Section 3
SITE SELECTION, DESIGN AND EVOLUTION

Contents

Tables

Figures

Appendices

Glossary

Term	Definition
Capacity factor	The capacity factor of any power plant is the percentage of generation of its actual generation against its theoretical maximum generation.
Cumulative impacts	The state in which a series of repeated actions have an impact greater than the sum of their individual impacts.
Environmental Impact Assessment	The process by which information about the environmental effects of a project is evaluated and mitigation measures are identified.
Environmental Impact Assessment Report	Statutory obligation to provide environmental impact assessments for certain projects or developments. The Environmental Impact Assessment Report (EIAR) is the collation of these assessments.
Meteorological Mast	Mast used for housing meteorological measuring equipment to measure wind speed and direction.
Mitigation	Term used to indicate avoidance, remediation or alleviation of adverse impacts.
Sustainable	Avoidance of the depletion of natural resources in order to maintain an ecological balance
Tip height	The distance measured from the surface of the wind turbine tower foundation to the maximum height the turbine tip reaches when the turbine blade is in a vertical position.
Wind Turbine	The structure comprising the tower, nacelle and blades that generate power from the wind by the rotation of the blades.

Abbreviations

Abbreviation	Description
AGL	Above Ground Level
AOD	Above Ordnance Datum
CWL	Community Windpower Ltd
DGC	Dumfries and Galloway Council
EIAR	Environmental Impact Assessment Report
GIS	Geographic Information Systems
GPA	Glasgow Prestwick Airport
GWDTE	Groundwater Dependent Terrestrial Ecosystems
Km	Kilometre
kV	Kilovolt
LVI	Landscape Visual Impact
m	Metre
m/s	Metres Per Second
MoD	Ministry of Defence
MW	Megawatt
NATS	National Air Traffic Services
NOABL	Numerical Objective Analysis Boundary Layer
NPPGs	National Planning Policy Guidance
OS	Ordnance Survey
RSA	Regional Scenic Area
SES	Scottish Energy Strategy
SPP	Scottish Planning Policy

Section 3: Site Selection, Design and Evolution

3.1 Introduction

3.1.1 This section explains the selection criteria used by CWL and the Applicant when looking for potential wind farm sites to develop. It describes the initial site selection process for the proposed Scoop Hill Community Wind Farm and Energy Storage Facility and the reasons behind the selection of this site. It also details the design evolution of the proposed wind farm.

3.1.2 As a wind farm developer, CWL and the Applicant have only evaluated potential sites for onshore wind farm development. At scoping, the inclusion of solar power generation was originally considered for the site, however after detailed site analysis, it was determined that solar power generation would not be suitable for the development area and was subsequently removed.

3.2 Initial Site Selection Criteria

3.2.1 Wind power has become a leading renewable energy technology in recent years. It is environmentally beneficial and sensible to site wind farms in areas of high wind speeds to maximise the generation capability of the wind turbines.

3.2.2 Back in 2005, *The Environmental Change Institute* at the University of Oxford, analysed 34 years of hourly wind data from over 60 sites around the UK. This provided a comprehensive view of the long-term patterns of wind power in the UK and ensured that any extreme events (such as very high or low wind speed conditions) were captured in their analysis.

Their key findings included:

- Scotland has the best wind resource in Europe. The recorded capacity factor for onshore wind energy in Scotland is over 27.9%, greater even than in Germany (15%) and Denmark (20%) where wind farms are currently most established as a renewable energy technology;
- The Scottish wind resources is the largest and most dependable in Europe with average wind speeds across upland areas of more than 10m/s.

3.2.3 Further to this, Scotland is one of the windiest countries in Europe, possessing around 25% of Europe's wind resource *(Scottish Development International, 2011)*. As a result, wind energy in Scotland is now playing an increasing part with regard to renewable energy generation and will be integral to delivering the ambitious renewable energy targets set by the Scottish Government as outlined further in Section 4: Renewables, Planning and Policy.

3.2.4 CWL and the Applicant are engaged in a continual search and assessment of potential wind farm sites throughout the Scotland to progress and develop into wind farm applications. This search began in 2001 and the process has yielded a number of sites, which have progressed to operational wind farms.

3.2.5 Since 2001 wind farm development has adapted to technological advancements, heightened environmental need and commercial influences. The history of wind power development has seen the engineering of progressively taller and taller turbines with longer blades. In simple terms, taller turbines benefit from better and more consistent wind speeds, whilst bigger blades cover a wider swept area which increases the capacity of the turbine. The combination of these two inevitable design advancements, increases the turbine's "capacity factor," and in turn increases the economic viability of a wind farm.

3.2.6 The demise of UK Government support for onshore wind generation in 2016 prompted considerable change in the UK onshore wind market. Wind farm designers were required to consider new ways of maximising the efficiency of wind farms so that low cost, low carbon electricity would continue to be economically viable and competitive to energy consumers.

3.2.7 The use of larger, more productive turbines that maximise energy yields and drive down the cost of clean energy was an inevitable consequence of the UK Governments policy change and is now a prerequisite for wind farm designers and financial modellers.

3.2.8 This 'new generation' of larger wind turbines has been universally adopted by the wind energy industry.

3.2.9 The Scottish Government has also acknowledged the need to embrace this 'new generation' of onshore wind turbines if they are to meet their ambitious low carbon targets and deliver clean, reliable, low cost and low carbon energy. Supporting this industry shift, paragraph 25 of the Scottish Onshore Wind Policy states: "*The Scottish Government acknowledges the way in which wind turbine technology and design is evolving, and fully supports the delivery of large wind turbines in landscapes judged to be capable of accommodating them without significant adverse impacts.*"

3.2.10 The Scottish Government's acceptance of turbines at 200m to tip and above has been unequivocally demonstrated with the consent of two separate wind farms developments in 2020. 'Hagshaw Hill' and 'Lethans' have now received consent from the Scottish Government which are utilising turbines at 200m and 220m to tip respectively.

3.2.11 Therefore this development has followed principles adopted across the industry and subsequently includes the use of larger, more powerful and efficient turbines

3.2.12 The search process involves an initial desk-based assessment being undertaken to identify potential areas for wind farm development and makes use of the following resources:

- The NOABL wind speed atlas, which gives average wind speeds in metres per second (m/s) at 45 metres (m) above ground level (agl);
- The Ministry of Defence (MoD) low flying area maps and tactical training area (TTA) maps;
- National Air Traffic Services (NATS) safeguarding maps;
- National Grid network operators' distribution and transmission maps for the 33 kilovolt (kV) and 132 kV networks;
- Scottish Planning Policy (SPP) and National Planning Policy Guidance (NPPGs), with particular regard to Renewable Energy, paragraphs 182-186;
- Maps of existing and planned regional and national designated areas for landscape, ecology and wildlife and archaeological sites;
- Adopted and emerging Development Plans;
- Location maps of existing and proposed wind farms;
- 1:50,000, 1:25,000 and 1:10,000 Ordnance Survey (OS) maps and contour data; and
- 'Spatial Planning for Onshore Wind Turbines – Natural Heritage Considerations' (updated in June 2015).

3.2.13 Following initial studies, areas are either selected for further examination or rejected as unsuitable. This process has identified a large number of sites throughout Scotland as suitable for further investigation and potential development.

3.2.14 For the remaining suitable sites which meet this very initial requirement, a list of selection criteria is produced, and each site is assessed against this list.

3.2.15 The selection criteria list is as follows:

- Landowner interest - a site has to have willing owners or be available for purchase;
- Area available for wind turbines - minimum requirement of 300 MW capacity to ensure viability of scheme;
- A minimum wind speed of 7.0 metres per second (m/s) at 45 m above ground level (agl), as identified using the ETSU NOABL wind speed atlas;
- Preferred areas for wind farm development identified in Local Development Plans and Capacity Studies;
- Proximity of existing wind farms or sites with planning permission for a wind farm;
- Turbine offset distance from the nearest non-financially involved property has been maximised;
- Availability and proximity of a potentially suitable and economically viable grid connection point;
- Potential of existing transport network to allow for the transportation of wind farm delivery vehicles and construction traffic to the site;
- Aviation consultation and assessment;
- Consideration of potential landscape and visual impacts, including national landscape designations;
- Scottish Planning Policy (SPP) Table 1 constraints were avoided;
- Ecological considerations including ecological designations;
- Ground conditions and their suitability;
- The presence and location of cultural heritage sites of national importance and the location and setting of Scheduled Monuments;
- Existing land use and Public Rights of Way; and
- Presence and location of existing infrastructure (e.g. mobile phone networks and electromagnetic paths).

3.2.16 Any site failing to meet this selection criteria or which conflicts with the criteria in a way that cannot be successfully resolved, is removed from the site selection process. The next step would be to further review the remaining potential sites and investigate which have the most potential for development.

3.2.17 The cumulative impact of wind farms is an increasingly important consideration for all wind farm developments in Scotland. Information is gathered on all wind farm proposals within a 45 km radius of the site. The planning history of wind farm applications in the vicinity of the site are also studied to examine the planning sensitivities and any precedents set for each proposed site.

3.2.18 If sites are considered to be environmentally unacceptable and mitigation solutions will not resolve any adverse negative impacts, then these sites are eliminated along with any others which are rendered uneconomically viable to develop.

3.2.19 The overall selection process of an appropriately located wind farm site is lengthy, with the vast majority of sites being deemed unsuitable or too heavily constrained to develop. Even when a suitable site has been found, issues can continue to arise during the course of the project's development, which can undermine the scheme.

