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Abbreviations

AWI	Ancient Woodland Inventory
CCA	Coastal Character Area
CEMP	Construction Environmental Management Plan
DEMP	Decommissioning Environmental Management Plan
EclA	Ecological Impact Assessment
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
GDL	Garden and Designated Landscape
GHG	Greenhouse Gas
GVA	Gross Value Added
GWDTE	Groundwater Dependant Terrestrial Ecosystem
ha	Hectare
HIP	Heritage Interpretation Plan
HGV	Heavy Goods Vehicle
IEMA	Institute of Environmental Management and Assessment
ITPE	ITPEnergised
km	Kilometre
LCT	Landscape Character Type
LCU	Landscape Character Unit
LLA	Local Landscape Area
LNCS	Local Nature Conservation Site
m	Metre
m/s	Metre per second
MW	Megawatt
NAC	North Ayrshire Council
NOABL	Numerical Objective Analysis Boundary Layer
NTS	Non-Technical Summary
NVC	National Vegetation Classification
PMP	Peat Management Plan
PSHRA	Peat Slide Hazard and Risk Assessment
SLA	Special Landscape Area
SPA	Special Protection Area

SSSI Site of Special Scientific Interest
WoSAS West of Scotland Archaeology Service

1 Background

- 1.1 This document is a Non-Technical Summary (NTS) of the Rigghill Wind Farm Environmental Impact Assessment (EIA) Report which supports the application by Rigghill Wind Farm Ltd (the Applicant) for the development of a wind farm (the Proposed Development) in North Ayrshire.

Background and Needs Case Considerations

- 1.2 The Applicant is preparing an application for the construction, operation and decommissioning of the Proposed Development, located approximately 1 km south-east of Skelmorlie in North Ayrshire.
- 1.3 The science behind climate change is well established and points strongly towards a need to reduce our reliance on fossil fuels in order to avoid negative economic, environmental and social effects. International and European commitments to reducing CO₂ and other greenhouse gas emissions and tackling climate change have been made by all major economies. In response to these issues, The UK has made significant, legally binding commitments to increase the use of renewable energy. As recently as May 2019, the Scottish Government announced its intention to set a legally binding goal to achieve net-zero greenhouse gas emission by 2045 at the latest (Scottish Government, 2019). The Proposed Development relates directly to both the need and those commitments.
- 1.4 The Applicant believes in engaging with the community from the onset of the project and ensuring that any changes to accommodate local views are incorporated where possible. All of their projects are developed with a strong commitment to local communities to ensure that local amenities are protected where possible, environmental effects are minimised, and local employment opportunities and community benefit funds are provided to maximise local benefits.

Site Selection

- 1.5 The location of the Proposed Development site was selected as part of a nationwide search for potential wind farm sites by the Applicant.
- 1.6 The Applicant considered 120 potential sites throughout the UK to establish the most appropriate locations for a wind farm development. This review included consideration of:
- Scottish Planning Policy;
 - international, national and local designated sites;
 - initial assessment using the Numerical Objective Analysis Boundary Layer (NOABL) database to ensure wind speeds greater than 7 m/s at 45 m height;
 - transport facilities;
 - operating airports;
 - reasonable proximity to a potential grid connection point;
 - distance from residential receptors; and
 - other operational, consented or in planning wind farm developments.
- 1.7 Of the initial sites investigated, the Applicant elected to progress with more detailed feasibility studies for approximately 20 sites, of which the Proposed Development site was one.
- 1.8 The Proposed Development site (refer to Figure 1) was identified as a suitable development site and further work was undertaken to establish feasibility of development and the potential scale and capacity of potential wind energy generation at the site. Further details can be found in Chapter 2 of the EIA Report.

2 Purpose of the Proposed Development EIA Report

- 2.1 ITP Energised (ITPE) was appointed by the Applicant to undertake an EIA of the Proposed Development in accordance with The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the EIA Regulations'). The EIA process is the systematic process of identifying, predicting, evaluating, and mitigating the environmental impacts of a proposed development.
- 2.2 The EIA process is reported in this EIA Report, which identifies the methodologies used to assess the environmental effects predicted to result from the construction and operation of the Proposed Development. Where appropriate, it also sets out mitigation measures designed to prevent, reduce and, if at all possible, offset potential significant adverse environmental impacts. An assessment of residual effects, those expected to remain following implementation of mitigation measures, is also presented.

3 Availability of the Proposed Development EIA Report

- 3.1 Copies of the Proposed Development EIA Report are available from:
Info@burcotewind.com
Rigghill Wind Farm Limited, 15 Furzton Lake, Shirwell Crescent, Furzton. Milton Keynes. MK4 1GA
Electronic copies of the EIA Report can be accessed at Info@burcotewind.com
- 3.2 Hard copies of the NTS are available free of charge from the Applicant, a hard copy of the EIA Report Volumes 1, 2, 3 and 4 are available for £1,250.00 (including printing and distribution). In addition, all documents are available (as a PDF for screen viewing only) on a DVD for £10.00.

4 Representations to the Application

- 4.1 Any representations to the application should be made directly to North Ayrshire Council (NAC) at: eplanning@north-ayrshire.gov.uk

5 Site Location and Description

- 5.1 The Proposed Development site is located east of Skelmorlie, North Ayrshire. It comprises of the western extent of Ferret of Keith Moor and the upper part of Skelmorlie Glen. The central grid reference for the site is British National Grid 221492, 666156 and it occupies an area of approximately 328 hectares (ha). The elevation of the site ranges from approximately 40 m AOD in the western extent of the site area and rises to approximately 245 m AOD at the eastern corner of the site. The site location and site boundary are shown in Figure 1.



