is proposed to re-establish this setting by the planting of native and broad leaf species around the clearing in which the cairn is located. The implementation of this woodland planting scheme would provide increasing screening aound the monument as it matures, and the significant effect would reduce to a non-significant effect over the lifetime of the development.

13.67 A significant effect is also predicted on the setting of the non-designated Little Auchrae settlement (MDG11404 identified as being of national importance in the Historic Environment Record), for which no mitigation is possible (in terms of screening).

13.68 In conjunction with the Longburn Wind Farm currently in planning, a significant cumulative effect is predicted to occur to the setting of Craigengillan Cairn (SM2238), but the proposed mitigation (as set set out above) would lead to a reduction in the effect as the planting matures, so the the impact becomes non-significant over time. A significant cumultaive efect is predicted for Stroanfreggan Fort (SM1093) and the Little Auchrae medieval Settlement (MDG11404) as a result of the addition of the Proposed Development to a baseline which includes Longburn.

13.69 The addition of the Proposed Development to a situation that includes Cornharrow Wind Farm will lead to a non-significant cumulative effect upon the setting of Stroanfreggan Fort. However, there would be a significant cumulative additional effect from the Proposed Development as an addition to both Longburn and Cornharrow.

13.70 No other assets are considered to receive an effect upon their settings, which are considered significant for purposes of the EIA Regulations, either from the Proposed Development in isolation or cumulatively with other proposed or operational and consented similar development. Any effects on setting are considered fully reversible on decommissioning of the Proposed Development.

Geology and Soils

13.71 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.

13.72 Peat probing was carried out within the Proposed Development site over two distinct phases. 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. 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. 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 Proposed Development Site Boundary. Within this area, peat was recorded at depths up to 4.5 m.

13.73 Generally the deep peat was recorded within flatter topography. The wider area and within the corridors of the proposed development infrastructure, peat was generally shallow or not present. The risk of peat instability was identified as locally low, but mainly negligible.

13.74 The assessment of peat disturbance has highlighted localised areas of peat at risk from the Proposed Development, in particular the western part of the site and, in the absence of mitigation, is classified as having a significant efffect. Mitigation measures will be location-specfic; however, should the mitigation and best practice measures proposed be implemented, the risk to peat disturbance would be reduced.

13.75 During construction, operation and decommissioning of the Proposed Development, a number of established good practice measures will be put in place to minimise peat disturbance, peat stability, and loss and compation of soils.

13.76 With effective and well managed mitigation measures in place, no significant residual effects on geology and peat are predicted as a result of the Proposed Development.

Hydrology and Hydrogeology

13.77 The effect of the Proposed Development on hydrological and hydrogeological receptors has been considered for the construction, operation and decommissioning phases of the Proposed Development.

13.78 The hydrological and hydrogeological assessment for the Proposed Development was based on a desk study, site sureys, and consultation with Dumfries and Galloway Fisheries Trust, Dumfries and Galloway Council, Marine Scotland, Scottish Water and SEPA.

13.79 There are no statutory designated sites within the study area that are hydrologically connected to the Proposed Development.

13.80 None of the Proposed Development infrastructure has been assessed as being at risk from flooding.

13.81 Three PWS are located within the catchments of the Proposed Development infrastructure. It is considered that these receptors could potentially be affected by the Proposed Development.

13.82 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.

13.83 The Proposed 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 Proposed Development, and raw water is pumped from Carsfad Loch to Lochinvar water treatment works.

13.84 Construction of the Proposed 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 Proposed Development.

13.85 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.

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

Noise

13.87 Ten potentially noise sensitive receptors were identified around the Proposed 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.

13.88 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.

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

13.90 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.

13.91 The cumulative effects of the Proposed Development in conjunction with the nearby Longburn, 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.

13.92 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

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

13.94 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.

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

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

13.97 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.

13.98 This assessment identified one location where there is a potential for significant effects to occur. 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 Proposed Development on traffic and transport are considered at maximum low, and not significant.

Aviation

13.99 The Proposed 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, navigation or surveillance systems. A single turbine will be visible to the National Air Traffic Services (En Route) Ltd (NERL) Great Dun Fell radar, however, a simple single cell blank should enable any objection to be removed. In the unlikely situation that this is not possible, Turbine 13 may need to be relocated or reduced in size to a height that is deemed acceptable by NERL.

Socio-Economics, Tourism and Recreation

13.100 A review of the impacts on the economies of Dumfries & Galloway and Scotland as a result of the Proposed Development, in both its construction and development and operation and maintenance phases, has been undertaken. It was estimated that these impacts would support over 200 job years in Dumfries and Galloway and 580 job years across Scotland during the development and construction phases. While the Proposed Development is operational, it was estimated that it would support 48 jobs in Dumfries and Galloway, and 78 jobs across Scotland. It was concluded that these impacts would be positive with a negligible significance.

13.101 The Applicant is committed to providing a community benefit fund in the region of £5,000 per MW of wind turbine installed capacity per year. The option of up to a 10% shared ownership arrangement with the local community is also being explored.

13.102 A range of national and regional tourist attractions, including local core paths and heritage trails, located close to the Proposed Development were identified. It was concluded that the characteristics of these attractions will not be affected by the Proposed 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.

13.103 The Southern Upland Way (SUW) passes within close proximity to the Proposed Development, approximately 740 m from the site boundary at its closest point. The Proposed Development will be visible from the SUW. Many hikers, chose to walk shorter sections of the SUW, and the Proposed Development would be located long 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.

13.104 The potential impact of the Proposed Development on the closest accommodation providers were also assessed. For all 23 providers that are located between 5 km and 15 km from the Proposed Development, it is expected that there will be 'very little' or 'no' impact on the behaviour of visitors, and the sigificance 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 between 15 and 19 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.

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

Shadow Flicker

13.106 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.

13.107 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).

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

13.109 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.

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

13.111 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 occurance, then mitigation measures will be implemented to prevent re-occurance. Application of appropraite mitigation will ensure that effects are minimised or removed entirely.

Telecommunications and Utilities

13.112 Consultation undertaken with the telecommunications and utilities consultees highlighted that the Proposed Development will not interfere with telecommunications and utilities. One telecommunications 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 Proposed Development.

Health and Safety

13.113 This chapter considers the potential effects of the Proposed Development upon health and safety, including major accidents and natural disasters.

13.114 Due to its location, the Proposed 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.

13.115 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 Proposed Development.

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

Climate Change and Carbon Balance

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

13.118 The Proposed Development will not significantly influence climate change, and the Proposed 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 Proposed Development on climate change is not significant.

13.119 A carbon balance assessment for the Proposed 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 Proposed Development has an expected payback time of between 0.9 to 4.6 years. The CO_2 'payback time' is the period of windfarm operation required until there is a net saving of CO_2.

14. CONCLUSION

14.1 The Proposed Development would consist of 19 wind turbines, 17 of which would have a maximum tip height of 149.9 m, and two would have a maximum tip height of 125m. The Proposed Development would have an overall maximum output 84.6MW. The operational life of the development would be 25 years.

14.2 In order to design the Proposed 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 Proposed 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 and the Applicant's commitment to mitigation measures identified as necessary, the results of the EIA demonstrate that the Proposed 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 Proposed 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_2 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:

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