3.3 Alternative Sites

3.3.1 Environmental Impact Assessment (EIA) legislation requires the consideration of alternatives and an indication of the reasons for selecting the site advanced, as noted in Planning Advice Note (PAN) 1/2013, which states *'Whilst the Directive and the Regulations do not expressly require the applicant to study alternatives, those alternatives which are in any case considered as part of the project planning and design process must be assessed, and an outline of the main alternatives studied by the applicant included in the ES. The ES must also give an indication of the main reasons for the choice made, taking into account the environmental effects'.*

3.3.2 As mentioned previously, CWL and the Applicant have a continuous search for potential wind farm sites. This involves a desk-based assessment utilising secondary data and a Geographical Information System (GIS) to identify constraints for each potential area or site. Sites that are not deemed suitable at one given time (i.e. 'the alternatives') may, at a later date, be re-assessed against the resources listed in paragraph 3.2.5, as well as up to date policy. Hence, for commercial reasons and in accordance with PAN 1/2013, it is not possible to disclose the names or locations of the alternative sites.

3.4 Site Selection Evaluation

3.4.1 The Scoop Hill Community Wind Farm site was identified as one of the most appropriate and best locations for a wind energy development as it was positive and successful in relation to meeting the initial site selection criteria.

3.4.2 Table 3.1 shows the levels of acceptability applied to the site selection criteria during the site selection process. The results of the assessment for Scoop Hill Community Wind Farm are reported in Table 3.2.

Table 3.1 – Site Selection Criteria Assessment Acceptability Scores

Good	Minimal negative impact or potential positive impact to a wind farm proposal.
Moderate	Potential negative impact from a wind farm proposal. Further investigation and consultation required. Reduction of potential impact through mitigation measures.
Poor	Serious potential threat to wind farm proposal. Further consultation needed. Mitigation measures required to be designed and discussed.

Table 3.2 – Site Selection Criteria and Levels of Acceptability for Scoop Hill Community Wind Farm

	Criteria	Comments	Acceptability
1	Availability of the Site	The area is available to lease from the landowners for the lifetime of the wind farm.	Good
2	Available Area for Wind Turbines	Over 5,685 Hectares (ha) with the potential to accommodate 75 turbines.	Good
3	Wind Resource	Wind speeds in the region of >7 m/s at 45 m agl based on NOABL wind speed data.	Good

4	Ministry of Defence (MoD)	Possible concerns from scoping due to impacts on Spadeadam (Deadwater Fell) radar and Eskdalemuir Seismological Recording Station. Strong potential and likelihood for mitigation to resolve this.	Moderate
5	Proximity and Suitability of Grid Connection Point	Grid connection point with sufficient capacity available, in very close proximity to Bearholm substation, south of Moffat	Good
6	Access on Site	Creation of site entrance and access tracks of a sufficient standing to accommodate the potential wind farm. Land has a suitable gradient.	Good
7	Transportation Route	Access to site will be gained from the A74(M) using existing public roads, farm and forestry tracks where possible. Other routes will be considered and could also be utilised.	Good
8	Planning Policies at National, Regional and Local Level	National, Regional and Local policy positively provide for renewable energy development. Figure 3.8 illustrates the development area with regards to Map 8 in the LDP2 for Dumfries and Galloway Council. Figure 3.8 shows that nearly 100% of the development boundary is located in areas with potential for wind farm development.	Good
9	Nature Scot Strategic Locational Guidance	The entirety of the development area falls within zone 1, least sensitive. These are areas of greatest potential for a wind farm development.	Good
10	International Designated Areas	There are no international designated area/zones within the development area.	Good
11	National Designated Areas	The Dryfe Water SSSI lies partly within and alongside development boundary. Every step possible will be taken to avoid developing infrastructure close to or within the SSSI. In addition, water quality control measures will be in place in accordance with SEPA guidelines, to avoid any potential impact on the SSSI.	Good/Moderate
12	Regional Scenic Areas	There are no regional designated scenic area/zones within the development area.	Good
13	Proximity to Residential Properties	No residential properties are within 1000m of the proposed wind turbines (which are not financially involved with the project)	Good
14	Presence of Existing and Consented Wind Farms	There are a number of operational and consented wind farms which are located in clusters to the south east and to the west of Scoop Hill. Nearest being Little Hartfell which is 5km away. Table 3.3 covers all operational and consented schemes within 20km.	Good
15	Existing Land Use	The development site is located within rough grazing upland moorland and managed commercial forestry.	Good
16	Communication Signals	Multiple fixed link communication links operate outwith of the site boundary. Telecom operators have stated they do not see the project having any effect on their links.	Good
17	Cultural Heritage	There are local, regional and nationally important cultural heritage assets within and beyond the site boundary. The Dryfe Archaeological Sensitive Area lies to the south of the development boundary and scheduled ancient monument Laverhay Cottage (Scheduled Monument, Index no. 12721 lies within the development area.	Good/Moderate
18	Peat Depth and Quality	The Nature Scot peatlands and soils classification shapefile indicates only 31ha, spread across 2 clusters, of the 5,685ha development boundary contains class 1 peat. Cluster 1 shows Turbine 75 located within, but more detailed site surveys showed peat depths of only 0.3m, thus would be classed as peaty soils. Cluster 2 contains only across tracks which will be floated. Figure 3.9 shows the Carbon and Peatland (Nature Scot) Classification	Good

3.4.3 The following paragraphs provide further details relating to the key components of the development:

Wind Resource:

3.4.4 Initial assessment of the wind resource was undertaken using the ETSU wind speed database, calculated from the NOABL wind flow model. The model estimates annual wind speed at a specified height for every square kilometre (km^2) of the United Kingdom, based on information from long-term meteorological station records throughout the UK. This has been supported by accurate onsite data from a temporary meteorological mast, which has recorded average on-site wind speeds of above 10 m/s.

Grid Connection Point:

3.4.5 The underground 33 kV cables routed from the proposed turbines would be brought to three satellite substations where the voltage would be stepped up to 132kV. From the satellite substations 132kV cables would transmit the generated electricity to the primary onsite substation. The primary onsite substation will connect to the grid substation at Bearholm which is approximately 2.6 km away from the proposed onsite substation location.

Transportation Route to Site:

3.4.6 Abnormal load studies were undertaken to determine the potential access routes for delivering the turbine components. Proposed access onto the site will utilise the A74(M) to the west of the site.

3.4.7 From the A74(M) three main access points have been identified and assessed. These can be found in more detail in Section 12: Transport Assessment of this EIAR.

3.4.8 Other potential vehicle access routes to site have been reviewed which will only be used for vehicle access for site personnel during construction and when the wind farm is operational. This will aid in reducing travel times and distance travelled for onsite personnel as well as reducing the overall carbon footprint from motor vehicles travelling onsite. They will also be used as an emergency access routes in case of an emergency on site.

Presence of Existing and Consented Wind Farms:

3.4.9 In total, there are fifteen wind farms either in consented or operational, situated within a 20 km radius of the proposed development. Table 3.3 details their current status and distance from the proposed development.

Table 3.3 – Existing and Consented Wind Farms within 20km

Wind Farm	Status	Distance from Development (Km)
Little Hartfell	Consented	6.0
Crossdykes	Consented	8.0
Minnygap	Operational	9.0
Ewe Hill	Operational	10.0
Hopsrig	Consented	10.0
Harestanes	Operational	10.5
Loganhead	Consented	11.0
Minsca	Operational	13.0
Craig (and extension)	Operational	14.0
Clyde	Operational	15.0
Lion Hill	Consented	17.0
Solway Bank	Consented	17.0
Whitelaw Brae	Consented	17.0
Dalswinton	Operational	19.0

3.5 Summary of Site Selection Evaluation

3.5.1 The site selection criteria 'acceptability assessment', scores this development as 'Good' against the vast majority of the criteria.

3.5.2 Based on the findings, the site for the Scoop Hill Community Wind Farm was selected for further investigation and possible eventual progression through the planning process, providing that no unacceptable adverse environmental impacts were identified during the scoping and EIA work.

3.5.3 Having fully evaluated the results of the selection criteria and process, CWL and the Applicant are of the opinion that development and operation of a wind farm at Scoop Hill, is an excellent use of the land available. The development falls largely within the most suitable area for a large-scale commercial wind farm, including Nature Scot's national heritage zoning and Dumfries and Galloway councils wind farm spatial mapping, areas preferred for wind farm development.

3.6 Site Evolution

Site Reconnaissance and Data collection

3.6.1 During the design process, the preparation of the EIAR and the consultation period with consultees and local communities, valuable and constructive feedback was provided, and an iterative design process was undertaken to take on board these comments. This sought to reduce and mitigate any potential impacts.

3.6.2 During the iterative design process, the following was undertaken:

- Site walkovers were conducted to assess the topographical nature of the development site, potential locations for the proposed turbines and infrastructure and to identify existing access tracks to utilise in order to minimise the length of track required, where possible;
- Liaison with landowners to satisfy their farming/agricultural and forestry requirements;
- The layout was amended to ensure turbines were located at sufficient distance from identified watercourses (minimum of 50m), the SSSI's and other environmental constraints;
- Consultation was undertaken with local landowners, local communities including Community Councils and local residents. The site layout has been adjusted to fit better with key viewpoints as identified in community consultation. Feedback was taken on board and where appropriate, the layout was altered accordingly to reflect the comments made;
- The separation distance between the proposed turbines and non-financially involved residential properties was maximised;
- Reviewing of reports and recommendations by independent consultants who have conducted the EIA work;
- Assessing ecological data, ornithological data, hydrological and geological data, cultural heritage constraints and revising the layout accordingly;
- Layout design has been discussed during the scoping process with external consultants and key statutory consultees. Following scoping responses, the number of turbines in the scheme was reduced to take into account specific comments;
- The height of the turbines was also reviewed and analysed in detail in order to reduce the potential visual impact of the scheme and ensure the wind farm is more appropriate for the existing landscape.

