

Non-Technical Summary

Introduction

- 1.1 North Lowther Energy Initiative Ltd (NLEI Ltd), a joint venture between 2020 Renewables Ltd (2020 Renewables) and Buccleuch Estates Ltd (Buccleuch Estates), are seeking consent from Scottish Ministers under Section 36 of the Electricity Act (1989) and deemed planning permission under Section 57 of the Town and Country Planning (Scotland) Act 1997 (as amended) to construct and operate a windfarm known as the North Lowther Energy Initiative (hereafter referred to as 'the Development'). The site (hereafter referred to as 'the Development Area') is located within the Queensberry Estate, approximately 5km south of Crawfordjohn, 2km northeast of Sanquhar and west of Wanlockhead, Dumfries and Galloway, as shown in **Figure 1.1**.
- 1.2 2020 Renewables is an experienced renewable energy developer based in Greenock. Established in 2010, its staff have been developing renewable energy projects since 1990. 2020 Renewables employs people with a proven track record in planning, constructing and operating windfarms, and they are committed to engaging with all stakeholders throughout the development and operation of their projects.
- 1.3 Buccleuch Estates Ltd is the landowner for the Development and the enterprise represents the business interests of the Buccleuch family. Today, the organisation is a diverse enterprise focused on all aspects of land use.
- 1.4 The impacts of climate change are widely recognised as being one of the greatest global economic, environmental and social challenges facing the world today. A major cause of climate change is a rise in the concentration and volume of greenhouse gases in the atmosphere, a significant contributor to which is the use of fossil fuels to generate power. The Development is being proposed in response to this challenge.
- 1.1 Moreover, the Development is part of a wider renewable energy and land use strategy that can deliver social, economic and environmental benefits on a wider scale. The Development reflects the latest stage in a series of renewable energy developments between 2020 Renewables and Buccleuch Estates.
- 1.2 The application for consent is accompanied by an Environmental Statement (ES) which presents the findings of the environmental impact assessment (EIA), undertaken in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 ('the EIA Regulations'), as amended. The ES presents information on the identification and assessment of the likely significant positive and negative environmental effects of the Development. Further details of the statutory requirements for EIA are set out in **Chapter 2: Approach to the EIA**.
- 1.3 This Non-Technical Summary (NTS) summarises the findings of the ES. The ES has been prepared by LUC on behalf of NLEI Ltd.

Environmental Impact Assessment

- 1.4 EIA involves the compilation, evaluation and presentation of any potentially significant environmental effects resulting from a proposed development, to assist the consenting authority (in this case, the Scottish Government), statutory consultees, and wider public in considering an application. Early identification of potentially adverse environmental effects also leads to the identification and incorporation of appropriate mitigation measures into the design to avoid, reduce and, if possible, remedy potentially significant adverse environmental effects. The ES presents information on the identification and assessment of the likely significant environmental effects of the Development. **major** or **moderate** effects are considered to be significant in the context of the EIA Regulations¹.
- 1.5 The scope of the EIA was informed by the Scoping Opinion provided by the Scottish Government Local Energy Consents and Deployment Unit (LECU) in May 2016, and included comments from a number of

statutory and non-statutory consultees including Dumfries and Galloway Council, South Lanarkshire Council, Scottish Natural Heritage (SNH), the Scottish Environment Protection Agency (SEPA) and Historic Environment Scotland (HES).

- 1.6 Consultation has formed an integral part of the EIA process and NLEI Ltd has engaged with the local community by means of local meetings and three rounds of public exhibitions. Consultation outwith the formal Scoping process, including discussions relating to the landscape and visual effects assessment, cultural heritage, hydrology, and ornithology assessments, was undertaken by NLEI Ltd and topic specialists with a number of consultees including SNH, SEPA, HES, South Lanarkshire Council and Dumfries and Galloway Council. NLEI Ltd also engaged fully with the LECU through the S36 Gatecheck process.

Overview of the Development

- 1.7 The Development Area comprises approximately 4,550 hectares (ha) of open moorland with relatively steep sided valleys and associated plateaux, interspersed by pockets of commercial conifer plantation. The land is owned by Buccleuch Estates and is used primarily for a mixture of tenanted and 'in-hand farming', principally livestock grazing, as well as commercial forestry. As outlined in **Chapter 4: Scheme Description** and shown in **Figure 4.1**, the main components of the operational Development will comprise:
 - The installation of 35 wind turbines of up to 149m (to blade tip) with a total maximum rated capacity of approximately 147 megawatts (MW);
 - crane hardstandings for each turbine;
 - vehicle turning heads;
 - one substation control building (incorporating transformers/electrical equipment);
 - two site access points (A and B);
 - onsite underground electrical cables;
 - 36km of access tracks comprising 3km of upgraded tracks, and 33km of new tracks including passing places and watercourse crossings;
 - replanting of 32.50ha of forestry;
 - conservation management plan (including riparian planting).
- 1.8 Construction of the Development will also require:
 - 3km of existing forest track (which does not require upgrading) for transport of material won from borrow pits;
 - felling of 69.11ha² of forestry to accommodate turbines and associated infrastructure;
 - the creation of up to five temporary onsite borrow pits for the extraction of stone;
 - five temporary construction compounds/laydown areas;
 - two potential concrete batching plants (to be located within excavated borrow pits).
- 1.9 Access to the Development Area will be via two access points (A and B) as shown in **Figure 4.1**. Access A is an existing access point south of Spango Farm, and Access B will comprise two new junctions south of Nether Cog, one of which will be used for turbine deliveries and the other for general construction traffic.
- 1.10 The existing junction at Access A will be upgraded as per **Figure 4.8a** to allow Heavy Goods Vehicles (HGVs) and abnormal loads vehicles to enter the Development Area. The two existing bridges within the vicinity of Access A which cross Whitecleuch Burn and Crawick Water, will also be upgraded to be able to accommodate HGVs and abnormal load movements.