Figure 1. Site Location

5.2 The site comprises largely of open upland. Skelmorlie Glen Site of Special Scientific Interest (SSSI), which carries Skelmorlie Water, is located within the centre and western boundary of the site and is designated for upland mixed ash woodland (refer to Chapter 7 for further details). Skelmorlie Water bisects the site, entering the Proposed Development boundary at its north-eastern extent and exiting at its south-western extent.

6 Design Process

6.1 The design of the Proposed Development has undergone several iterations of turbine and infrastructure layout. It has taken into consideration factors including comments received from consultees, environmental constraints, visual effects and landscape character. The following principles were adopted during the design iterations to ensure that the final design was the most suitable for the site:

- ▶ maximising wind yield and maintaining adequate spacing between turbines;
- ▶ avoiding areas of peat where reasonably practicable;
- ▶ a minimum buffer of 50 m being maintained around watercourses for turbines and disturbance limited to as per best-practice guidance;
- ▶ consideration of key views, in particular from Outerwards, Roman fortlet;
- ▶ a minimum buffer of 85 m being maintained between turbines and woodland bat features and a minimum buffer of 30 m being maintained between turbines and trees with identified bat roost potential;

- ▶ a buffer zone of approximately 200 m north and 300 m south of the Fardens property following the identification of bat roosts;
 - ▶ a minimum buffer of 60 m being maintained between turbines and the Renfrewshire Heights Special Protection Area (SPA), abutting the northern edge of the site boundary; and
 - ▶ avoiding inconsistent turbine spacing, such as relatively large gaps, outliers or excessive overlapping turbines to minimise visual confusion and ensure a balance/compact array from key views.
- 6.2 The Proposed Development layout put forward in the EIA Report is considered to represent the most appropriate design while maximising the generating capability of the site. The process of design iteration is explained fully in Chapter 2 of the EIA Report.

7 Description of the Development

The Proposed Development

- 7.1 The Proposed Development comprises ten stand-alone, three bladed horizontal axis turbines of up to a maximum height 149.9 m from ground to blade tip when vertical. The overall capacity of the Proposed Development will be approximately 42 megawatts (MW).
- 7.2 The proposed locations of the ten turbines, together with their access tracks, substation and temporary construction compounds are shown on Figure 2.
- 7.3 A micro-siting allowance of up to 50 m in all directions is being sought in respect to each turbine and its associated infrastructure in order to address any potential difficulties which may arise in the event that preconstruction surveys identify unsuitable ground conditions or environmental constraints that could be avoided. It is proposed that the micro-siting of all infrastructure will be subject to an appropriately worded planning condition.
- 7.4 A number of ancillary elements are also proposed, including a temporary construction compound, permanent hardstandings adjacent to the wind turbines for installation and maintenance cranes, temporary laydown areas adjacent to the wind turbines, external transformers, internal access tracks, borrow pit, underground cables between turbines, an on-site substation compound and a permanent meteorological monitoring mast. A full description of the Proposed Development can be found in Chapter 3 of the EIA Report.