3.6.3 The site layout has been designed to mitigate any potential impacts and the Applicant is satisfied that the Scoop Hill Community Wind Farm has excellent potential for a wind farm development. The environmental and technical constraints of the scheme have been very important in influencing the final design of the wind farm layout. These constraints are shown in Figure 3.1.

Policy and Guidance

3.6.4 The design of the wind farm has been influenced by a range of national, regional and local planning policy considerations and best practice guidance, which can be seen in detail in the separate Planning Statement which accompanies the planning application.

3.6.5 The EIA and the design of the scheme has been undertaken in accordance with the following policies and published guidance:

- Scottish Planning Policy, Scottish Government (2014);
- National Planning Framework for Scotland 3, Scottish Government (2014);
- Visual Representation of Wind farms – Version 2.2 (February 2017), Nature Scot;
- Good Practice during Windfarm Construction, A joint publication by Scottish Renewables, Nature Scot, SEPA, and the Forestry Commission Scotland; Version 4 (2019);
- Assessing the Cumulative Impacts of Onshore Wind Energy Developments, Nature Scot (2012);
- Spatial Planning for Onshore Wind Turbines – Natural Heritage Considerations, Nature Scot (2015);
- Siting and Design of Wind farms in the Landscape – Version 3 (February 2017) Nature Scot;
- Guidance for the Assessment of Cumulative Landscape and Visual Impacts Arising from Wind farm Developments – Version 3a, Nature Scot (2017);
- Visual Assessment of Wind Farms: Best Practice, University of Newcastle and Nature Scot (2002);
- Guidelines for Landscape and Visual Impact Assessment, Second Edition, Landscape Institute and IEMA 2002);
- Dumfries and Galloway Council, Dumfries and Galloway Wind Farm Landscape Capacity Study (2017);
- Dumfries and Galloway Council, Local Development Plan 2 (LDP2) (2019);
- Dumfries and Galloway Council, Wind Energy Development: Development Management Considerations (2020);
- Guidelines for Landscape and Visual Impact Assessment, Third Edition, Landscape Institute and IEMA (2013); and
- Photography and photomontage production in Landscape and Visual Impact Assessment, Advice Note 1/11, Landscape Institute (2011).

3.6.6 The layout of the proposed development has been designed to minimise any potential visual and environmental impacts. The LVIA detailed in Section 6 of the EIAR provides a complete assessment of the potential effects of Scoop Hill Community Wind Farm upon:

- Individual landscape features and elements;
- Landscape character; and
- Visual amenity and the people who view the landscape.

Consultation

3.6.7 The evolution of a viable wind farm design relies on guidance provided by statutory and non-statutory consultees. The Applicant submitted a scoping request in May 2019 and subsequently received the scoping in August 2019. This prompted further engagement with consultees in order to achieve a viable design. The following consultees responded to scoping:

Nature Scot

3.6.8 CWL and the Applicant have engaged with Nature Scot on a number of occasions since the scoping request was submitted with most of the communications relating to ornithology and ecology. Whilst COVID-19 and changes in Nature Scot personnel have frustrated communications regarding landscape and visual matters, Nature Scot have provided comments/guidance on viewpoints, the Wild Land Area and turbine aviation lighting for the landscape and visual impact assessment.

RSPB

3.6.9 During a meeting in 2018, Community Windpower met with both officials from Nature Scot and RSPB to discuss the first year's findings from the first year of ecological and ornithological surveys would aid in the second year. It was determined that particular attention should be paid to badgers and any warrens on site, along with raptor species. RSPB and Nature Scot suggested that key-hole felling would preserve the ecological standard better and compensatory planting may be better suited off-site.

3.6.10 At a further joint meeting with Nature Scot & RSPB, CWL and their ornithological consultant in February 2020, the findings of the two years of ecological and ornithology surveys were discussed at length. Both parties were pleased to hear that the surveys, results and assessment would be included with the EIAR.

Scottish Water

3.6.11 Following scoping, CWL liaised with Scottish Water in order to minimise the potential impact on the adjacent Black Esk drinking water catchment.

3.6.12 During further consultation with Scottish water it was determined that the proposed wind farm would propose a 'Low' risk to the drinking water catchment. Scottish water requested that post planning, they would be involved with the final design of infrastructure that is located in close proximity to the catchment to ensure there is no risk to the Black Esk reservoir.

3.6.13 CWL and the Applicant are fully committed to working alongside Scottish Water and other consultees post-consent and pre-construction to ensure the protection of the Black Esk reservoir and its catchment.

SEPA

3.6.14 Following scoping, CWL attended a meeting with SEPA on 18th December 2019.

3.6.15 Potential issues and concerns with the proposal at scoping were raised, regarding peat, GWDTE, Forestry, Hydrology, borrow pits, pollution and waste management.

3.6.16 SEPA raised concerns on the proximity of the project to the Black Esk Drinking Water Catchment and they advised liaising with Scottish Water.

3.6.17 Concerns were raised over the quantity and quality of the stone required from on-site borrow pits and requested the stone was tested. During the construction phase of the wind farm, borrow pits would only be opened as required, and existing quarries would be used wherever possible to avoid excess excavations. In addition, CWL commissioned a stone quality assessment survey to ensure that the onsite material is of adequate quality and thus borrow pits with poor, fine material would not be opened, to reduce the risk of harming water quality.

3.6.18 Regarding the extensive onsite commercial forestry and associated felling required, SEPA requested that forestry waste is minimised and it should be considered within the Forestry chapter of the EIAR. This can be found in Section 13, with additional measures in the outline CEMP. Post planning there will also be a site waste management plan.

3.6.19 In addition, it was made clear by SEPA that sensitive ecological habitats must be protected by intelligent site design. During the design process every effort has been made to avoid siting infrastructure within 'High' and

'Medium' GWDTE. This has meant through the design process, there has been the movement of several borrow pits and the Substation and its associated infrastructure into 'Low' GWDTE areas.

3.6.20 With regards to hydrology, SEPA wished to see a thorough hydrological section submitted as part of the EIAR, the illustrates how the wind farm will have a minimal impact on private water supplies and flood risk and the hydrological environment of the development site. This is covered in Section 10 of this EIAR.

HES

3.6.21 During the site design process, CWL and their archaeological consultant Headland Archaeology have discussed in detail the requirements of the Cultural Heritage assessment with Historic Environment Scotland (HES). CWL and Headland Archaeology have provided substantial information during the design process, including wireframes and ZTV's.

3.6.22 In return, HES outlined the most prominent heritage assets from their prospective, that lie within close proximity to the proposed wind farm, that should be taken into consideration in regards to turbine placement and height. Wireframes and/or photomontages of several assets have been completed and are incorporated into the EIAR.

Dumfries and Galloway Council – Landscape Architect

3.6.23 One key factor in determining the viability of the proposed wind farm was the Dumfries and Galloway Local Development Plan (adopted in October 2019), Wind Energy Spatial Framework 'MAP 8', which identifies the development site as an 'Area with potential for wind farm development'. Notwithstanding this CWL and the Applicant sought guidance from the Dumfries and Galloway Landscape Architect both at scoping and thereafter.

3.6.24 The Dumfries and Galloway Councils response to the scoping request failed to include any representations from their Landscape Architect and referred only to the characteristics of the various landscape character types that may be affected by the proposed development. This provided only the planning and policy guidance background as captured in the Councils adopted Development Plan. Site specific comments were limited only to the viewpoint selection and sensitive receptors to be considered.

3.6.25 Comments from the Dumfries and Galloway Council Landscape Architect to the scoping request were subsequently submitted to the Applicant on 4th June 2020, some thirteen months later. Unfortunately, this delay meant the wind farm design and LVIA methodology, visualisations and figures were already completed, before this response was issued.

Local Communities

3.6.26 CWL have actively engaged with of the local host communities though meetings with Community Councils and public exhibitions. Community Councils were also invited to respond to the Applicants scoping request.

3.6.27 In July 2019, three public exhibitions were held introducing the communities to the proposal and providing them with the opportunity to ask questions and comment on the proposal. These comments fed directly into the final design of the wind farm.

3.6.28 Further meetings with Community Councils were held throughout February and March 2020, providing local residents and businesses with an update on the evolving design and development programme.

3.6.29 Below is a summary of the points that were raised by communities during these consultations. More detail can be found in the Pre-Application Consultation report which accompanies this application. (Note: Turbine numbers referred to below are for those featured in Figure 3.3).

- Members of the community raised concerns over turbines (Scoping Layout Numbers) T52-T55 and their proximity to the Dryfe Archaeologically Sensitive Area (ASA).;
- The proximity of turbines T52, T53, T54, T55, T57, T58, T10 and T09 and their visual impact on the village of Boreland and some of the more sensitive receptors such as the village Church;
- The LVI of turbine T74, T75, T77 and T78 on the town of Moffat;
- The potential for increased flooding or the exacerbation of flooding which occurs in the Dryfe Valley, as a result of increased felling of commercial forestry and an increase in non-permeable surfaces.;
- Access travelling through Boreland and North Milk could lead to a severe degradation of roads and significant disturbance to the residents who live on those roads.;
- Concerns on cumulative LVI with the operational and consented schemes in the area;
- Proximity of turbines to local properties;
- The impact that the proposal could have on local tourism. Many local people operate their own tourist businesses; and
- The impact of Turbine Aviation Lighting on the Moffat dark sky area.