² A minimum of 36.61ha of additional planting (the difference between the felling and replanting) will be delivered as part of the Compensatory Planting Plan. A 297ha area of search for native riparian woodland is proposed as part of the Development, part of which will be used to accommodate the 36.61ha of Compensatory Planting required to meet the Scottish Government's Control of Woodland Removal Policy which provides direction for decisions on woodland removal in Scotland.

¹ This is the case for all topic chapters with the exception of Chapter 11: Noise and the assessment of effects on aviation and telecoms in Chapter 14: Other Issues.

- 1.11 Access B involves the creation of a new junction to serve general construction vehicles and the creation of a separate access junction for abnormal loads which links onto a new section of access track. This access will also require a new bridge crossing over the Crawick Water as shown indicatively in **Figure 4.8b**.
- 1.12 There are 474.42ha of predominantly Sitka spruce dominated commercial woodlands within the Development Area, currently managed under a Forestry Commission approved Forest Plan. By working closely with the existing forest structure and current Forest Plan, the Development has been designed to minimise effects on the existing forest. To accommodate the Development however, a total of 69.11ha of woodland will be felled and 32.50ha will be replanted. A further 36.61ha of compensatory planting (balance between felling and replanting) will be delivered within the 297ha search area for riparian planting that is proposed within the Development Area. The remaining area will represent new woodland cover, resulting in a net expansion in woodland. More details on forestry proposals are provided in **Chapter 4**.
- 1.13 Electrical power from the turbine transformers will be transferred to the electricity distribution system through a switchgear unit, housed within the control building. The grid connection will be subject to a separate consenting process undertaken by the grid operator and does not form part of this S36 application and associated EIA. It is the responsibility of the grid operator to deliver and implement the grid connection from the Development to the existing electricity network.
- 1.14 Subject to the granting of S36 Consent, it is anticipated that the construction of the Development will last up to 24 months, including forestry clearance. The operational life of the Development will be 25 years. Following the 25 year operational period, 18 months are set aside for decommissioning, with an outline decommissioning strategy provided at **Appendix 4.3: Outline Construction and Decommissioning Environmental Management Plan**.
- 1.15 It is estimated that that the Development could produce approximately 343,242 (mega-watt hours) MWh annually, which is enough to power the equivalent of 78,852 households in Scotland for a year.
- 1.16 The Development also provides the opportunity for the delivery of net biodiversity gains via an outline conservation management plan (OCMP) which will be tailored to benefit birds including hen harrier, merlin, short-eared owl and black grouse, curlew and lapwing. Enhancement measures included in the OCMP comprise the management of wet modified bog, blanket bog and dry heath habitats, planting of native riparian woodland, and a funded Regional Hen Harrier Project Officer to undertake practical conservation management actions. The aim of the OCMP is to bring an area under positive management measures that is equivalent to 20 times the habitat loss area associated with the Development (excluding commercial forestry) to ensure that an overall net benefit will be delivered for these habitats over the lifetime of the Development. The OCMP is provided at **Appendix 8.6**.

Site Selection and Design Strategy

- 1.17 The Development is the product of a combined vision for delivering large scale habitat enhancement, implementing a major renewable energy development and creating the potential for investment in the local economy.
- 1.18 Following identification of the Development Area as a suitable location for a windfarm, a feasibility study was undertaken based on a preliminary layout comprising 140 turbines of 130m tip height, designed solely on potential wind yield, and including turbines located within both Dumfries and Galloway and South Lanarkshire Council administrative boundaries. The study focussed on the likely landscape and visual effects of such a large development. Given the scale of the proposal under consideration at that time (140 turbines), significant landscape effects were anticipated which would result in a change in landscape character from 'Southern Uplands' to a windfarm landscape. It was also noted however that the landscape is of a generally large-scale comprising many of the characteristics indicating the ability to accommodate wind turbines.
- 1.19 Informed by the feasibility study, the design strategy for the Development aimed to provide a balance between achieving maximum energy yield and creating a legible layout which relates to the landform and scale of the Development Area and to limit where possible visual effects whilst at the same time avoiding effects on other environmental characteristics. The strategy also reflected relevant design guidanceⁱ.
- 1.20 The key objectives of the Design Strategy have been the following:

- to develop a layout which would appear cohesive and be legible in key views as experienced from the surrounding landscape;
- to develop a layout that reflects the landform of the Development Area where possible;
- to develop a layout that seeks to match the perceived scale of the turbines, and the scale of the overall windfarm, with the scale of the landscape;
- to develop a layout that relates well to other windfarms in the local area, as well as being coherent in its own right; and
- to develop a layout that fulfils the above objectives whilst respecting other environmental and technical constraints including ecological and hydrological (including peat) related constraints identified during the EIA process.