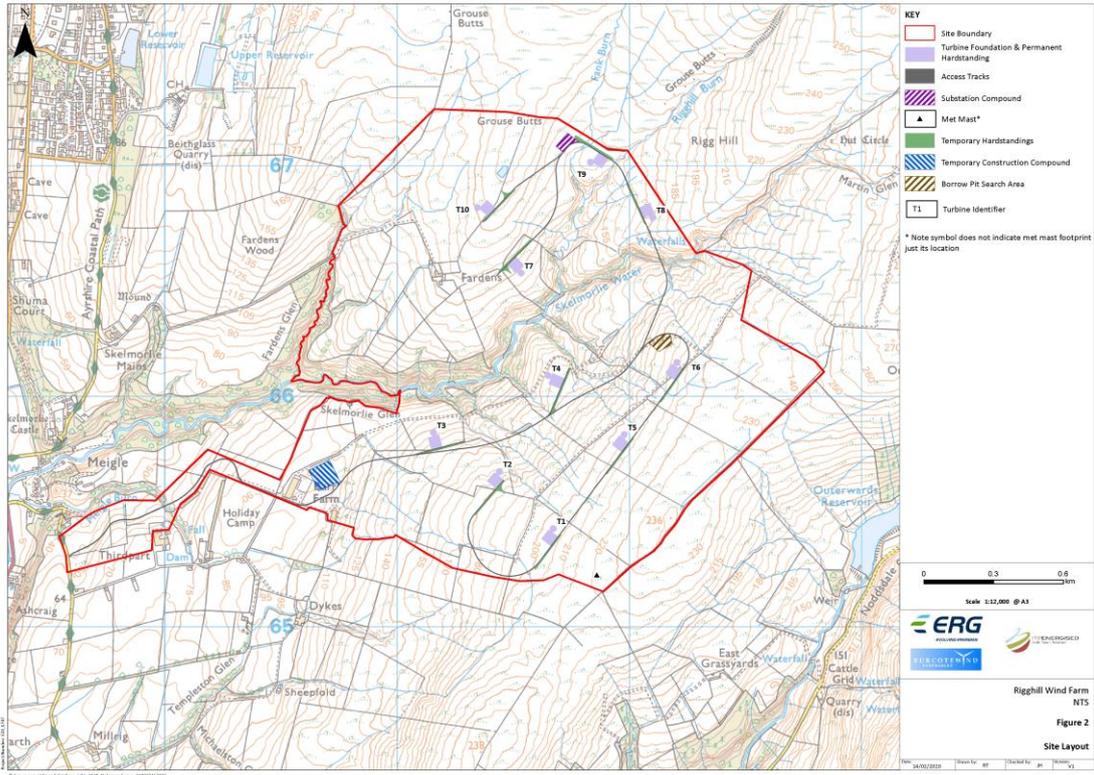


Figure 2. Proposed Development Site Layout

Construction

- 7.5 The estimated on-site construction period for the Proposed Development is expected to take approximately 14 months and includes a programme to reinstate all temporary working areas. Normal construction hours will be between 07:00 and 19:00 Monday to Friday and 08:00 to 18:00 at weekends. These times have been chosen to minimise disturbance to local residents and if required to be restricted this will be agreed with NAC by an appropriately worded condition. Details of the construction programme will be provided to NAC in a Construction Environmental Management Plan (CEMP) prior to the commencement of construction.
- 7.6 The construction programme will consist of the following principal operations, listed sequentially where possible; the Proposed Development will likely be phased so that certain activities will take place concurrently:
- ▶ construction of the construction compound and establishment of a storage area for wind farm components and temporary site facilities;
 - ▶ construction of access tracks, including construction of drainage, and excavation of cable trenches;
 - ▶ construction of wind turbine foundations, crane pad hardstanding areas, met mast and substation;
 - ▶ cable laying;
 - ▶ erection of wind turbines;

- ▶ connection of on-site electrical power and signal cables;
 - ▶ commissioning of the site equipment; and
 - ▶ site reinstatement and restoration of temporary works areas.
- 7.7 As soon as practical, once installation is complete, the immediate construction area will be restored to its original profile, although the crane hardstanding's will be retained for future maintenance. The topsoil will be replaced and reseeded where appropriate and as advised by an on-site Environmental Clerk of Works (ECoW). The ECoW will be responsible for pre-construction surveys and will be onsite through construction and post-construction as required. Further details of their role will be provided in the CEMP.
- 7.8 The Applicant will ensure that the all construction traffic will be routed as agreed with NAC and Transport Scotland, to minimise disruption and disturbance to local residents. Further details regarding transport and access can be found in Chapter 11 within the EIA Report.

Operation and Maintenance

- 7.9 Most of the operation of the Proposed Development will be automatic, with turbine operation managed by control and monitoring systems to control the rotational speed of each individual turbine and ensure its continued safe operation.
- 7.10 The lifetime of the Proposed Development is envisaged to be 30 years from final commissioning to commencement of decommissioning. Regular maintenance and servicing will be performed on each turbine. Additionally, there may be a need to conduct irregular, ad hoc maintenance in the event of breakdown.

Decommissioning

- 7.11 At the end of the Proposed Development's operational lifespan of 30 years, it will be decommissioned, unless subject to a successful new planning application for repowering. It is expected that decommissioning will take approximately 12 months. The environmental effects of decommissioning are considered to be the same or less than those during construction, and over a shorter time period.
- 7.12 Prior to decommissioning, a Decommissioning Environmental Management Plan (DEMP) will be produced to reflect then current legislation and policy and will be agreed with the relevant statutory authorities.

8 Consultation

- 8.1 Consultation remains a critical component of the EIA process. In order to inform the EIA, there has been on-going consultation with statutory consultees, engagement through the formal EIA Scoping process and subsequent discussions, correspondence and meetings as required. Full details of these are provided within each technical chapter of the EIA Report.

Public/Community Consultation

- 8.2 The Applicant has consulted widely with the general public/local community on the Proposed Development, including holding community consultation events and presentations at community council meetings. Full details of all the public consultation that has been undertaken can be found within the Pre-Application Consultation (PAC) Report.

9 Environmental Impact Assessment (EIA)

9.1 The EIA considers the effects of the Proposed Development during construction, operation and decommissioning on the following topics:

- ▶ landscape and visual (effects to the character of the landscape and views from agreed locations);
- ▶ ornithology (the effects to birds and protected bird habitats);
- ▶ ecology (the effects to protected habitats, flora and fauna, excluding birds);
- ▶ noise and vibration (effects to local properties from noise and vibration caused by the Proposed Development);
- ▶ cultural heritage (direct effects and indirect effects on historic assets);
- ▶ geology, peat, hydrology and hydrogeology (the effects to surface water, peat resources, ground water, rocks and soils);
- ▶ traffic and transport (effects from traffic travelling to, and from, the Proposed Development);
- ▶ socio-economics, tourism and recreation (effects to the local and national economy, local tourism businesses, recreation facilities, and the change in use of the land at the site of the Proposed Development);
- ▶ aviation and radar (effects to civil and military aviation facilities and air space);
- ▶ shadow flicker (effects caused by the passing of the turbine blades in front of the sun); and
- ▶ telecommunications (effects to telecommunications links)

9.2 Chapter 4 of the EIA Report describes the EIA process in more detail.

9.3 For each topic, the existing conditions (the baseline) were identified, the effects of the Proposed Development on these conditions assessed (the likely effects) and the standard best practice mitigation for those receptors identified. Potential effects are assessed to determine which are significant and on what scale. Mitigation measures have then been proposed to minimise or avoid adverse effects where required. Following this, an assessment was undertaken of the effects of the Proposed Development on the existing conditions taking into consideration the proposed mitigations (the residual effects) to identify significant and non-significant residual effects. An assessment of the cumulative effects of the Proposed Development in combination with other existing and proposed developments in the local area, primarily wind farms, was also undertaken.

9.4 A summary of the baseline conditions, the proposed mitigation and the resulting residual effects for each topic is provided below. Full details of the EIA for each of the topics are provided in Chapters 5 to 15 of the EIA Report.