Turbine Layout Considerations

Environmental Considerations

3.6.30 During the iterative site design and development, extensive site surveys on a number of key environmental receptors were undertaken. These can be found below:

- Desk based assessment and spatial mapping of known constraints (E.g. Watercourses and Environmental Designations);
- Phase 1 & Phase 2 peat surveys;
- Phase 1 and NVC habitat surveys;
- Two years of Ornithology surveys;
- Ecology and Protected Mammal surveys;
- Cultural Heritage walkovers and site visits;
- Extensive site reconnaissance visits over 3 years;
- Landscape and visual fieldwork and site visits;
- Private water supply source visits; and
- Background noise monitoring from local properties.

Technical Constraints

3.6.31 Community Windpower have engaged with BT, Atkins and JRC to establish if there are likely to be any impacts on microwave links as a result of the development.

3.6.32 When the final turbine design was established earlier in 2020, Community Windpower re-contacted each of the consultees listed above with the final turbine layout.

3.6.33 All three consultees responded to confirm that they still anticipated no interference with their operational and planned links.

Site Design Principles and Efficiency

3.6.34 Due to the improvements in technology, turbines can be built bigger which results in greater efficiency and capacity. Not only does the capacity of the turbines increase, but so does the capacity factor. Whitelee Wind Farm anticipates operating at a capacity factor of 27%[1], whereas Scoop Hill Community Wind Farm expects a capacity factor of around 50% and a conservative figure of 45% is used in this EIAR. The ability to utilise larger turbines results in some immediate changes to the design methodology.

3.6.35 In recent months, the developer of the nearby Hopsrig, Crossdykes and Loganhead wind farms, have applied to Dumfries and Galloway Council, to increase the tip height of all turbines across the three developments. The new heights of these turbines would mean that there would be 22 turbines between the height of 174m and 180m to tip, and a further 8 turbines at 200m to tip. This helps to highlight that larger, more efficient turbines are becoming the new 'normal' when it comes to wind farm design.

3.6.36 Smaller turbines could typically use a spacing method of one and a half times the rotor diameter in the non-prevailing wind direction and three times the rotor diameter in the prevailing wind direction. In larger turbines using this method of spacing would result in significant wake increases and wake loss. It could also potentially lead to increased wear and tear on the turbines, subsequently leading to greater downtime of the turbines as increased maintenance and repairs are required.

3.6.37 In order to reduce this wake loss, spacing is increased to three and a half times the rotor diameter in the non-prevailing wind direction and five times the rotor diameter in the prevailing wind direction. This leads to significant improvements to wake loss but decreases the density of turbines per hectare (ha). This means when comparing the proposal with older projects, turbines may appear sporadic and spread out.

3.6.38 The Applicant and CWL have approached the Scoop Hill development with the aim of maximum efficiency and minimal impact on the surrounding area. By reducing the total number of turbines, the footprint of the site becomes much smaller, leading to a reduction in length of access tracks and the number of borrow pits that are required and other associated infrastructure.

3.6.39 Utilising a modern layout design set out above provides the following benefits;

- Reduced total number of excavations;
- Reduced removal of peat;
- Reduced likelihood of peat slide;
- Reduced number of abnormal loads;
- Reduced felling requirement which utilises keyhole felling;
- Increased site efficiency, adverting greater quantities of greenhouse gases; and
- Reduced ecological impact on sensitive receptors.

[1] https://www.scottishpower.co.uk/whitelee/

Turbine Tip Height Increase

3.6.40 As detailed above, a number of turbines have either been removed or relocated into the centre of the development area, in order to reduce the impact of the development on a number of key receptors, including LVI impacts from Moffat, Boreland and the ASA.

3.6.41 This has increased the density of the core development area, reducing the distance between turbines, which has often been a criticism of new developments with larger turbines.

3.6.42 This has led however to a slight decrease in site efficiency, as result of the increase in turbulent airflow. In order to rectify this issue some turbines were subsequently uplifted from the original 240m tip height, to 250m tip height. Although a small increase in height (10m), this has led to a combined increase in efficiency of up to 5%.

3.6.43 As well as increase in performance, increasing the distance between the tree canopy and the lowest blade sweep point provides a number of other benefits, particularly to bats and forestry. For instance, by increasing the distance between the tree canopy and lowest blade sweep point, the impact which turbines could potentially have on bats is reduced and the quantity of commercial forestry to be removed is reduced.

3.6.44 When evaluating whether a turbine was suitable for an increase in tip height, considerable thought was given to the LVI impact on key receptors such as the Dryfe ASA, the village of Boreland and the town of Moffat and the approaches to the town.

3.6.45 This was done by using the detailed viewpoint list and feedback from the site visits and fieldwork by CWL's LVI consultant Optimised Environments Ltd (OPEN), alongside the response from North Milk Community Council, to create wireframes using the ReSoft WindFarm Software. This allowed the impact of any tip height changes (increased or decreased) to be evaluated per turbine. Only where turbines posed no additional impact, were they chosen for an increase in height.

3.6.46 As a result, turbines which are in the centre of the of the development and to the east, situated in extensive commercial forestry have been increased in height by 10m from the turbine layout submitted at scoping. All turbines which are 225m and 250m tip heights are located within LCA 19a, which in Dumfries and Galloway Councils wind farm capacity study (2017) can cater for turbines taller than 150m.

3.6.47 As a result of this change, the proposed wind farm is able to operate at an efficiency greater than the proposed scoping layout, despite the loss of three turbines and height reduction of more than 53 other turbines, to reduce the LVI.

3.6.48 Table 3.4 summarises the various stages of the wind farm layout iteration process undertaken for the Scoop Hill Community Wind Farm proposal.

Turbine Layout in the South of the Development

3.6.49 During the scoping consultation response, North Milk Community Council commented that turbines T52, T53, T54, T55, T57, T58, T10 and T09 (See Figure 3.3) and their visual impact on the village of Boreland and some of the more sensitive receptors such as the village Church, was especially high.

3.6.50 Also, to the south of the development area, lies the Dryfe Archaeological Sensitive Area (ASA) (number 20, DGC, 2018) which is an area of archaeological importance as designated by DGC. Through site design and evolution, the development boundary has been altered to move the development out with of the ASA.

3.6.51 Within the ASA is Rangecastle hill (Viewpoint 5). This viewpoint aided in the design and layout of turbines and was consequently also part of the reasoning behind the reduction in height and removal in a number of turbines in the southern areas of the development.

3.6.52 Turbines T52, T53, T54, T55, T57, T09 and T10 from the scoping layout as presented in Figure 3.3 have been removed or relocated in the development area and T58 has been moved north-west by 500m. This has increased the distance from the nearest turbine between the development and the village of Boreland by 1.8km. The turbine in closest proximity is now 4km away.

3.6.53 In addition, 53 turbines, have been reduced in height to 180m, 200m and 225m tip heights. All turbines within 6km of the village of Boreland have been reduced by 40m in height. This has reduced the LVI on a number of sensitive receptors in the south of the development area, including Boreland Church (Viewpoint 6 in Section 6) and the Dryfe Archaeological Sensitivity Area (ASA).

3.6.54 In response to the concerns over aviation lighting for turbines greater than 150m to tip, a number of photomontages can be found in Section 6 which provide an illustration of how it may appear from 3 viewpoints which forms the night time lighting assessment by OPEN. It is also important to note that the EIAR will determine the worst-case scenario with all turbines being lit with 2,000 candela (cd) lighting. This is a worst case scenario, and a more likely scenario will also be demonstrated using 200 cd lighting. Furthermore, CWL and the Applicant are committed to investigating the possibility of using a radar-activated lighting system which would reduce the impacts of turbine lighting and subsequent LVI.

3.6.55 The development boundary also surrounds Dryfe Water Site of Special Scientific Interest (SSSI), designated for its upland mixed ash woodland, therefore necessary measures will be taken to assure no impact on the SSSI, particularly during construction.

Area of deep peat in the South-east of the Development

3.6.56 Although indicated to be only class 3 peat (Figure 3.9), further peat surveys were conducted across the south-east of the development.

3.6.57 Initial phase 1 peat surveys indicated that there were areas of peat which were deeper than a significant majority of the development. Phase 2 peat surveys showed in greater detail that in the south-east of the development, near Sandyford, there were increased amounts of peat.

3.6.58 In order to minimise the impact on these deeper peat areas, a number of turbines have been relocated and adjusted to minimise the impact;

- Turbines T03, T04, T05, T07, and T13 (Turbine numbers as referred to in Figure 3.3) have all been moved to areas of lower peat within the immediate area;
- Turbines T08 and T15 have been relocated to other areas of the site where peat depth is substantially lower.

3.6.59 The average peat depth across the development is 0.39m.

3.6.60 The Peat Management Plan (Section 10 - Appendix 10.3) provides further detail in addition to the approach to peat excavation, use and reinstatement.

Turbine Layout in the North of the Development

3.6.61 During community consultation with residents living in the Moffat area, some raised concerns that turbines on the northern ridges of the development which are visible from some parts of the Moffat area, were too big and too close.

3.6.62 In order to alleviate some of these concerns, tip heights of these turbines have been reduced by 60m and T78 (from the scoping layout in Figure 3.3) has been re-located within the development.

3.6.63 When making this decision, particular attention has been paid to the tourist route A701 north of Moffat (Viewpoints 10 and 12) as well as Moffat High Street (Viewpoint 9).

3.6.64 Some turbines which have been relocated from the south of the development have been relocated in the north-eastern sections of the development area.