- 1.21 Subsequently, as a consequence of the EIA process and consultation with statutory consultees and the public, there have been a number of rounds of modifications to the design, to avoid or minimise environmental effects without compromising the overall design strategy, which has resulted in the final layout comprising 35 turbines of 149m to tip as shown in **Figure 4.1**. The modifications have been made to:
- reduce prominence from closest settlements and residential properties, to avoid/minimise effects on residential visual amenity;
 - ensure the development complies with noise limits at nearest residential properties (including cumulatively);
 - minimise effects on ornithology and ecology;
 - avoid known archaeological features;
 - avoid historic mining areas;
 - minimise loss of woodland;
 - avoid areas of relatively deeper peat;
 - minimise the number of onsite watercourse crossings and proximity to watercourses;
 - retain a minimum 150m distance between the turbines and the Southern Upland Way .
- 1.22 The main components of the Development considered in the design modifications were the turbines. Due to the extent of the existing infrastructure currently used for farming and forestry within the Development Area, including access tracks and borrow pits, part of the design strategy was to make best use of these where practicable to reduce the footprint of new infrastructure, whilst avoiding environmental constraints.
- 1.23 Forestry was also considered throughout the design process to seek to minimise the loss of woodland and maximise opportunities to improve the woodland mix across the Development Area, i.e. increase the percentage of native species. The resulting woodland felling and replanting proposals were developed in line with discussions with Forestry Commission Scotland (FCS) to minimise effects on the felling and replanting plans set out in the approved and current Forest Plan and ultimately limit the requirement for forestry removal to accommodate the Development.

Landscape and Visual Amenity

- 1.24 The landscape and visual amenity assessment (LVIA) considers the potential effects of the Development on landscape character and views from key viewpoints during construction and operation, including cumulatively with other developments. More details are provided in **Chapter 6: Landscape and Visual Amenity**. The Development Area is currently upland moorland used predominantly for grazing, although there are areas of forest plantations.
- 1.25 A study area over a 35km radius was used to determine the landscape context, with the study area for the detailed assessment covering a radius of 15km from the outermost turbines as agreed through consultation with Dumfries and Galloway, South Lanarkshire and East Ayrshire Councils. Following a review of other windfarm development patterns across a wider 60km (radius) study area for context, the

cumulative assessment focusses on the cumulative relationships of the Development with windfarms within the detailed study area (15km).

- 1.26 To assess the likely effects of the Development on visual amenity, 24 viewpoints have been identified, as well as key settlements and routes (roads and walking routes etc). Effects on residential properties within approximately 2-2.5km were also assessed in relation to residential visual amenity.
- 1.27 The method for assessment included field survey, computer modelling, creation of a zone of theoretical visibility (ZTV), mapping and photography (viewpoint photomontages are provided in **Figures 6.11-6.39**). Field survey work was carried out between December 2015 and September 2016 and included visits to the Development Area, viewpoints and designated landscapes, and extensive travel around the study area to consider potential effects on landscape character and on experiences of views seen from routes.
- 1.28 The design process included detailed consideration of the appearance of the Development from key locations in the surrounding area, and the potential for mitigation of effects through, for example, locating turbines away from the tops of the ridges overlooking Nithsdale and the Crawick Water valley, and minimising visibility from Wanlockhead and surrounding routes where possible. Further details are included in **Chapter 3: Site Selection and Design Strategy**.
- 1.29 The closest settlements to the Development are Wanlockhead, Leadhills, Sanquhar, Kirkconnel, and Crawfordjohn, with local transport and recreational routes including the B740, Mennock Pass and the Southern Upland Way (SUW), which runs through the Development Area. The Development Area lies partly within the Thornhill Uplands Regional Scenic Area (RSA), and adjacent to the Leadhills and Lowther Hills Special Landscape Area (SLA) as shown in **Figure 6.4**. Within 15km, there are six Landscape Character Types (LCTs) with potential views of the Development, with the majority of the Development Area located within the Southern Upland LCT. There are also a number of existing and proposed windfarms within the 15km study area as shown in **Figure 6.7**.
- 1.30 Construction activities will change the moorland to a construction site with excavations and significant landscape and visual effects are predicted to occur for the Development Area during the construction period, which is expected to take up to two years in total.
- 1.31 The landscapes and viewpoints close to the Development Area, from where ground conditions will be discernible, will experience a large scale of change during construction, although this will be short term and relatively localised. Receptors will include the host landscape of the Development Area (landscape effects on the Southern Uplands unit) and local people and walkers on the SUW as it passes through the Development Area (visual effects). Effects on the landscape or on views seen from outside the Development Area will be more distant and will not be significant during construction.
- 1.32 The sources of landscape and visual effects that will occur during the operational phase of the Development, with a lifespan of 25 years, will include the introduction of turbines and ground level infrastructure elements. Significant effects on landscape character are not considered likely to occur beyond 15km away given the limited visibility of the Development from these areas. Significant landscape effects are considered likely for parts of the Southern Uplands LCT, the Upland Glens LCT, the Upland River Valley LCT and the Upper Dale LCT and will occur within 7km of the Development Area. Significant cumulative effects are also predicted on parts of the Upland River Valley and Upper Dale LCTs.
- 1.33 The visual amenity assessment considered views from static viewpoints, settlements and routes and paths within the study area. Significant effects on views and visual amenity are predicted to occur in the vicinity of the Development Area up to approximately 12.5km from the proposed turbines, with higher sensitivity receptors comprising residents in local settlements and people using recreational routes e.g. the SUW.
- 1.34 Significant visual effects are predicted from the settlement of Wanlockhead, sections of the A76 (including cumulatively with other developments), B797 and B740 roads, also sections of the SUW, Coffin Road and the Muirkirk to Wanlockhead Drove Road. Significant visual effects are predicted for 14 of the 24 representative viewpoints. Of these, Lowther Hill (VP6), Crawick Multiverse (VP10) and the B740 at Crawfordjohn (VP13) are predicted to have significant cumulative effects with other developments. No significant effects are predicted for the other viewpoints and routes, including cumulatively with other developments.
- 1.35 The residential visual amenity assessment considered the effects of the Development on the visual aspects of residential amenity from properties within approximately 2-2.5km of the Development. Of the

16 properties, or groups of properties, that were assessed, only Clackleith which is located within the Development Area approximately 500m from a turbine, was found to result in the property becoming an 'unattractive place to live'. However, this property is currently uninhabitable, is owned by Buccleuch Estates and will not be brought into residential use during the lifetime of the Development.