Landscape and Visual

9.5 The full assessment of effects on landscape and visual amenity is provided in Chapter 5 of the EIA Report.

9.6 The assessment of landscape and visual effects has been carried out to identify the significant effects that are likely to arise as a result of the Proposed Development. It has considered the effects on landscape and visual receptors, as well as the cumulative effect of the Proposed Development in addition to other wind farm developments. The process involved identifying those receptors with potential to be significantly affected and assessing the potential impacts that the construction and operation of the Proposed Development will give rise to.

- 9.7 The study area for the Proposed Development covers a radius of 40 km and within this area, those receptors with the potential to be significantly affected have been assessed in detail. This has included two landscape elements, 11 Landscape Character Types / Units (LCTs / LCUs), four Coastal Character Areas (CCAs), five designated landscapes, one Wild Land Area and 15 representative viewpoints. Photomontages have been prepared for 14 viewpoints. The figures also include a wireline of the Proposed Development on its own and wirelines with all other cumulative developments. These visualisations have helped assist in the assessment process.
- 9.8 In respect of the physical effects on landscape elements, the assessment found that the direct effect on the rough grass moorland and trees as a result of the construction of the Proposed Development will be not significant. The losses will comprise only a small proportion of a much wider landscape resource.
- 9.9 In respect of effects on landscape character, the assessment found there will be significant effects within an approximate 4 to 5 km radius of the Proposed Development, with five LCTs / LCUs either wholly or partially significantly affected. These LCUs are all close to the site, located across the higher elevated uplands to the north or east, the lower-lying valley to the south-east and south, or the coastal landscape to the west, where a closer association with the site occurs. All LCTs / LCUs beyond this radius will not be significantly affected. Of the four CCAs considered around the Upper Firth of Clyde, the assessment found that no significant effects will arise.
- 9.10 In respect of landscape designations, the assessment found that there will be no significant effects on national landscape designations within the study area, including Mount Stuart GDL. There would, however, be significant effects on the regional landscape designations of the North Ayrshire SLA and West Renfrew Hills LLA out to approximately 4 to 5 km from the Proposed Development, in line with the extent of significant effects assessed in respect of the LCTs / LCUs. These significant effects would also arise across the corresponding parts of the Waterhead – Muirshiel Wild Land Area and the Clyde Muirshiel Regional Park, although the very localised extent of these effects means that the effect on these areas as a whole would be not significant.
- 9.11 In respect of effects on visual amenity, of the 15 viewpoints assessed, the assessment found that ten will be significantly affected during the construction and operational phases of the Proposed Development. These viewpoints are all located within an approximate 12 km radius of the Proposed Development. The viewpoints will mostly be affected owing to either their close proximity to the construction / decommissioning works and operation of the Proposed Development, or their greater sensitivity. Not all viewpoints within this 12 km radius will be significantly affected and all viewpoints beyond will not be significantly affected as a result of the Proposed Development.
- 9.12 The most relevant wind farms to the cumulative assessment are operational or under construction and these form part of the baseline situation. The assessment of the Proposed Development in addition to the cumulative situation is covered by the main assessment as this takes into account all the relevant operational and under construction wind farms. There will be no significant cumulative effects largely owing to the separation distance of a minimum 9 km between the Proposed Development and any of the cumulative wind farms, the relatively small scale of the cumulative wind farms, both in terms of the number of turbines and their size, and the relatively small scale of the Proposed Development, in terms of the number of turbines, albeit of a larger scale. These factors result in wind farms not being a prevailing characteristic of landscape character or visual amenity.
- 9.13 The Residential Visual Amenity Assessment (RVAA) concludes that significant effects were found to arise in respect of 13 of the 52 properties. However, none of these properties has the potential to reach the Visual Amenity Threshold.
- 9.14 In summary, the Proposed Development will give rise to significant effects on landscape character and associated regional landscape designations during the construction, operation and decommissioning of the Proposed Development, albeit contained within the localised extent of approximately 4 to 5 km. It will give rise to significant effects on visual amenity out to approximately

12 km during the construction and operation of the Proposed Development. The fact that seven of the 12 viewpoints lie within the first 3 to 4 km of the Proposed Development raises the likelihood for significant effects to arise in respect of the representative viewpoints and highlights the localised nature of actual visibility.

- 9.15 While landscape and visual receptors beyond these ranges may be affected by the influence of the Proposed Development, these effects will not be significant. There will be no significant cumulative effects. In respect of the wider 40 km study area, all effects will be close range and this reflects the natural containment of the site owing to its relatively low-lying location and enclosure from the higher uplands to the north, east and south-east. The extent to which the Proposed Development will be visible is limited in comparison to the typical extent of visibility of other wind farms of this scale.
- 9.16 All effects during the construction of the Proposed Development will be short-term and reversible and all effects during the operation of the Proposed Development will be long-term and reversible. All effects are assumed to be adverse in nature