3.6.65 Using wirelines, it was established that this area would be most suitable for additional turbines as the extent of visibility from residential areas is far less due to the elevation of the topography in this area which provides screening. In addition, the impact on other environmental features was considered low.

3.6.66 As mentioned prior, the north-east of the development is the only location where class 1 peat can be found, as seen in Figure 3.9. More details phase 1 and phase 2 peat surveys around turbine 75 indicated peat depths of only 0.3m.

3.6.67 The remaining class 1 peat located near met mast A and turbine 21, was found to have deeper peat but ranged from 0.1m to 1.8m. Due to the presence of higher quality peat, all of the access tracks located within the class 1 peat will be floated to reduce the impact on high quality soils. Track typologies can be found in Figure 10.3.1 of the PMP.

Turbine Layout in the East of the Development

3.6.68 Utilising the responses and comments from consultees in the Scoping Opinion from the ECU, it was established that the area of least sensitivity to wind farm development was in the heavily forested east of the development area.

3.6.69 Here there is a significantly reduced population and reduced clusters of residential housing. In addition, much of the eastern boundary falls within the LCT 19a, which due to its dense and extensive commercial forestry, has a lower sensitivity to wind farms over 150m tall (Dumfries and Galloway Council wind farm capacity study, 2017).

3.6.70 Due to the extensive commercial forestry in this area, there are far fewer instances of higher sensitive habitats, such as GWDTE. There are however increased numbers of some species of mammals, such as bats. Increasing the distance between the edge of the tree canopy and the lowest point of the turbine blades, significantly reduces the impact which turbines may have on bats.

3.6.71 This area also has low peat depths, which reduce the peat landslide risk and reduce the total quantity of peat being removed. Of the 28 turbines in the eastern forestry cluster, only 9 of these have peat depths greater than 0.5m and none have a depth greater than 1.0m.

3.6.72 When re-locating turbines from more sensitive areas in the south of the development and some parts of the northern edge of the development area, the eastern area was identified as the most suitable. This is due to its lower sensitivity to environmental factors, as mentioned above.

3.6.73 It was also determined to be the ideal location to increase turbine density and increase turbine tip heights to 250m without significantly increasing the environmental impact or visual impact.

3.6.74 Although there is no viewpoint as it was determined via a desktop based viewshed study there was no visibility, the development in the east considered the sensitive report of the Samye Ling monastery, when locating turbines.

Turbine Layout in the West of the development

3.6.75 The western areas of the development area are situated within a predominantly upland farming landscape, with large existing infrastructure such as the West Coast Main line, A74M and 274kv line connecting to the Bearholm Substation.

3.6.76 There are also a number of residential clusters in the Wamphray area, therefore in order to reduce the impact of the development, turbines are located more than 1.5km from the development boundary. This has meant the relocation of T62 from the scoping layout (Figure 3.3), to a location elsewhere within the development boundary.

3.6.77 Also, all turbines along the western edge of the development have been reduced by 40m to 200m tip heights.

3.6.78 Located within this area are some more sensitive habitats, namely some GWDTE's. Where possible turbines have been placed out with of the SEPA recommended buffer of 250m buffer from a GWDTE. Further information can be found in Section 8: Ecology of the EIAR.

Table 3.4 – Summary of the Evolution of the Wind Farm Layout

Layout	Development Stage/Date	Description	No. turbines	Figure No.
A	Pre-scoping Report 2016	Initial turbine layout developed based on initial desktop assessments and initial site visits, 90 turbines proposed at 150 m to tip and a total capacity of 360MW.	90	3.2
B	Scoping Report April 2019	Revised layout issued as part of the 2019 Scoping Report. Following a more detailed site investigation, ongoing changes within the Onshore Wind sector, and availability of new land areas, it was decided to use larger turbines. Wind flow modelling illustrated that the revised, larger turbine layout provides greater wind capture and greater turbine performance, which would be beneficial in the post-subsidy era of Onshore Wind. Tip heights were increased to 240m, thus the separation between turbines increased. This resulted in a total of 80 turbines with an increased capacity of 560MW as 7MW turbines could be implemented.	Maximum of 80	3.3
		Following a re-assessment of environmental and technical constraints within and near the development area, several turbine clusters were re-located and/or re-adjusted following the increase in turbine size.		
C	August 2019	Following scoping responses, community consultation and meetings with local people, the Applicant and CWL endeavoured to meet all appropriate recommendations. Several turbines were re-located or removed to reduce LVI and impact on the Dryfe Archaeological Sensitive Area and larger population areas such as Boreland and Moffat. This included detailed analysis of turbine visibility and views from key viewpoints including Samye Ling, Boreland Church, Moffat High Street, A401 north of Moffat, Southern Upland way and Range Castle Hill. Following this, all turbines were initially reduced to 200m tip heights and turbines T52, T53, T54, T55, T57, T58 were either removed or relocated further into the development. Initial survey results from some of the consultancy works such as phase 1 peat surveys and ecology & ornithology surveys, were also taken into consideration.	78	3.4
D	Final Turbine Layout	This is the final turbine layout submitted with this application. From the previous layout, T09 and T10 were moved further north in the development to reduce views from the Dryfe Water Valley and Range Castle Hill. T72, T74, 75 and T77 were dropped from 200m to tip to 180m to tip, whilst T78 was removed completely. This was to reduce the visual impact on Moffat even further. T62 was removed to reduce visual impact on residential receptors in the Wamphray area. The final wind turbine design contains 75 wind turbines, 4 at 180m to tip, 2 turbines at 225m to tip, 47 at 200m to tip and 22 turbines at 250m to tip. Turbines in most appropriate areas were increase to 250m tip heights. This counteracts a decrease in turbine spacing to increase turbine density in parts of the development with reduced turbine visibility. It was at this stage that wind farm infrastructure was also added to the final layout, this included hardstands and access tracks which were designed to avoid sensitive areas where possible, as well as minimise visual impact. Other infrastructure, including construction compounds,	75	3.5

		substations, borrow pits and a meteorological mast. The final design was further refined with advice and recommendations from the EIA consultants and key consultees. The wind turbines were also re-numbered to give continuity after turbines were removed from the scheme.		

3.6.79 The different stages of the wind farm iteration process are shown in Figures 3.2 to 3.5 and the final turbine and infrastructure layout is illustrated in Figure 3.6

3.7 Site Infrastructure Evolution and Design

Consideration of Environmental Factors

3.7.1 When designing site infrastructure such as access tracks, hardstands, borrow pits, substation and control room , significant consideration has been given to all environmental receptors.

3.7.2 These key environmental receptors are included in the respective sections within this EIAR but are also listed below;

- Cultural Heritage;
- Ecology;
- Ornithology;
- Hydrology, geology and hydrogeology;
- Landscape and Visual.

3.7.3 When designing the associated wind farm infrastructure, some basic principles have been followed to reduce the likelihood of any environmental impact.

3.7.4 The local cultural and historical asset data set was provided by the Archaeology Officer at Dumfries and Galloway Council to Headland Archaeology. Using this data set, which was checked with onsite field surveys by Headland, a 10m buffer was placed on all assets to protect them from possible direct effects.

3.7.5 Using the hydrological network data set, provided by Ordnance Survey, a 50m buffer was placed on all watercourses, to protect against any potential pollution. The only exception to this rule is where an access track needs to cross a watercourse and therefore a watercourse crossing is required. These have been assessed in the Watercourse Crossing Assessment in Appendix 10.1 of Section 10.

3.7.6 In the following subsections, for each of the infrastructure pieces listed in 3.7.1, there is more specific information about how the environmental receptors listed as part of 3.7.2 have shaped the design of the wind farm.

Access Tracks and Hardstands

3.7.7 From the early stages of the wind farm design, particular attention has been paid to the existing forestry access tracks.

3.7.8 Experienced civil engineers from Community Windpower are satisfied that the existing access track quality, is suitable for that of wind farm usage, both in construction, operation and decommission.

3.7.9 Therefore, in order to minimise the construction of new access tracks, this existing network has been utilised to its full extent.

<u>Landscape and visual</u>

3.7.10 Where possible when designing access tracks and hardstands, they have been routed in a way that minimises additional landscape and visual effects as a result of the wind farm development. The following were fundamental when designing the site access tracks:

- Use of existing tracks and openings within the site wherever possible;
- Avoidance of watercourses to minimise the need for culverts and watercourse crossings;
- Minimal land take once on-site to ensure landowners could continue to maximise agricultural land use; and
- Design the shortest route possible allowing for all of the above considerations.

3.7.11 The design of the access tracks has been completed in accordance with Nature Scot guidelines 'Constructed Tracks in the Scottish Uplands', as well as requirements from turbine suppliers regarding minimum bend radii, maximum slope gradients and frequency of passing places. In order to satisfy Nature Scot guidelines and turbine manufacturer guidance, the tracks have been designed to reflect the topography of the site. The tracks therefore follow the natural contours where possible and follow a sweeping, sinuous route in order to avoid the introduction of incongruous linear forms into the landscape.

3.7.12 In addition, the existing landform has been utilised to screen sections of access tracks. This has reduced the visibility of access tracks from outside of the development boundary considerably.

3.7.13 The very limited visibility of site infrastructure, which ensures that the disruption and potential clutter of access tracks and other infrastructure is avoided.

<u>Peat</u>

3.7.14 There are only isolated pockets of deep peat within the development boundary. In some instances, it has not been possible to avoid these locations and instead an engineered mitigation is proposed.

3.7.15 Details of the proposed floating roads can be found within the Peat Management Plan.

<u>GWDTE</u>

3.7.16 When designing the access tracks within the development boundary, careful consideration has been given to both the access track route and the type of construction to be used for the access track.