- 1.36 The LVIA considered the effects of the Development against the special qualities of designated landscapes within 15km. For the Thornhill Uplands RSA, whilst the physical landform and land cover of the northernmost part of the RSA will not be affected by the Development; there will be changes to the character of that area and views of it. There will also be changes to parts of the Leadhills and Lowther Hills SLA including cumulatively with other developments. No changes to the qualities of other designated landscapes are predicted.
- 1.37 Significant landscape and visual effects are a feature of almost all commercial scale windfarm applications and to some degree are inevitable. However, the extent of the landscape and visual effects identified as significant for the Development, are within the range of effects that can be expected from a development of this type and size.

Hydrology, Hydrogeology, Geology and Soils

- 1.38 The hydrology, hydrogeology, geology and soils chapter considers the potential effects of the construction of the Development on surface water and groundwater, modification of surface water drainage patterns, groundwater dependent terrestrial ecosystems, private water supplies, soils and peat instability during construction. More details on the assessment are provided in **Chapter 7: Hydrology, Hydrogeology, Geology and Soils** and **Appendices 7.1-7.7**.
- 1.39 The main study area is based upon the Development Area, with a wider study area of 5km downstream considered for surface water effects and 1km from the Development Area for groundwater effects. The wider study area was used to assess potential effects on private water supplies and natural heritage designations. Field surveys were undertaken by teams with experience of assessing geology, hydrology, soil and peat issues between June 2016 and February 2017. The surveys comprised extensive peat probing, verifying private water supplies, soil and water sampling and a geotechnical walkover to assess the Development Area for landslide instability. In addition, site walkover activities and local research were undertaken to identify the geographical extent of historic mining activities.
- 1.40 There are numerous, relatively small, upland streams draining the Development Area. These are the Wanlock Water and its tributaries which drain the northern and eastern areas of the Development Area, flowing north to join the Crawick Water/Spango Water. Open ground is typically covered by a mixture of upland moorland vegetation, with craggy rock outcrops.
- 1.41 Wanlockhead and Leadhills, east of the Development, were historically the centres for lead mining in Scotland. A legacy of this mining is the discharge of heavy metals (lead, zinc, cadmium and copper) locally into groundwater and the Wanlock Water valley downstream of Wanlockhead. Baseline results from samples collected within the Development Area show that whilst elevated levels of heavy metals are present in soil and water samples across the locality, this is irrespective of proximity to historic mine workings. These are considered to represent naturally elevated levels determined by the local underlying geology and not linked to historic mining activity.
- 1.42 Areas of historic mining activity, which could be at risk of contamination from this former use, have been identified during the site surveys and research, and the design of the Development has avoided these areas.
- 1.43 Peat depths across the Development Area are relatively shallow, averaging 0.44m, with small pockets of deeper peat (greater than 1.5m) on the saddles or within 'bowls', which have been avoided by infrastructure where possible (see **Figures 7.5 and 7.5a-d**). No public water supply infrastructure is located within the Development Area, and whilst a number of properties are served by private water supplies, only Nether Cog and Clenries were considered to be hydrologically connected to the Development Area.
- 1.44 The hydrology, peat and ground conditions (e.g. stability) within the Development Area influenced the design of the turbine and infrastructure layout to avoid and/or minimise potential effects on these features. The layout has, where possible, maintained a minimum distance of 50m from watercourses, avoided deeper areas of peat, minimised the number of watercourse crossings required, avoided steep

slope angles, avoided areas associated with historic mine workings, and avoided areas of potential peat stability concern and areas of landslide susceptibility.

- 1.45 The application of good practice construction measures form an integral part of the construction process and include measures to avoid/control potential pollution events and storage of peat. Following the implementation of further specific mitigation measures, including competent environmental supervision and monitoring during construction, detailed drainage design to control run-off and further micro-siting of infrastructure, no significant adverse effects are predicted during the construction of the Development.
- 1.46 No potentially significant effects are predicted cumulatively with other developments during construction or during the operation of the Development.

