Proposed 10 Turbine Wind Farm

Cairnmore Hill, Caithness

Environmental Impact Assessment Scoping Report

Document reference: 03001-000350

Contents

1. INTRODUCTION

RES Ltd ('the Applicant') has identified the potential for a wind farm development approximately 4.5 km West of Scrabster, and the intention is to submit an application for Planning Permission to construct and operate a wind farm and associated infrastructure at this site (hereafter referred to as the 'Proposal').

The site location is shown on Figure 1 and an Indicative Turbine Layout is shown on Figure 2 both included in Appendix 1.

If it is considered that as "the development is likely to have significant effects on the environment by virtue of factors such as its nature, size or location" an Environmental Impact Assessment (EIA) is required. In this case, RES has volunteered to undertake an EIA rather than request a formal screening opinion to confirm whether likely significant effects may arise.

EIA is a process that identifies the likely significant environmental effects, (both positive and negative) of a Proposal and aims to prevent, reduce and offset any significant adverse environmental effects. The findings of the assessment are presented in a single document, known as an Environmental Statement (ES). The ES will be a clear and concise assessment of the environmental impacts associated with construction, operation and decommissioning of the proposed wind farm, identifying the effects, in EIA terms, resulting from the assessment of potential environmental impacts.

The purpose of the ES is to inform The Highland Council, other statutory consultees and the wider public about the proposals, allowing these organisations and groups to provide feedback, and enabling The Highland Council to take into account all relevant environmental information when making a determination of an application.

1.1. The Purpose of this Report

This report is provided to The Highland Council and other stakeholders in support of a request by RES for a '*Scoping Opinion*' regarding the information to be provided within the ES which will accompany an application for Planning Permission.

The specific objectives of this report are to:

- Seek agreement on the likely significant effects associated with the Proposal at Cairnmore Hill to ensure that all likely significant effects have been correctly included in the proposed scope of the EIA ('scoped in');
- Seek agreement where known non-significant effects will be excluded ('scoped out'); and
- Invite comment on the proposed approach to baseline data collection, prediction of environmental effects and the assessment of significance.

The scoping report will be provided to the consultees set out in Table 1.1.

Table 1.1: EIA Consultees

Statutory Consultees	Non-Statutory Consultees
The Highland Council Planning Services Road and Transport Environmental Health	Transport Scotland
	Scrabster Harbour Trust
	Royal Society for the Protection of Birds (RSPB)
Scottish Natural Heritage (SNH)	Communications Providers (including Three, O2, EE (Everything, Everywhere), Vodafone, Airwave, Arqiva, Atkins, BBC, Channel 5, CSS Spectrum Management Services Ltd, BT and Joint Radio Company (JRC))
Historic Environment Scotland (HES)	Association of Salmon Fisheries
Scottish Environment Protection Agency (SEPA)	Scottish Water
Caithness West Community Council	Scottish Rights of Way Society
Scottish Government	Scottish Wildlife Trust
	Civil Aviation Authority
	Highlands & Islands Airport
	National Air Traffic Services
	MoD Defence Infrastructure Organisation
	Marine Scotland
	The Crown Estate
	Visit Scotland
	Health and Safety Executive
	Nuclear Safety Directorate
	Scotways

Given the nature of the site and the proposals, the following bodies are not deemed relevant consultees for this proposal:

- Forestry Commission Scotland;
- Mountaineering Council of Scotland; and
- John Muir Trust.

1.2. Structure of this Report

The remainder of this report is structured as follows:

- Section 2 provides a brief description of the nature and purpose of the Proposal, typical construction activities and decommissioning proposals;
- Section 3 provides an outline of the planning and renewable energy policy context;
- Section 4 describes the intended Environmental Assessment process and the approach that will be adopted for the cumulative impact assessment; and

- Section 5 describes the baseline environment conditions, the likely significant environmental effects identified and the proposed method for further data collection and evaluation of effects. This is followed by a brief overview of the next steps in the EIA process.

2. DEVELOPMENT DESCRIPTION

2.1. Proposed Wind Farm

The main elements of the Proposal are expected to be as follows:

- Up to 10 wind turbines, each up to a maximum tip height of 125 m;
- at each turbine, associated transformers, and related switchgear;
- turbine foundations;
- hardstand areas for erection and maintenance cranes at each turbine location;
- one permanent freestanding meteorological mast;
- a series of on-site tracks with associated water crossings;
- a site access route with any necessary road improvement works from the public road network;
- borrow pits (dependent on suitability of stone on-site);
- a control building and substation compound and communications mast;
- a network of buried electrical cables;
- temporary construction compound and laydown areas;
- temporary guyed meteorological masts to be used for detailed wind definition and wind farm commissioning/acceptance testing; and
- energy storage unit and associated infrastructure.