3.7.17 Where possible access tracks have avoided GWDTE's and remain outside their respective 100m buffer. In some instances, an engineered approach has had to be considered. Several access tracks are to be floating tracks removing any potential impact on GWDTE.

Borrow Pits

3.7.18 When choosing the locations for borrow pits, key environmental factors have been considered including but not limited to: geology, peat, watercourses and GWDTE.

Peat

3.7.19 Using the initial phase 1 peat surveys, borrow pits have been positioned where peat depths are only 0.5m or less. These can be classed as peaty soils, thus the total extraction of peat is zero.

3.7.20 Further information in regard to peat can be found in Section 10: Hydrology in Technical Appendix 10.3: Peat Management Plan.

GWDTE

3.7.21 All borrow pits have been positioned more than 250m from the nearest GWDTE. Therefore no impact is predicted. Appropriate pollution prevention methods can be found in the outline CEMP.

Ecology

3.7.22 In a previous iteration of the wind farm infrastructure design, an additional borrow pit was located in the north-west of the development.

3.7.23 However, upon further ecological surveys it was discovered that the borrow pit was located in close proximity to either one or a series of badger sets. It was therefore decided that this borrow pit was removed.

3.7.24 The location of badger sets can be found within the confidential annex.

Substation & Control Room and Energy Storage Facilities

3.7.25 Prior to the establishment of GWDTE communities, utilising local geology data to locate high productivity baseline geology which would lead to the creation or possibility of a GWDTE community was used.

3.7.26 Using this data, it was determined that the initial siting of the substation and its associated infrastructure would have directly impacted highly sensitive GWDTE habitat.

3.7.27 To rectify this, the substation and associated infrastructure was relocated more than 250m south so that it was out with of this sensitive habitat.

3.7.28 This movement can be seen in Figure 3.7.

3.7.29 This movement however may cause a small increase in the zone of theoretical visibility. This is a necessary balancing act however, where one environmental receptor takes precedence over another.

3.8 Final Turbine and Infrastructure Locations

3.8.1 The final turbine layout has been designed to effectively capture the energy from the wind in order to maximise the energy yield from the site, whilst minimising potential impacts to the environment. This EIAR reports on the final layout selected for this development.

3.8.2 The final design of the wind farm features 75 turbines comprising:

- 4 wind turbines will have a maximum tip height of 180m;
- 47 wind turbines will have a maximum tip height of 200m;
- 2 wind turbines will have a maximum turbine height of 225m; and
- 22 wind turbines will have a maximum tip height of 250m.

3.8.3 The candidate turbines have a rated capacity of 7 MW, so the combined generating capacity of the wind farm will be around 525 MW.

3.8.4 Following consultation during the scoping process, CWL and the Applicant has endeavoured to address the majority of the landscape and visual concerns raised by local communities and statutory consultees and ultimately reduce the footprint of the wind farm infrastructure. This has subsequently involved a reduction in the scheme from the first layout design in Figure 3.2 of up to 90 turbines down to 75 turbines.

3.8.5 The results of the site evolution and design process demonstrate that the turbine layout is considerably improved and refined in terms of the visual impact from key viewpoints. The resultant reduction in the scheme to 75 turbines and the further reduction in height of the majority of turbines is considered to be an appropriate number of turbines to be accommodated on the site, within the design parameters.

3.8.6 The benefits of the final turbine and infrastructure layout are as follows:

- Reduces the prominence of a number of turbines from key viewpoints;
- Reduces the potential visual appearance of turbines in residential areas;
- South-westerly turbines have been removed which tightens up the layout and reduces the overall development envelope;
- Turbines and infrastructure have been located out with of areas of deepest peat wherever possible, to protect the valuable carbon store. Where this is not possible, suitable mitigation has been provided;
- The layout is more cohesive and reduced the number of 'clusters' within the development area;
- Consideration has been given to the existing core path network and where possible turbines have been located more than 200m from core paths. Upgrades to the core path network and additional walking routes are suggested in the Commitment to Communities report;
- Keeping turbines in the less sensitive landscapes of Southern Uplands, Foothills and Foothills with forestry reduces the visual impact;
- Existing forestry and agricultural access tracks and existing quarries/borrow pits have been utilised where possible to reduce the requirement for new access tracks, gates and new borrow pits; and
- Reduction in the quantity of commercial forestry felling by utilising taller turbines.

3.9 Conclusion

3.9.1 The site selection process has identified that Scoop Hill is an excellent location for a wind farm and the following exceptional circumstances warrant its development:

- The site is located over 5 km from Moffat and 11.5 km from Lockerbie, hence it is significantly distant from local towns and villages;
- Of most importance the site possesses exceptionally high average wind speeds, well above 7 m/s. It is anticipated that the capacity factor will be 45% for the Scoop Hill scheme;
- The wind farm will harnesses the latest technological advancements in wind turbine technology, allowing more efficient and productive wind turbines to contribute to the ambitious targets as set out in the Scottish Energy Strategy (2017b);
- The development falls almost entirely within the preferred area for wind farms, as seen in Figure 3.8 and Map 8 within the Dumfries and Galloway Council Local Development Plan 2 (2019);
- The site is located significantly in an area of extensive commercial forestry in an upland setting, which has been identified by the local authority as one of the best places for large wind farm developments;

- Proximity to the A74M allows for access to the development with less disruption than more rural and isolated development;
- A valuable and significant contribution to energy supplies can be achieved relatively quickly once planning permission is granted, thus positively contributing towards the Scottish Governments renewable energy targets for 2030 and net-zero by 2045;
- The wind farm would generate clean, green electricity, using the natural resource of the wind, powering over 572,000 homes and displacing almost 37 million tonnes of carbon dioxide over the 40 year operational lifetime of the wind farm;
- The wind farm development would deliver significant economic investment in to the local area and Scotland as a whole, through business and job opportunities, local expenditure, development of community assets and community benefit funding for local host communities.

3.9.2 The final layout of the turbines and site access tracks has been developed through an iterative design process based upon the assessment of technical, planning and environmental constraints and following extensive consultation with key consultees, communities and EIAR consultants.

3.9.3 For all these reasons, CWL and the Applicant believe this final scheme is an appropriate and well-designed scheme, strategically located in an established and accepted wind farm landscape, is sustainable, and will deliver a substantial contribution towards Scotland and UK targets for renewable energy generation, helping to a achieve net-zero energy mix and a reduction in carbon dioxide emissions.

References

National Grid (2019) Future Energy Scenarios. (Online) Available at https://www.nationalgrideso.com/sites/eso/files/documents/fes-2019.pdf [Accessed July 2020]

Scottish Development International (2011) 'Renewables' (Online) Available at: https://www.sdi.co.uk/business-in-scotland/key-sectors/renewables [Accessed July 2020]

Scottish Government (2017a) The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. Scottish Executive Planning Department. [Accessed July 2020]

Scottish Government (2017b) *The future of energy in Scotland: Scottish energy strategy*. Energy, Environment and Climate Change Department. [Accessed July 2020].

Nature Scot (2015) 'Spatial Planning for Onshore Wind Turbines – Natural Heritage Considerations' (Online) Available at: https://www.nature.scot/sites/default/files/2017-06/A1663759.pdf [Accessed July 2020]

The Environmental Change Institute (2005) *Wind Power and the UK Wind Resource*. University of Oxford.

Vivid Economics and Imperial College (2019) Accelerated electrification and the GB electricity system. (Online) Available at https://www.vivideconomics.com/wp-content/uploads/2019/08/20191027-CCC-Accelerated-Electrification-final-report.pdf [Accessed July 2020]

Appendix 3.1 – Third Party Sites

Wind Farm	Status	Approx. Distance from the proposed development	Description
Andershaw	Operational	35km	14 turbines 125m tip height
Auldton Farm	Consented	47km Note. this development lies out with the 45km radius but has been included in the assessment as it forms part of a cluster that lies partly within 45km	1 turbine 67m tip height
Barrel Law	Nb Barrel Law was refused at appeal in December 2019, subsequent to the cumulative cut-off date. Barrel Law is shown on the figures but is not included in the written assessment.		
Beck Burn	Operational	29km	9 turbines 126.5m tip height
Birkhill		46km n.b. this development; lies out with the 45km radius but has been included in the assessment as it forms part of a cluster that lies partly within 45km	2 turbines 99.9m tip height
Black Brow	Consented	43km	1 turbine 74m tip height
Blackcraig	Operational	42km	23 turbines 110m tip height
Broken Cross	Consented	45km	7 turbines 126.5m tip height
Broken Cross Resubmission	Application	45km	10 turbines 149.9m tip height
Broken Cross Surface Mine	Consented	44km	2 turbines 55.7m tip height
Cloich Forest	Consented	43km	18 turbines 115m tip height
Clyde and Extension	Operational	15km	206 turbines 125/125.5/142m tip height
Craig and Extension	Operational	14km	6 turbines (5 operational) 99.5m tip height
Crookedstane	Consented	21km	4 turbines 126.5m tip height
Crossdykes	Consented	8km	10 turbines 176.5m tip height
Cumberhead	Application	49km	14 turbines 149.9/180m tip height
Dalswinton	Operational	19km	15 turbines 125m tip height
Dalquhandy	Application	48km	15 turbines 131/149.9m tip height
Douglas West	Consented	43km	13 turbines 126.5m tip height
Douglas West Extension	Application	44km	13 turbines 200m tip height
Eastertown	Operational	46km n.b. this development; lies out with the 45km radius but has been included in the assessment as it forms part of a cluster that lies partly within 45km	1 turbine 67m tip height
Ewe Hill	Operational	10km	22 turbines 109.6m tip height
Faw Side	Application	12km	45 turbines 175/200m tip height
Galawhistle	Operational	45km	22 turbines 121.2m max. tip height
Glenkerie	Operational	25km	11 turbines 105/120m tip height
Glenkerie Extension	Consented	25km	6 turbines 100m tip height
Glenmuckloch	Consented	44km	8 turbines 149.9m tip height
Glentaggart	Application	38km	5 turbines 132m tip height
Great Orton	Operational	42km	6 turbines 68.5m tip height
Hagshaw Hill & Extension	Operational	44km	46 turbines 55/80m tip height
Hagshaw Hill Repowering	Application	44km	14 turbines 200m tip height
Hallburn	Operational	34km	6 turbines