Ecology

- 1.47 The ecology assessment considers the potential construction and operational effects of the Development on designated areas, terrestrial habitats, aquatic habitats and protected species. Particular attention has been paid to valued habitats and species which were identified within or adjacent to the Development Area. More details of the assessment are provided in **Chapter 8: Ecology** and **Appendices 8.1-8.6** and survey results are presented in **Figures 8.1-8.9**.
- 1.48 Field surveys were carried out to establish habitat type, distributions and the presence of badgers, bats, fish, freshwater pearl mussel, otter, pine marten, red squirrel and water vole. The study area for the field surveys included 100m from proposed tracks and 250m from turbine positions for habitat surveys and 300m from proposed tracks and turbine positions for protected species surveys. 23 locations along watercourses within the catchment (downstream of confluences) of the Development Area were surveyed for fish, aquatic invertebrates and freshwater pearl mussel.
- 1.49 There are five statutory nature conservation designations within 5km of the Development Area as well as areas of Ancient Woodland. However these are considered unlikely to be affected by the Development.
- 1.50 The main habitat within the survey area is wet modified bog (30.78% of survey area), followed by acid grassland (21.06%). The habitat survey results were referenced against SEPA guidance to identify those habitats which were potentially groundwater dependent terrestrial ecosystems (GWDTEs). However, based on a number of factors such as geology, presence of peat and topography, the potential GWDTE communities are judged not to be groundwater dependent. Further information on GWDTEs is found in **Chapter 7**.
- 1.51 In relation to protected species, the Development Area offers limited areas of suitable habitat for badgers. Signs of otter were recorded within the study area in the form of footprints and faeces, particularly along the larger watercourses (such as Wanlock Water and Cog Burn which provide suitable habitat for otter prey), however there were no holts identified. No evidence of water vole was recorded during surveys and limited habitat suitability of the watercourses was found for this species. There were no signs of pine marten during surveys. There are no records of red squirrel being present within the study area within the last 15 years and whilst surveys found evidence of squirrel being present (feeding signs), the species cannot be determined and the majority of the study area is considered to be unsuitable for red squirrel due to its open nature and lack of tree cover and it is therefore likely that only grey squirrel are present.
- 1.52 Two properties (Duntercleuch and Clackleith) were considered to have low and medium bat roost potential respectively. In addition, trees supporting roost potential were identified at 11 locations across the study area. Turbines have been located to ensure that they are a sufficient distance from these features to avoid any risk to these potential roosts. Five bat species were recorded during surveys, the highest recorded activity level being from soprano pipistrelle. Overall, recorded bat activity for all species was low.
- 1.53 During fish surveys, salmonids (salmon, trout, charrs, freshwater whitefishes, and graylings) were found within 19 of the 23 locations surveyed. Based on historical information and limited habitat, it has been determined that freshwater pearl mussels are unlikely to be present in the area. The study area offers good habitat for reptiles, however no suitable habitat was identified for great crested newts within the Development Area.

- 1.54 Ecological constraints identified through baseline survey results informed the layout design, including maintaining a stand-off distance between turbines and newly created woodland edges to avoid bat collision and minimising the loss of sensitive habitats.
- 1.55 No significant effects on designated sites, habitats or protected species during construction and operation of the Development are predicted, including cumulatively with other developments.
- 1.56 A Draft Species Protection Plan will be implemented by a qualified Ecological Clerk of Works (ECOW) during construction to ensure monitoring and the protection of species. In addition, the OCMP includes proposals to bring an area under positive management that is equivalent to 20 times the habitat loss area (excluding commercial forestry) as well as the planting of native woodland to deliver an overall net biodiversity benefit.

Ornithology (Birds)

- 1.57 The assessment of potential effects on birds considers direct habitat loss and disturbance during construction, displacement of birds as a result of indirect habitat loss during operation, habitat modification, collision risk during operation and cumulative effects. More details on the assessment are provided in **Chapter 9: Ornithology** and **Appendix 9.1 Annex A-E** and survey results are presented in **Figures 9.1-9.21**.
- 1.58 The study area for the assessment comprises the Development Area and appropriate buffers around all infrastructure as recommended by SNH Guidanceⁱⁱ, including a Collision Risk Analysis Area (CRAA) which comprises a buffer of 500m in all directions from each turbine. Following the desk based collation of existing bird records and/or data, and along with consultation with Dumfries and Galloway Raptor Study Group, RSPB and SNH, field surveys were undertaken between April 2014 and August 2016.
- 1.59 There are no statutory designations relating to birds within the Development Area. The Muirkirk and North Lowther Uplands Special Protection Area (SPA) is adjacent to the north-west of the Development Area (see **Figure 9.1**) and is designated for breeding hen harrier, merlin, peregrine falcon, short-eared owl, golden plover, and non-breeding hen harrier.
- 1.60 Field surveys identified that there are five black grouse leks (display areas) within the Development Area. Hen harrier bred successfully within the study area between 2014 and 2016 (up to four pairs), and flight activity was largely limited to the areas around nest sites (within approximately 1.5km). Two breeding pairs of merlin were recorded within the survey area in 2015, with one confirmed breeding attempt in 2016. In 2015, up to three pairs of goshawk were recorded breeding, although no breeding attempts were confirmed during the 2016 breeding season. In 2014 up to four short-eared owl pairs were present, with at least three successfully fledging young. Three territories were present in early 2015 but no breeding attempts were recorded and the species was absent in 2016. Peregrine was observed infrequently during surveys and no breeding within the study area was recorded.
- 1.61 Curlew and lapwing were regularly recorded in the breeding season, with up to 17 curlew pairs and nine lapwing pairs present within the study area. One golden plover pair was recorded in 2015.
- 1.62 The presence of species breeding and flying within the Development Area formed a key layout design consideration and the design sought to avoid placing infrastructure within 500m of recorded historic nesting locations of hen harrier and merlin, avoid black grouse leks by at least 500m, and avoid areas of highest flight activity rates of hen harrier.
- 1.63 During construction, if left unmitigated; there could be moderate adverse (significant) effects on black grouse, hen harrier, merlin and short-eared owl populations in terms of direct habitat loss or construction disturbance. To mitigate these effects, a Breeding Bird Protection Plan will be implemented during construction, and pre-construction surveys will be undertaken, with appropriate separation distances (buffers) applied to nest locations. No significant operational displacement or collision effects are predicted, including cumulatively with other developments. The OCMP for the Development will implement measures within the Development Area, aimed at benefitting birds, including black grouse, merlin, hen harrier, short-eared owl, lapwing and curlew. It includes a funded Regional Hen Harrier Conservation Management Plan, and associated Project Officer, to undertake practical conservation management actions and further the monitoring, understanding and conservation of Hen Harrier in the area.