Ornithology

- 9.17 The full assessment of effects on ornithology (bird life) is provided in Chapter 6 of the EIA Report.
- 9.18 The ornithology assessment evaluated the bird interest at the site and determined the nature conservation importance of this interest. It considered the potential effects of the Proposed Development on birdlife, drawing on information from desk studies, consultations and field surveys.
- 9.19 Following consultation with Scottish Natural Heritage, a suite of ornithological surveys was adopted for the purposes of assessing the avian baseline conditions for the Proposed Development. The surveys included: 24 months of vantage point surveys (updating earlier surveys carried out in 2011-2014), while breeding bird surveys, breeding raptor surveys and winter walkover surveys were all undertaken between 2012-2016.
- 9.20 Five species of high conservation value raptor and owl, and four species of common raptor and owl were registered during the breeding season. None were assessed as breeding within the site or within the 2 km survey area. Greylag goose was recorded during the non-breeding season. Five species of gull were recorded during both the breeding and non-breeding seasons. Three species of waders were recorded during all surveys, two of which were assessed as probably or possibly breeding within the Study Area and the third (golden plover) was a brief winter visitor. Black grouse lek surveys were completed in 2013 confirming no birds within the development area and 1.5 km survey buffer. As none of the other ornithological surveys registered any black grouse, they have been assessed as absent from the study area.
- 9.21 The levels of recorded flight activity are considered to be relatively low and recorded at risk flight time facilitated collision risk modelling for one target species only: osprey. In addition, due to close proximity of the Renfrewshire Heights Special Protected Area (SPA) which is designated for its breeding population of hen harrier, scenario modelling was undertaken in order to assess the potential impacts on the SPA population if breeding returned to levels recorded at the point of citation (i.e. 10 breeding pairs) as compared to the current situation where no breeding pairs are recorded.
- 9.22 An assessment of ornithology effects arising from the construction, operation and decommissioning of the Proposed Development was undertaken, based on the proposed layout and turbine dimensions. Through a standardised evaluation method, Important Ornithological Features were identified and brought forward for assessment. These features include two designated sites (Renfrewshire Heights SPA/SSSI; Renfrewshire Heights Important Bird Area) and five species and species groups (curlew, osprey, hen harrier, gull species and other (passerine) species).

- 9.23 In line with industry guidelines and best practice, the impact assessment process assumes the application of standard mitigation measures. With these in place, predicted effects were considered to be barely perceptible and therefore not significant for all Important Ornithological Features. With further specific mitigation detailed, residual impacts for construction and operation phases are considered to have barely perceptible adverse significance, i.e. not significant. Given the site's proximity to the adjacent SPA (and the unfavourable declining status of the qualifying feature), a "shadow" Habitats Regulations Appraisal was undertaken, based on a theoretically recovered population, and found the operation of the Proposed Development would not affect the integrity of the SPA and its conservation objectives.
- 9.24 Likely cumulative effects of nearby operational developments, as well as those currently consented or at application stage of planning, were also considered and no significant cumulative effects are anticipated as a result of the Proposed Development.
- 9.25 The assessment concludes that there would be no significant adverse effect on any of the ornithological interests of the site, as a result of the Proposed Development.

Ecology and Nature Conservation

- 9.26 The full assessment of effects on ecology and nature conservation is provided in Chapter 7 of the EIA Report.
- 9.27 An assessment of terrestrial ecology effects arising from the construction, operation and decommissioning of the Proposed Development was undertaken, based on the current Proposed Development layout and turbine dimensions. A range of ecological studies were undertaken, to identify the terrestrial ecological interests of the Proposed Development site and to establish the ecological baseline for the ecological impact assessment (EclA). This included identification of existing wildlife records and nearby sites designated for nature conservation and survey of the habitats and faunal interests of the site. Field surveys were undertaken for: habitats, both Phase 1 habitat survey and National Vegetation Classification (NVC) survey, including consideration of groundwater-dependent terrestrial ecosystems (GWDTEs); badger; otter; bat species; and fish (additional species covered for the main site access included red squirrel, pine marten and water vole).
- 9.28 The site chosen for the Proposed Development is primarily open hill livestock grazing on the edge of an area upland moor (primarily sheep on the northern area and a mix of sheep and cattle to the south of the glen). The habitat is one of primarily grassland, though the most north-eastern locations of the Proposed Development infrastructure is on the edge of the moorland blanket bog, which is relatively shallow at this point. Much of the Skelmorlie Glen is covered by a mix of wet and oak woodland, with oak woodland extending up the Rigghill and Fank burns, with the Skelmorlie Water flowing through a gorge for much of its length within the application boundary. The woodland is classed as Ancient (of semi-natural origin) on the Ancient Woodland Inventory (AWI), and carries a SSSI designation for a large expanse and has Local Nature Conservation Site (LNCS) status to either side of the SSSI
- 9.29 Otter use of the Skelmorlie Water catchment was found to be extremely limited, partially explained by unpassable gorge waterfalls preventing migratory fish access to the upper catchment, though a resident brown trout population has been identified. Badger use of the Skelmorlie Glen area has also been established.
- 9.30 Bat species have been identified to be using the area, primarily the edge habitat of the glen woodland. Potential roosting features have also been identified on the route of the main site access to Barr Farm from the public road network.
- 9.31 No other protected or otherwise notable species have been recorded using the site.

- 9.32 Assessment indicates that no significant impacts are predicted to habitats or species, though a permanent minor change is predicted for the upper section of the LNCS and negligible adverse effects are predicted for the short to long term, for the terrestrial IEFs.
- 9.33 No significant residual effects are predicted.
- 9.34 No cumulative effects on the site terrestrial ecological interests are predicted from in-combination interaction between the Proposed Development and similar wind farms in the surrounding 10km.

Noise

- 9.35 The full assessment of noise and vibration effects is provided in Chapter 8 of the EIA Report.
- 9.36 An assessment of noise and vibration effects arising from the construction, operation and decommissioning of the Proposed Development has been undertaken. This has involved deriving suitable noise limits in accordance with current policy and guidance and with reference to baseline noise data obtained from surveys at nearby noise-sensitive receptors. Noise levels expected to be generated by the Proposed Development have been modelled based on a candidate turbine of the scale and capacity likely to be constructed and predicted noise levels at noise-sensitive receptors have been compared with the derived limits. Cumulative effects have also been assessed by considering noise from other operational, consented or proposed (in planning) wind energy developments in the vicinity.