Wind Farm	Status	Approx. Distance from the proposed development	Description
			126.5m tip height
Harestanes	Operational	10.5km	68 turbines 125m tip height
Hazelside Farm	Under construction	43km	2 turbines 74m tip height
Hellrigg	Operational	44km	4 turbines 121m tip height
Hopsrig	Consented	10km	12 turbines 140m tip height
JJ's Farm	Consented	46km n.b. this development; lies out with the 45km radius but has been included in the assessment as it forms part of a cluster that lies partly within 45km	1 turbine 99m tip height
Kennoxhead	Consented	43km	19 turbines 180m tip height
Langhope Rig	Operational	29km	10 turbines 121.2m tip height
Lethans	Consented	44km	22 turbines 136/149.9/152/176m tip height
Lethans Resubmission	Application	44km	22 turbines 176/200/220m tip height
Lion Hill	Consented	17km	4 turbines 126.5m tip height
Little Hartfell	Consented	6km	9 turbines 160m tip height
Loganhead	Consented	11km	8 turbines 135m tip height
Lorg	Consented	44km	9 turbines 130/149.9m tip height
Lorg Variation	Application	44km	9 turbines 149.9m tip height
Middle Muir	Operational	35km	15 turbines 136/152m tip height
Midtown Farm	Operational	42km	1 turbine 74m tip height
Minnygap	Operational	9km	10 turbines 125m tip height
Minsca	Operational	13km	16 turbines 120m tip height
Nether Fauldhouse	Consented	44km	1 turbine 77m tip height
Netherhall Farm	Operational	46km n.b. this development; lies out with the 45km radius but has been included in the assessment as it forms part of a cluster that lies partly within 45km	1 turbine 67m tip height
North Lowther	Application	29km	30 turbines 149m tip height
Nutberry	Operational	48km	6 turbines 125m tip height
Orton Grange Farm	Operational	45km	1 turbine 67m tip height
Orton Park	Operational	45km	2 turbines 86.5m tip height
Penbreck	Consented	44km	8 turbines 145m tip height
Pines Burn	Consented	35km	12 turbines 130/149.9m tip height
Pines Burn variation	Application	35km	12 turbines 149.9m tip height
Plascow Farm	Operational	42km	3 turbines 76.5m tip height
Plascow Farm Extension	Consented	42km	1 turbine 86.5m tip height
Poniel	Consented	42km	3 turbines 100m tip height
Priestgill	Consented	29km	7 turbines 145m tip height
Sandy Knowe	Consented	43km	24 turbines 125m tip height
Sanquhar	Operational	42km	9 turbines 126.5m tip height
Sanquhar 'Six'	Consented	44km	6 turbines 130m tip height
Sanquhar II	Application	38km	50 turbines 149/200m tip height
Solwaybank	Under construction	17km	15 turbines

Wind Farm	Status	Approx. Distance from the proposed development	Description
			126.5m tip height
Spital Sykes Farm	Operational	43km	1 turbine 67m tip height
Sunnyside Farm	Operational	38km	2 turbines 62m tip height
Tempest Tower	Operational	42km	1 turbine 54.7m tip height
Todhills, Blackford	Consented	37km	1 turbine 67.5m tip height
Troston Loch	Application	43km	14 turbines 149.9m tip height
Twenty Shilling	Under construction	34km	9 turbines 125m tip height
Twenty Shilling Resubmission	Application	34km	9 turbines 140m tip height
Wether Hill	Operational	43km	14 turbines 91m tip height
Whitelaw Brae	Consented	17km	14 turbines 133.5m tip height
Whiteside Hill	Operational	40km	10 turbines 121.2m tip height
Windy Edge	Consented	28km	9 turbines 110/125m tip height
Windy Edge variation	Application	28km	9 turbines 110/149.9m tip height

374 Scoop Hill

Legend

- Site Boundary
- Residential Buffer (1000m)
- Watercourse Buffer (50m)
- Railway Buffer (275m)
- Road Buffer (275m)
- Site of Special Scientific Interest (SSSI)
- Special Protection
- Ancient Woodland
- Semi-Natural Woodland
- Scheduled Monuments
- Listed Buildings
- Gardens and Designated Landscapes
- Conservation
- Archaeologically Sensitive Area

Notes: N/A
Revisions: N/A

0 500 1,000 2,000 m

Scale: 1: 55,000 @ A3

N

Figure 3.1: Constraints Assessment

Date: 27/07/2020 Ref: 374-191107-7205-A

Produced: DR Reviewed: SM Approved: GC

community windpower
Godscroft Lane
Frodsham - WA6 6XU
t: 01928 734544 f: 01928 734790
e: info@communitywindpower.co.uk w: www.communitywindpower.co.uk

374 Scoop Hill

Legend

- Site Boundary
- Wind Turbine (150m to Tip)

Notes: N/A
Revisions: N/A

0 500 1,000 2,000 m
Scale: 1:55,000 @ A3

N

Figure 3.2 - Layout A

Date: 28/07/2020 Ref: 374-191107-7206-A
Produced: DR Reviewed: SM Approved: GC

community windpower
Godscroft Lane
Frodsham - WA6 6XU
t: 01928 734544 f: 01928 734790
e: info@communitywindpower.co.uk w: www.communitywindpower.co.uk

374 Scoop Hill

Legend

- Site Boundary
- Wind Turbine (240m to Tip)

Notes: N/A

Revisions: N/A

0 500 1,000 2,000 m

Scale: 1:55,000 @ A3

N

Figure 3.3 - Layout B

Date: 28/07/2020 Ref: 374-191107-7207-A

Produced: DR Reviewed: SM Approved: GC

community windpower

Godscroft Lane
Frodsham - WA6 6XU
t: 01928 734544 f: 01928 734790
e: info@communitywindpower.co.uk w: www.communitywindpower.co.uk

374 Scoop Hill

Legend

- Site Boundary
- Wind Turbine (200m to Tip)

Notes: N/A
Revisions: N/A

0 500 1,000 2,000 m
Scale: 1:55,000 @ A3

N

Figure 3.4 - Layout C

Date: 28/07/2020 Ref: 374-191107-7208-A
Produced: DR Reviewed: SM Approved: GC

community windpower
Godscroft Lane
Frodsham - WA6 6XU
t: 01928 734544 f: 01928 734790
e: info@communitywindpower.co.uk w: www.communitywindpower.co.uk

374 Scoop Hill

Legend

- Site Boundary
- Wind Turbine (180m to tip)
- Wind Turbine (200m to tip)
- Wind Turbine (225m to tip)
- Wind Turbine (250m to tip)

Notes: N/A
Revisions: N/A

0 500 1,000 2,000 m
Scale: 1:55,000 @ A3

N

Figure 3.5 - Final Layout

Date: 28/07/2020 Ref: 374-191107-7209-A
Produced: DR Reviewed: SM Approved: GC

community windpower
Godscroft Lane
Frodsham - WA6 6XU
t: 01928 734544 f: 01928 734790
e: info@communitywindpower.co.uk w: www.communitywindpower.co.uk

374 Scoop Hill

Legend

- Site Boundary
- Wind Turbine (180m to tip)
- Wind Turbine (200m to tip)
- Wind Turbine (225m to tip)
- Wind Turbine (250m to tip)
- Permanent Met Masts
- Access Tracks
- Site Entrance
- Existing Access Tracks to be Upgraded
- Substation & Control Room
- Substation & Control Room Construction Compound
- Temporary Construction Compound
- Borrow Pit
- Existing Quarries or Borrow Pit
- Borrow Pit Area of