- 1.64 Information presented to inform an Appropriate Assessment as part of the Habitats Regulations Appraisal process concludes that the integrity of the Muirkirk and North Lowther Uplands SPA, and all other Natura 2000 designated sites will be unaffected by the Development, when mitigation measures are considered.

Cultural Heritage

- 1.65 Cultural heritage assets include sites, features and areas such as Scheduled Monuments; Listed Buildings; Conservation Areas; Gardens and Designed Landscapes (Inventory and Non Inventory status); and other historic environment interests.
- 1.66 Two study areas were used for the assessment: an Inner Study Area (focussing on the Development Area) to identify heritage assets that could be directly affected during construction; and a Wider Study Area (a zone extending to 10km from the outermost turbines) to identify assets whose settings³ may be affected by the operational Development.
- 1.67 Consultation was undertaken with Historic Environment Scotland (HES), including a joint site visit, and with Dumfries and Galloway Council Archaeology Service (DGCAS).
- 1.68 Following desk based data collection, field surveys of the Development Area were undertaken in August 2016 to assess the nature, condition and extent of known heritage assets and to identify and record any previously unrecorded assets. Cultural heritage assets in the wider study area were visited in October 2016 to assess their settings.
- 1.69 There are 85 known heritage assets within the inner study area (see **Figure 10.1**), most of which comprise sheepfolds or farmsteads (including Cogshead Farmstead, Nether Cog Farmstead and Duntercleuch Farmstead); although none of these are heritage assets with statutory or non-statutory designations. Within the wider study area, there are a number of heritage assets with statutory designations: Scheduled Monuments, including Auchengruith Craig, cross-shaped earthwork, Wanlockhead (remains of lead mining and smelting), Wanlockhead Beam Engine and Leadhills (remains of lead mining and smelting); Category A, B and C Listed Buildings; and four Conservation Areas (Wanlockhead, Leadhills, Durisdeer and Sanquhar). There are also Inventory Gardens and Designed Landscapes (Drumlanrig Castle) and Non-Inventory Designed Landscapes (e.g. Eliock and Craigdarroch) (see **Figure 10.2**).
- 1.70 The layout of the Development, including the positioning of the turbines, access tracks and other infrastructure, was designed to avoid direct effects on cultural heritage assets wherever possible, including increasing the separation distance for infrastructure in proximity to Nether Cog and Cogshead Farmsteads. Visibility of the Development from Wanlockhead and Leadhills Conservation Areas and associated Scheduled Monuments was also reduced through the design process.
- 1.71 On this basis, a potential moderate significant effect is only considered possible on one cultural heritage asset (enclosure) during construction of the access track associated with Turbine 18. Mitigation such as the marking off of the asset during construction and the presence of an archaeologist on site during construction will avoid damage to this feature and will result in a minor (not significant) effect on this asset. As a precautionary measure, a minor-moderate effect on buried unidentified archaeological remains has also been identified prior to mitigation. However, through the proposed monitoring of construction activities likely to uncover archaeological remains and the recording of any finds, no significant residual effects are likely.
- 1.72 During operation of the Development, it is likely that there will be residual moderate (significant) effects on the setting of Auchengruith earthwork cross Scheduled Monument and Cogshead Farmstead. However, these effects are not sufficient to diminish the ability of the visitor to either appreciate the character of the assets or to understand and appreciate their settings, and the effects on their settings will not diminish the heritage value of the assets. It is proposed that some interpretation be put in place at Cogshead Farmstead as an enhancement measure, to inform the visitor experience of those either passing the Development Area along the Southern Upland Way, or those visiting the farmstead itself. **Figure 10.4(a-d)** includes wirelines showing visibility of the Development from Cogshead Farmstead. Visibility of the Development from Auchengruith is represented in **Figure 6.16a-d: VP7: Mennock Pass**.

- 1.73 There are no predicted significant cumulative effects on cultural heritage.

Noise

- 1.74 Once operational, windfarms emit aerodynamic noise due to the movement of the rotating blades through the air, and mechanical noise from components within the nacelle of a wind turbine. Noise will also be generated during the 24 month construction phase of the Development from the operation of construction machinery and from construction traffic.
- 1.75 Potential noise effects were an important consideration in designing the layout. In accordance with the relevant guidanceⁱⁱⁱ, the turbine layout has been designed so that predicted operational noise levels do not exceed noise limits at the closest properties.
- 1.76 For the operational assessment, background noise monitoring was undertaken at eight properties which are considered to be representative of the noise sensitive receptors located closest to the Development Area. A total of 24 noise sensitive receptors were chosen as noise assessment locations. The daytime limit for noise associated with the Development, and against which effects have been assessed, has been set at 35dB(A) or background plus 5dB, whichever is the greater. For night-time periods, the recommended limits are 5dB(A) above prevailing background or a fixed minimum level of 43dB whichever is higher. Where a property has a financial involvement with a windfarm, the operational noise limits at that property can be raised to 45dB for daytime and night-time periods. The operational noise limits for the Development were agreed with Dumfries and Galloway Council and the Development has been designed taking account of the potential for cumulative noise effects from other windfarm developments in the area.
- 1.77 The construction noise assessment found that whilst elements of construction noise may be audible at the closest residential receptors for certain periods during the temporary construction phase, application of the good practice construction measures will mean that there will be no significant effects on nearby residential receptors.
- 1.78 Predicted operational noise levels at all the noise assessment locations will be below the specific daytime and night-time noise limits, whilst cumulative wind turbine noise levels also meet the relevant noise limits, therefore no significant operational effects are considered likely.