Figure 3: Noise surveying equipment

- 9.37 Construction and decommissioning noise and vibration has been considered and assessed; potentially significant noise and vibration effects have been identified during the construction phase, associated with construction of the access track. Mitigation has been specified such that appropriate measures to control construction noise and vibration will be implemented, in line with good practice.
- 9.38 Significant noise effects have been identified during the operational phase when the Proposed Development is operating at the closest noise-sensitive receptors to the west and south-west, whereby predicted noise levels exceed the derived noise limits by up to 1.7 dB during the daytime period. A commitment has been made to address these exceedances through appropriate turbine selection, or an operational noise management plan, such that the residual significance of daytime operation noise effects has been reduced to “not significant”.
- 9.39 During the night-time period predicted noise levels meet the derived noise limits at all noise-sensitive receptors. Operational noise effects have therefore found to be not significant during the night-time period.
- 9.40 Few potentially cumulative developments have been identified in the study area, and the assessment addresses cumulative noise by derivation of appropriate noise limits for the Proposed Development, which take the consented noise limits of cumulative developments into account and no significant effects were identified.

Cultural Heritage

- 9.41 The full assessment of effects on cultural heritage and archaeology is provided in Chapter 9 of the EIA Report.
- 9.42 This assessment identifies the archaeological and cultural heritage value of the site and surrounding study area and assesses the direct and indirect likely significant effects on archaeological features and heritage assets resulting from the construction, operation and decommissioning of the Proposed Development. The assessment also identifies measures that should be taken to mitigate predicted likely significant adverse effects and reports on the residual impact of the Proposed Development on heritage assets.
- 9.43 This assessment has identified 31 known heritage assets within the site boundary. These assets range between the Roman and the modern period. A minor and not significant direct effect has been identified on any surviving remains associated with the possible route of the Roman road between Laxlie Hill and Blackhouse Manor. Additionally, the identification of archaeological remains of prehistoric to post-medieval date in and around the site indicate the potential for hitherto unknown sub-surface archaeological deposits. Where possible, the Proposed Development has been designed to avoid direct impacts upon known heritage features within the site.
- 9.44 Given the known remains and potential for archaeological remains to survive within the site, a programme of archaeological works to investigate, record and mitigate against the possibility of uncovering hitherto unknown remains will be undertaken. Mitigation works will include; fencing of all known heritage assets within 50 m of working areas to prevent inadvertent damage to them; an archaeological watching brief undertaken on a representative proportion of ground-breaking works. A phase of further archaeological evaluation (non-intrusive and/or intrusive) based on the projected route of the Laxlie Hill and Blackhouse Manor Roman road will also be undertaken. Details of mitigation will be agreed with West of Scotland Archaeology Service (WoSAS) on behalf of NAC through a Written Scheme of Investigation.
- 9.45 Potential indirect effects on the settings of 37 designated heritage assets have been considered in detail as part of this assessment. A potential moderate and significant operational effect on the setting of Outerwards, Roman fortlet has been identified. The Proposed Development layout has been designed to minimise impacts upon the setting of the fortlet through the deletion and location of turbines and imposition of a 1 km buffer to ensure that the turbines do not dominate the setting of the fortlet. The design of the Proposed Development means that views towards the Firth of Clyde would still be permeable, although altered, and the Proposed Development will only have an impact on one sightline from the fortlet. It would still be possible to understand the monument as a defensive site set in a strategic location with extensive views of the landscape, particularly key areas of transition. The key relationship between the fortlet and land to the north, east and south, as well as the key relationship of the fortlet with the Roman road which is aligned through it would also be unaffected. The fort survives as a subtle landscape feature and is not visible at any distance and thus there would be no effect on views towards the fort from across the landscape. Thus, the overall integrity of the setting of the monument would not be adversely affected.
- 9.46 Interpretation and further survey works of a Roman road possibly located within the site and the wider Roman landscape will be undertaken as compensatory mitigation, as part of a Heritage Interpretation Plan (HIP), to partially offset potential impacts of the Proposed Development on the setting of heritage assets in its vicinity. The HIP would include a programme of archaeological evaluation, community survey and excavation works within the proposed development site, focusing specifically on the Roman road network hypothesised by Newall (1976) to pass through the Proposed Development site but about which very little is currently known. Subsequent interpretation, undertaken as part of the HIP, would enhance our understanding of the historic landscape setting of Outerwards, Roman fortlet. Improved access and interpretation both on site and remotely (i.e. interpretation hubs, guided school visits, education packs, Historic Environment

- Record enhancement) would also enhance visitors' experience of heritage in the area and of the countryside in general.
- 9.47 Survey and excavation works would focus on the landscape setting of the fortlet rather than the fortlet itself and thus no proposals would be put forward that would require Scheduled Monument Consent. The setting effect on Outerwards, Roman fortlet would remain significant.
- 9.48 All operational effects upon the settings of heritage assets would be reversed with the removal of the turbines following decommissioning, leading to a neutral residual effect
- 9.49 The possibility of cumulative effects has been assessed. No significant cumulative effects were identified.