2.1.1. *Wind Turbines*

The turbine's maximum dimensions would indicatively be:

- maximum rotor diameter of 110 m;
- maximum hub height of 80 m; and
- maximum tip height from base to tip of 125 m.

The indicative capacity of each turbine is up to 3.5 MW, and the overall wind farm capacity would be approximately 35 MW. This reflects the ongoing development of wind turbine technology as well as the potential wind resource that exists in this area.

2.1.2. *Turbine Foundations*

The turbines will be fixed to reinforced concrete foundations, typically up to 20 m in diameter. The foundations will be formed in excavations approximately 3.5 m deep, depending upon ground conditions.

Prior to excavation, topsoil and existing vegetation will be lifted and stored. After completion the foundations will be backfilled with suitable excavated or imported material and the original vegetation will be reinstated where possible if it is considered ecologically sensitive.

Concrete for site construction, including turbine foundations, would most likely be brought in from a local off-site batching facility.

2.1.3. *Transformers*

Turbines typically generate at 690 V. In order to prevent cable losses and to minimise cable diameter, the voltage would be increased to 33 kV by transformers at each turbine. Depending on

the turbine model selected for the project, these transformers may be housed within the turbine tower or in a small container sited on a concrete slab alongside the turbine.

2.1.4. *Electrical Cabling*

The turbines would be electrically connected to the control building by means of 33 kV cables. These cables would be laid underground in trenches generally running adjacent to the site tracks, leading to the on-site control building. These trenches would be backfilled with retained excavated material, marked with buried safety warning tape and have the original vegetation reinstated.

2.1.5. *On Site Substation & Control Building*

The electrical cables would terminate at the substation, which is likely to be approximately 20 m x 30 m in size. Located adjacent to the substation would be a control building measuring approximately 30 m x 15 m with a pitched roof up to 5.5 m, containing switchgear, control equipment and basic welfare facilities, including a toilet.

2.1.6. *Access and Site Tracks*

Given the location of the site, it is most likely than turbine components would be delivered from the Port of Scrabster.

Access to site would be taken from a new entrance off the A836. The exact location of the site entrance is to be decided, based on assessment of existing road alignments and visibility assessments. Existing tracks on the site itself would be utilised wherever reasonably practicable. New and upgraded tracks would be typically up to 5.5 m wide with appropriate widening at bends and passing places dependent on site conditions. The verges of the tracks would be reinstated as appropriate after construction.

2.1.7. *Borrow Pits*

Stone would be required for various purposes, primarily track construction. If the stone on site is found to be suitable then a proportion of this could be won from foundation excavation and the remainder will be sourced from onsite borrow pits or from off-site quarries.

2.1.8. *Crane Hardstands*

The turbines would be erected using mobile cranes. These require areas of hardstand adjacent to the turbine locations, which can support the load of the cranes on their outriggers. The permanent hardstands, typically up to approximately 30 m by 40 m dependent on site conditions, and approximately 550 m^2 of temporary hardstands at each turbine, are formed by excavating soft ground, and infilling with compacted stone. Temporary hardstand areas would be required for laydown of turbine components and for a small support crane to assist the main erection crane.

2.1.9. *Construction Compound*

At least one site compound of approximately 50 m by 80 m, would be required to contain temporary site offices and with services including sealed waste storage and toilet facilities; sufficient parking for cars and construction vehicles; containerised storage facilities; and a receiving area for incoming vehicles. After construction, the compound would be removed and the site cleared of stone, with the ground re-graded to a natural profile and reinstated.

2.1.10. *Energy Storage*

In order to match on-site energy generation to energy demand, as well as facilitate the reduction in any possible grid constraint requirements and provide ancillary services to the grid, the Proposal will also provide for the provision of an energy storage device. The energy storage device will consist of a number of permanent containers containing batteries, mounted on small concrete foundations.

The exact location and number of energy storage devices will be determined through the design process and will consider all relevant technical and environmental sensitivities.

2.2. Construction and Environmental Management

The proposed construction works would be set out in the ES, including anticipated details of timescales, traffic generation and construction phasing. The ES would also contain details of appropriate environmental management measures, including pollution prevention measures (in line with SEPA's Pollution Prevention Guidelines (PPGs)), and waste minimisation and management measures.

It is currently estimated that construction would take approximately 12 months from award of contract; however, this would be subject to environmental and weather constraints which could extend this period. The main phases would include:

- access route road improvements;
- site entrance construction and excavation of first borrow pit (if applicable);
- construction/upgrade of on-site access tracks;
- construction of temporary construction compound and hardstands;
- construction of turbine foundations, requiring the import of concrete and steel;
- construction of the substation and control building;
- excavation of trenches and laying of cables alongside site tracks;
- connection of distribution cables;
- delivery and erection of wind turbines;
- commissioning of site equipment; and
- site demobilisation and restoration.