Access, Traffic and Transport

- 1.79 The assessment identifies the likely volume of traffic that will be generated during construction (including forestry traffic) and the subsequent effect that this will have on the local road network, including on sensitive receptors. In accordance with good practice guidelines^{iv}, particular attention is paid to: the perception of severance (populations being cut-off), driver/pedestrian delay, accident risk and safety, and the potential effects of dust and dirt. Operational traffic associated with maintenance of the Development will be minimal and so operational effects of traffic on the public road network are not assessed. More details on the assessment are provided in **Chapter 12: Access, Traffic and Transport**.
- 1.80 The study area for the assessment has been defined as the public road network in the vicinity of the Development, which will be used as access routes by traffic bound for the Development Area and is indicated by **Figure 12.2**. To determine appropriate routes to the Development Area, a detailed assessment of the surrounding road network has been undertaken. This involved a comprehensive desk based study, multiple site visits and consultation with Dumfries and Galloway and South Lanarkshire Council Road Departments.
- 1.81 During construction of the Development, turbine components will be transported to the Development Area on vehicles capable of carrying 'abnormal loads' (vehicles longer than 17m and/or more than 4m wide) along the M74 trunk road (T), the B7078 and the B740 to the two site access points 'A' and 'B'. General construction materials (concrete, aggregates, pipes, cabling, etc.) and the removal of forestry will be transported in standard HGVs. The route for general construction traffic will depend on the source of the materials required, however, for the purpose of assessment; it is considered that HGVs will follow the same route as the abnormal loads and also follow a route from the A76 (T) to the south of the Development. The indicative abnormal loads route is shown in **Figure 12.1**.

³ Setting is the way in which historic structures or places are understood, appreciated and experienced.

- 1.82 Upgrades will be required to the public road network in some locations along the abnormal loads delivery route, including through Crawfordjohn where an access track through a field to the north of the B740 will be required. These upgrades will be required to ensure that the abnormal loads vehicles can travel safely to the Development Area. Abnormal loads will be delivered under police escort to ensure that the safety of all road users is protected.
- 1.83 The months with the highest number of traffic movements during the 24 month construction period are months 11 and 12 with 2,790 two-way HGV movements respectively. Assuming 4 weeks per month, this equates to approximately 698 two-way HGVs per week (approximately 349 inbound and 349 outbound) and 127 two-way trips daily (assuming 5.5 working days per week). The assessment assumes a scenario whereby 100% of general HGV construction traffic use the same route as the abnormal loads as a 'maximum case' scenario; however in reality, a percentage of HGVs and staff cars will travel via the A76 from the south. Whilst there will be a notable increase in traffic movements on the local road network during construction, the effects are not considered to be significant. However, measures to minimise effects on the local road network, including on road users will be implemented, including use of a Construction Traffic Management Plan and a Dilapidation Survey. Abnormal loads will be transported over an 11 month period avoiding the two month peak HGV traffic months; therefore no significant effects are predicted as a consequence of the abnormal load movements.
- 1.84 No significant cumulative effects are considered likely as the only route anticipated to be used by construction vehicles associated with other proposed developments is the A76, which has capacity to accommodate short term increases in traffic.

Socio Economics, Tourism and Recreation

- 1.85 The assessment considers the potential effects on direct and indirect employment and economic benefits, as well as effects on recreation and tourism. More details on the assessment are provided in **Chapter 13: Socio-Economics, Tourism and Recreation**.
- 1.86 With respect to potential effects of the Development on employment, economic benefits and tourism, the assessment considers potential effects at a local, and regional (Dumfries and Galloway and South Lanarkshire) level, and on the local area for recreational effects. A desk based study was undertaken alongside local consultation, to establish the current social and economic conditions within the study area, including identification of tourist attractions such as the Museum of Lead Mining and also key recreational routes such as the Southern Upland Way (SUW) (see **Figure 13.3**).
- 1.87 During construction it is anticipated that up to £33.9 million could be spent regionally and of this, up to £3.4 million will be spent locally, and that 28 job years will be created, resulting in a moderate (positive) significant effect. During construction, recreational routes within the Development Area, including the SUW, will experience some disruption resulting in a moderate (significant) adverse effect. To mitigate this effect, an Access Plan will be agreed with key stakeholders to ensure that a route between Sanquhar and Wanlockhead is kept open during construction. For example, this may include the use of controlled crossing points, as undertaken successfully during the construction of the Kilgallioch Windfarm through which the SUW passes.
- 1.88 NLEI Ltd has agreed to provide community funding of £5,000 per MW, in line with Scottish Government Guidance. As the Development is expected to have a generating capacity of approximately 147MW, this suggests that the annual contribution to the fund will be up to £735,000. Over the 25 year lifetime of the Development, this will equate to a total of £18.4 million. This equates to a significant moderate (positive) effect. NLEI Ltd has also made a commitment, through the consultation process, that there will be an opportunity for local communities to take a shared ownership stake in the Development if there is a desire to do so, and an offer has been made to progress discussions with interested communities. To date, NLEI Ltd has held initial discussions with the Upper Nithsdale Trust, representing the Royal Burgh of Sanquhar, and Kirkconnel and Kelloholm Community Councils regarding shared ownership. The Trust has expressed an interest in investing in the Development on a shared ownership basis and NLEI will continue discussions with them as the development progresses to further explore this opportunity.
- 1.89 There is no research evidence that the presence of windfarms have negative effects on the tourism economy. However, the assessment considers whether there might be any specific effects on individual tourism assets in the local area, and whether the Development could result in changes that could lead to

changes in the behaviour of tourists. Overall, no significant effects are considered likely on local tourism and recreational assets or on local accommodation during operation.