Geology, Peat, Hydrology and Hydrogeology

- 9.50 The full assessment of effects on geology, peat, hydrology and hydrogeology is provided in Chapter 10 of the EIA Report.
- 9.51 The assessment examines the potential impacts of the Proposed Development on geology, peat, hydrology and hydrogeology resources. This includes detailed consideration of potential impacts on surface watercourses, groundwater and the local geology in and around the site and any potential impacts on flood risk in the local area. Potential impacts on peat deposits, and risks associated with peat slide, are also assessed.
- 9.52 A combination of desk study and field survey work was undertaken to identify and characterise the geological, hydrological and hydrogeological receptors which could be subject to impacts from construction, operation and decommissioning of the Proposed Development. Field survey work included a peat depth survey, watercourse crossing survey and National Vegetation Classification (NVC) survey to identify potential groundwater dependent terrestrial ecosystems (GWDTE). This has also been expanded upon through consultation, as part of the EIA process for the Proposed Development.
- 9.53 Surface water drainage from the site flows into local watercourses including the Skelmorlie Water and the Noddsdale Water, which themselves flow westward, ultimately draining into the Firth of Clyde.
- 9.54 24 new water crossings will be required, where access tracks will need to traverse watercourses. One existing watercourse crossing will need to be upgraded.
- 9.55 The site is mainly underlain by the Kelly Burn Sandstone Formation and is overlain by diamicton till, with the exception of the north-north-eastern section of the site where the bedrock is exposed.
- 9.56 Some localised pockets of peat are recorded on published geological mapping and a peat depth survey has identified minimal peat (all instances at a depth of less than 1 m) across the Proposed Development area, with the majority of probes (96.5 %) identifying either peaty soils or no peat. A Peat Slide Hazard and Risk Assessment (PSHRA) has been completed alongside the peat survey work.
- 9.57 Potential construction, operational and decommissioning effects arising from the Proposed Development (in the absence of mitigation) include changes to groundwater flow; removal of, and impact on, peat; pollution impact from silt-laden runoff and chemical contaminated runoff; impact from soil compaction; impact on integrity of banking; direct discharge of untreated foul drainage;; impact on fluvial geomorphology; impact on fluvial flood risk on-site and downstream; and impact on surface water drainage.
- 9.58 Standard mitigation measures to avoid or reduce potential impacts include infrastructure design to minimise impacts on geology and hydrology; following best practice procedures as outlined in a Construction Environmental Management Plan (CEMP); implementing an Outline Peat Management

Plan (PMP), to be developed into a Detailed PMP; and implementing a Water Quality Monitoring Programme.

- 9.59 Following implementation of standard and additional mitigation measures, the significance of residual effects on geological, hydrological and hydrogeological receptors is considered to be negligible or minor and therefore not significant. No cumulative effects are anticipated due to a lack of cumulative wind farm developments in the study area.

Traffic and Transport

- 9.60 The full assessment of effects on traffic and transport is provided in Chapter 11 of the EIA Report.
- 9.61 Assessment covered the likely traffic and transport effects associated with the construction and operation of the Proposed Development.
- 9.62 The Proposed Development will be accessed from Craigmarnloch Road via a priority access junction constructed near to the existing access junction with Barrfarm Road. In order to construct the Proposed Development, bulk materials such as concrete will be imported to the site from local sources, whilst specialist loads such as the turbine components will arrive from the south via the A78 and Routenburn road.
- 9.63 The construction activities will lead to increased traffic volumes on Craigmarnloch Road, Routenburn Road and the A78 during the construction and decommissioning phases. Following commissioning of the Proposed Development, traffic flows will average two vehicles every fortnight.
- 9.64 An assessment of likely potential effects using Institute of Environmental Management and Assessment (IEMA) guidelines has been undertaken. This determined that prior to the implementation of mitigation, a moderate/minor effect could be expected for users of Craigmarnloch Road and Routenburn Road, relating to the increase in HGV traffic operating on the route. All other receptors indicated a negligible effect caused by the Proposed Development within the study area.



Figure 4: Example turbine blade in transit

- 9.65 With the implementation of appropriate mitigation, no significant residual effects are anticipated in respect of traffic and transport issues. The residual effects are all assessed to be minor and as they will occur during the construction phase only, they are temporary and reversible.

Socio-economic, Recreation and Tourism

- 9.66 The full assessment of socio-economic effects, and effects on recreation and tourism is provided in Chapter 12 of the EIA Report.
- 9.67 The renewables industry is an important economic asset to the UK and Scotland and supports a substantial and growing number of employment opportunities. Although not significant in terms of the EIA regulations, the Proposed Development will further contribute to the positive economic effect of renewable energy, and associated skills base within the UK and Scotland.
- 9.68 It was estimated that during the construction and development phase the Proposed Development could support up to:
- £2.3 million gross value added (GVA) and 33 job years in North Ayrshire; and
 - £15.8 million GVA and 242 job years in Scotland.
- 9.69 The operation of the Proposed Development each year is expected to generate up to:
- £0.3 million GVA and five jobs in North Ayrshire; and
 - £0.6 million GVA and eight jobs in Scotland.
- 9.70 The socio-economic impact during construction was assessed as negligible beneficial for both the local and national economies. The annual impacts occurring during operation were also assessed as negligible beneficial. In addition, the economic impacts during the decommissioning phase of the Proposed Development was assessed and found to be negligible beneficial.
- 9.71 The tourism recreation and tourism assessment found that no significant effects would be expected. The tourism assessment was based on consultation with tourism stakeholders, a literature review of the relationship between wind farms and tourism activity in Scotland, as well as a desk-based study of tourism assets and accommodation providers located in the proximity of the Proposed Development.
- 9.72 The baseline assessment found that the population in North Ayrshire is relatively older than in Scotland as a whole, has declined over the last decade and is expected to decrease in the future. The local economy has a relatively larger share of its workforce employed in sectors linked to construction. The main source of tourism activity in the area is fishing.
- 9.73 This assessment found that there were no significant effects expected as a result of the Proposed Development.