Notes: N/A
Revisions: N/A

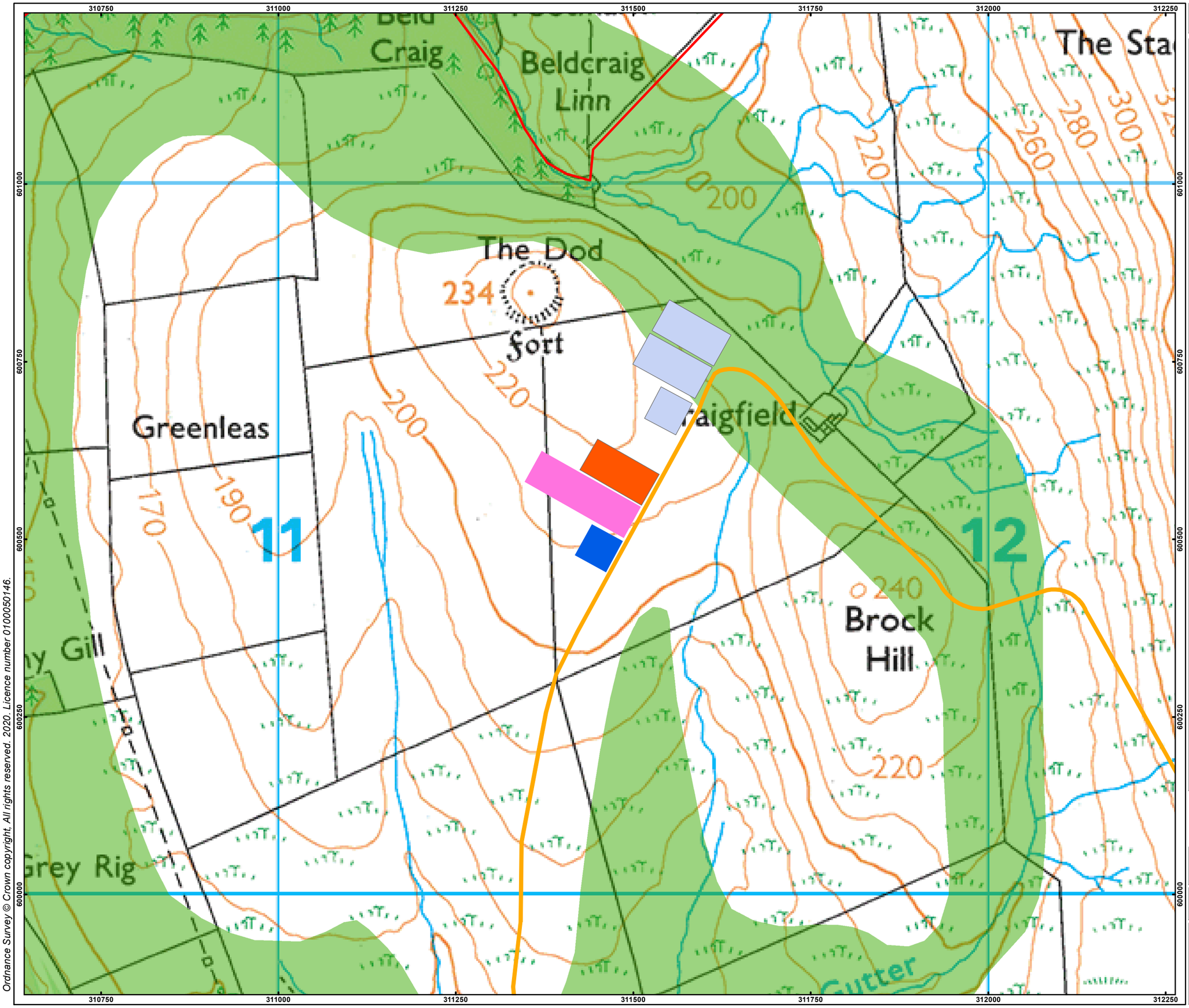
0 500 1,000 2,000 m
Scale: 1:55,000 @ A3

N

Figure 3.6 - Final Layout with Infrastructure

Date: 28/07/2020	Ref: 374-191107-7210-A	
Produced: DR	Reviewed: SM	Approved: GC

community windpower
Godscroft Lane
Frodsham - WA6 6XU
t: 01928 734544 f: 01928 734790
e: info@communitywindpower.co.uk w: www.communitywindpower.co.uk



374 Scoop Hill

Legend

- Site Boundary
- Access Tracks
- Substation & Control Room
- Substation & Control Room Construction Compound
- Temporary Construction Compound
- Intergranular & Fracture Flow; Very High Productivity
- Original Siting of Infrastructure

Notes: Substation and Control Room specification updated between final and orginal location.
Revisions: N/A

0 62.5 125 250 m

Scale: 1:5,000 @ A3

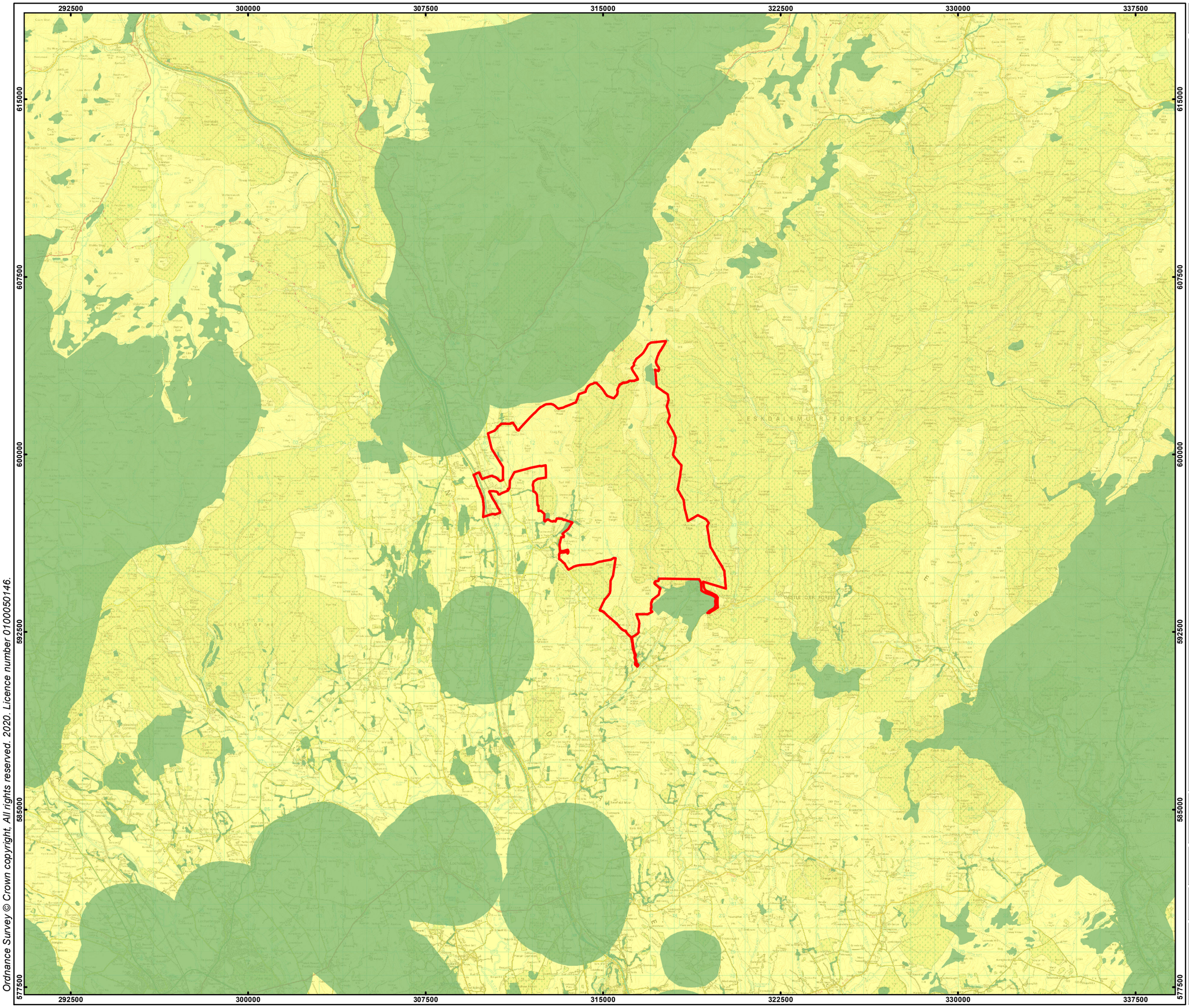
N

Figure 3.7 - Re-Siting of Substation and Associated Infrastrcture

Date: 14/01/2020 Ref: 374-200729-7364

Produced: DR Reviewed: SM Approved: GC

community windpower
Godscroft Lane
Frodsham - WA6 6XU
t: 01928 734544 f: 01928 734790
e: info@communitywindpower.co.uk w: www.communitywindpower.co.uk



374 Scoop Hill

Legend

- Site Boundary
- Areas of Significant Protection
- Areas with Potential for Wind Farm Development

Notes: N/A
Map 8 of the Spatial Framework for Onshore Wind Farms within Dumfries and Galloway Councils Local Development Plan 2
Revisions: N/A

0 1,875 3,750 7,500 m

Scale: 1:150,000 @ A3

N

Figure 3.8 - DGC LDP2 Wind Farm Spatial Framework

Date: 30/07/2020 Ref: 374-200730-7373

Produced: DR Reviewed: SM Approved: GC

community windpower
Godscroft Lane
Frodsham - WA6 6XU
t: 01928 734544 f: 01928 734790
e: info@communitywindpower.co.uk w: www.communitywindpower.co.uk

374 Scoop Hill

Legend

- Site Boundary
- Wind Turbine (180m to tip)
- Wind Turbine (200m to tip)
- Wind Turbine (225m to tip)
- Wind Turbine (250m to tip)
- Permanent Met Masts
- Access Tracks
- Site Entrance
- Existing Access Tracks to be Upgraded
- Substation & Control Room
- Substation & Control Room Construction Compound
- Temporary Construction Compound
- Borrow Pit
- Existing Quarries or Borrow Pit
- Borrow Pit Area of Search

Carbon and Peatland (SNH) Class:

- Class 1
- Class 2
- Class 3
- Class 4
- Class 5
- Class 0: Mineral soils
- Class -1: Unknown soil type
- Class -2: Non-soil

Notes: N/A
Revisions: N/A
Layout: 374-191212-9018

0 500 1,000 2,000 m

Scale: 1:55,000 @ A3

N

Figure 3.9 - Carbon and Peatland (NatureScot) Classification

Date: 06/08/2020 Ref: 374-200805-7387
Produced: DR Reviewed: SM Approved: GC

community windpower
Godscroft Lane
Frodsham - WA6 6XU
t: 01928 734544 f: 01928 734790
e: info@communitywindpower.co.uk w: www.communitywindpower.co.uk