Other Issues

- 1.90 The assessment of the potential effects of the Development on aviation and defence, telecommunications and dust was undertaken through desk based study and consultation. A carbon balance assessment has also been undertaken using the current Scottish Government guidance. Further details of these assessments are provided in **Chapter 14: Other Issues**.

Aviation and Defence

- 1.91 The Development Area is located within the NATS Radar Safeguarding Area, with Lowther Hill radar station being located approximately 3.3km east of the nearest turbine. NATS has indicated that the Development will be visible to the Lowther Hill radar. NLEI Ltd is currently in discussion with NATS to identify a potential mitigation solution, a process which involves complex radar modelling and ongoing discussions with the aim of arriving at a solution.
- 1.92 Prestwick Airport is approximately 46km north-west of the Development Area. Modelling of visibility of the Development to Prestwick Airport has shown that the turbines will not be visible to its radar and that effects are unlikely.
- 1.93 No airfields are located within the consultation zone for the Development (2km) as specified in guidance^v.
- 1.94 The MoD had no objections to the Development at the Scoping stage and will be re-consulted on the application.

Telecommunications

- 1.95 Four telecommunication (microwave/radio) links cross the Development Area, and these are operated by BT and Joint Radio Company (JRC) (on behalf of ScottishPower).
- 1.96 The telecommunication links identified by BT were mapped and a setback distance of 100m has been maintained to avoid effects on these links.
- 1.97 Onsite constraints, such as steep slopes (in relation to stability and health and safety), meant that turbines could not be moved to avoid the JRC operated link connecting Green Lowther radio station with Fauldhead substation resulting in potential technical interference to this link. To mitigate this effect, NLEI Ltd will continue to engage with JRC following submission of the application for consent to establish the likelihood and extent of potential interference and to agree a technical mitigation solution if necessary.

Dust

- 1.98 Only one inhabited property (Nether Cog) is located within the study area for consideration of dust effects (200m from construction activities in accordance with accepted good practice)^{vi}. This property is therefore judged to be a potential receptor of dust emissions from onsite construction works (see **Figure 14.1**).
- 1.99 NLEI Ltd will commit to adopting good practice measures for dust management during construction, such as
- ensuring all loads which will enter the Development Area are covered where practicable ,
 - enforcing an appropriate speed limit;
 - making the use of netting screens for construction activities within 200m of Nether Cog.
- 1.100 With adherence to these good practice measures, significant dust effects will be avoided.

Carbon Balance

- 1.101 The carbon balance assessment calculates the 'payback time' of CO₂ emissions for the Development. The payback time is defined as the length of time (in years) required for the Development to be considered a net avoider of emissions rather than a net emitter. The calculation of payback time includes consideration of emissions resulting from the construction and operational phases of the Development and includes the quantification of the carbon storage loss as a result of loss of peat and

forestry within the Development Area (expressed as CO₂ emissions). The expected carbon payback period is calculated to be between 12 and 36 months, with 12 months being the most likely scenario^{vii}. Even taking the worst case for carbon payback (36 months), the Development will make a substantial positive net contribution to CO₂ reductions and will be a net reducer of CO₂ for the vast majority of its operational life. The carbon offset by the Development will contribute positively to meeting Scotland's targets for reducing greenhouse gas emissions.

Summary

- 1.102 The EIA for the Development has been carried out in accordance with regulatory requirements and guidance on good practice. The findings of the surveys undertaken, in addition to extensive consultation, have informed the design process and, as a result, design changes have been introduced to reduce effects on views from the surrounding landscape, and on cultural heritage, ecology, ornithology, hydrology and soils (peat).
- 1.103 Prior to committed mitigation, potentially significant effects are predicted in relation to: landscape and visual amenity; hydrology, hydrogeology, geology and soils, ornithology cultural heritage and socio-economics (recreational effects). However, there is scope to mitigate many of the predicted significant effects and several effects are therefore considered not significant following implementation of the proposed mitigation. As a consequence, during operation of the Development, significant residual effects are predicted in relation to landscape and visual amenity and cultural heritage (setting only), and cannot be avoided in their entirety given the inherent nature of windfarm development. In addition significant residual positive socio-economic effects are predicted during construction and operation of the Development.
- 1.104 Overall, this EIA shows that, given the iterative design process, and with the committed good practice measures and proposed further site specific mitigation in place, most potential environmental effects associated with the construction and operation of the Development can be avoided or minimised. In addition, an outline conservation management plan is proposed which provides the opportunity for the delivery of net biodiversity benefit in relation to habitats and birds.

ⁱ Scottish Natural Heritage. (2014). Siting and Designing Windfarms in the Landscape (Version 2)

ⁱⁱ SNH (2014). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, May 2014.

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

^{iv} Guidelines for the Environmental Assessment of Road Traffic (1993)

^v CAP 793: Safe Operating Practices at Unlicensed Aerodromes

^{vi} Design Manual for Roads and Bridges (DMRB), Volume 11 Environmental Assessment Techniques, Part 1, HA207/07 Air Quality

^{vii} The Scottish Government (2016), Carbon Calculator Tool Version 1.0.1