Aviation and Radar

- 9.74 The full assessment of effects on aviation and radar is provided in Chapter 13 of the EIA Report.
- 9.75 The assessment identifies the potential issues associated with aviation and radar as a result of the Proposed Development during the construction, operation and decommissioning phases.
- 9.76 The Applicant has consulted with key stakeholders identified as potential receptors to aviation and radar effects from the Proposed Development, including National Air Traffic Services Plc, Glasgow Airport, Glasgow Prestwick Airport and the Ministry of Defence. Consultation was undertaken with these stakeholders to establish whether any effects are anticipated and, if so, effective mitigation measures to be implemented.
- 9.77 No effects on aviation and radar have been identified from the construction, operation or decommissioning of the Proposed Development. Although no effects have been identified, should an effect arise it will be mitigated through consultation with the aforementioned consultees. Otherwise, no mitigation measures are deemed necessary.

- 9.78 As the Proposed Development will not impact on any aviation or radar receptors, the Proposed Development will not have any cumulative effect on aviation and radar with other developments. It should be noted that stakeholders consider cumulative impacts in their responses.

Shadow Flicker

- 9.79 The full assessment of shadow flicker effects is provided in Chapter 14 of the EIA Report.
- 9.80 Shadow flicker is the effect of the sun passing behind the moving rotors of turbines casting a flickering shadow through the windows and doors of neighbouring properties. This occurs in certain combinations of geographical position, time of day, time of year and specific weather conditions. No shadow flicker effect can occur during the construction of the Proposed Development.
- 9.81 Within this assessment, the potential shadow flicker effects from the wind turbine generators of the Proposed Development on neighbouring residential receptors are described and assessed.
- 9.82 Shadow flicker effects were modelled for eight identified receptors using WindPro software for both theoretical worst-case and realistic scenarios. The theoretical duration of shadow flicker calculated exceeded guideline thresholds for all receptors. However, the theoretical scenario represents many unrealistic conditions such as a clear sky for 365 days a year and permanently occupied receptors. The realistic duration of shadow flicker calculated exceeded guideline thresholds for three receptors.
- 9.83 Mitigation through the implementation of a 'Wind Farm Shadow Flicker Protocol', to be agreed through consultation with NAC, is deemed to be an effective measure to reduce the impact of shadow flicker effects. Following this mitigation, the residual effect of shadow flicker is deemed to be insignificant at all identified receptors.
- 9.84 Cumulative effects are non-existent due to the absence of existing, proposed or consented turbines within the study area other than the Proposed Development.

Telecommunications

- 9.85 The full assessment of effects from the Proposed Development on telecommunications is provided in Chapter 15 of the EIA Report.
- 9.86 This assessment considers the potential effects of the Proposed Development on existing and planned telecommunications infrastructure, both within the site and in the wider area, during the construction, operation and decommissioning phases.
- 9.87 Assessment of effects to television reception has been scoped out within the EIA Scoping Report (refer to Appendix 4.1 of the EIA Report) as the strength of the digital signal in the area, as predicted by Digital UK, and the inherently resilient nature of digital television broadcasting mean that there is a low risk of interference with domestic television reception from a wind energy development at this location. This has therefore not been assessed in this chapter.
- 9.88 The telecommunications assessment, as informed by current guidelines and legislation, has been undertaken through consultation with the appropriate consultees, namely Atkins, Arqiva, JRC and Ofcom. No effects on telecommunications from the construction, operation or decommissioning of the Proposed Development were identified.
- 9.89 Although no effects on telecommunication links have been identified, should an effect arise it will be mitigated through consultation with the operator and could include micro-siting of turbines. Otherwise, no mitigation measures are deemed necessary.
- 9.90 As the Proposed Development will not impact any telecommunication links, the Proposed Development will not have any cumulative effects on telecommunication links with other developments.

Other Issues

Air Quality

- 9.91 Due to the low volumes of traffic to be generated by the construction and operation of the Proposed Development, the Proposed Development does not meet the criteria for an air quality assessment for emissions and no significant effects are anticipated.
- 9.92 Dust emissions during construction will be controlled through best practice as detailed within the CEMP and no significant effects are anticipated.

Carbon

- 9.93 Increasing atmospheric concentrations of greenhouse gases (GHGs), including carbon dioxide (CO₂) – also referred to as carbon emissions – is resulting in climate change. A major contributor to this increase in GHG emissions is the burning of fossil fuels. With concern growing over climate change, reducing its cause is of utmost importance. The replacement of traditional fossil fuel power generation with renewable energy sources provides high potential for the reduction of GHG emissions. This is reflected in UK and Scottish Governments climate change and renewable energy policy.
- 9.94 However, no form of electricity generation is completely carbon free; for onshore wind farms, there will be emissions as a result of manufacture of turbines, as well as emissions from both construction and decommissioning (if required) activities and transportation of materials to site.
- 9.95 However, this generation of carbon is minimal in comparison to the generation of carbon free electricity, and it is estimated that carbon generation will be offset by the Proposed Development's carbon savings within three months. Compared to fossil fuel electricity generation projects, which also produce embodied emissions during the construction phase and significant emissions during operation due to combustion of fossil fuels, the Proposed Development has a very low carbon footprint and the electricity generated will displace grid electricity generated from fossil fuel sources. The site would in effect be in a net gain situation following the estimated 1.4 year carbon payback period (when compared to the fossil fuel mix which is the existing energy mix within the UK) and will be contributing to national objectives of reducing greenhouse gas emissions. Therefore, the Proposed Development is evaluated to have a beneficial effect on meeting current climate change targets.

10 Conclusion

- 10.1 This Non-Technical Summary of the EIA Report provides an overview of the EIA undertaken for the Proposed Development in east of Skelmorlie, North Ayrshire.
- 10.2 Within Chapter 17 of the EIA Report a schedule of commitments can be found which details the environmental mitigation measures, summarised above, which the Applicant has committed to implement, while Chapter 18 of the EIA Report summarises the likely environmental effects, the mitigation to be implemented and the resulting residual effects.