Some of these activities would be carried out concurrently in order to reduce the length of the construction program. Site restoration would be conducted as early as possible.

Vehicle movements associated with construction works would include:

- cars and minibuses for transporting construction personnel to the site;
- heavy goods vehicles (HGVs) for pre-construction delivery of site offices, construction equipment and materials;
- HGV abnormal load vehicles for delivery of the turbine components and base rings;
- mobile road going cranes, used for the erection of the turbines; and
- standard HGVs for transporting electrical cable, steel reinforcement for foundations, construction plant fuel and other items and equipment.

A Traffic Management Plan would be agreed in consultation with The Highland Council and Transport Scotland and other stakeholders (including the local communities and Scrabster Harbour Trust). This would address the scheduling, routing and overall management of abnormal loads movements along with the programming and management of all other HGV movements.

2.3. Operation and Maintenance

Turbines typically have an operational life of 25 to 30 years. A wind farm is typically visited up to four times a month by a maintenance team. There would also be a requirement for maintenance of the access tracks and substation.

2.4. Decommissioning

On completion of the operational life of the proposed wind farm, the turbines could be removed, reconditioned, or replaced, and appropriate site restoration measures implemented. If the desire is to retain a wind farm, a new associated planning application would be required.

3. PLANNING AND ENERGY POLICY CONTEXT

The EIA will take into consideration the planning policy and other guidance listed below as applicable:

- National Planning Framework for Scotland (2014);
- Scottish Planning Policy (2014);
- The Scottish Government Online Advice (2013) - Onshore Wind Turbines (replacement for PAN 45);
- Planning Advice Notes;
- Highland-wide Local Development Plan 2012;
- Highland Renewable Energy Strategy & Planning Guidelines 2006; and
- Highland Council Onshore Wind Energy: Draft Supplementary Guidance (Sept. 2015).

Further information summarising the relevant aspects of the above planning policy and guidance relevant to the proposed wind farm at Cairnmore Hill is provided below.

3.1. National Planning Policy and Guidance

3.1.1. *National Planning Framework for Scotland*[1]

In June 2014, the Scottish Government released the third National Planning Framework for Scotland, setting out its spatial strategy for planning ambitions in Scotland. The framework sets out the broad context of spatial planning and recognises an ambition to create Scotland as a low carbon place with ambitions of achieving at least an 80% reduction in Greenhouse Gas emissions by 2050.

The expectation remains that Scotland will need between 14 GW and 16 GW of renewable energy capacity to meet its target of "*generating the equivalent of at least 100% of gross* electricity consumption from renewables" (paragraph 3.8). The position of the Scottish Government as set out within NPF3 (paragraph 3.23) is that "Onshore wind will continue to make a significant contribution to diversification of energy supplies".

3.1.2. *Scottish Planning Policy 2014*[2]

There is an expectation within SPP for the maximisation of renewable energy opportunities. It states that Development Plans should seek to ensure an area's "*full potential for electricity and heat from renewable sources is achieved in line with national climate change targets*" (paragraph 155). It is expected that this will be achieved giving due regard to "*relevant environmental, community and cumulative impact considerations*" (paragraph 155).

In specific reference to onshore wind farm development, SPP instructs planning authorities to support the development of wind farms in areas where the technology can operate efficiently and where the impacts on communities and the environment can be satisfactorily addressed.

A key tool that planning authorities are required to employ is a spatial framework for windfarms and SPP 2014 defines 3 groups and these are considered in Table 3.1.

[1] See: http://www.scotland.gov.uk/Resource/0045/00453683.pdf
[2] See: http://www.scotland.gov.uk/Resource/0045/00453827.pdf

Table 3.1: SPP 2014 Spatial Framework

Spatial Framework Groupings	SPP 2014 Policy Position	Relevance for the subject site
Group 1: National Parks and National Scenic Areas	Wind farms will not be acceptable	Not Applicable to the subject site.
Group 2: Areas of significant protection	Wind farms may be appropriate in some circumstances	There are no areas of wild land in close proximity to the site and the wind turbines are beyond 2km of any settlement. There are designated SPAs within the wider vicinity of the site.
Group 3: Areas with potential for wind farm development	Beyond groups 1 and 2, wind farms are likely to be acceptable, subject to detailed consideration against identified policy criteria	Other than the need to consider the presence of impacts on the ecological integrity of the SPAs within the wider vicinity of the site, the site could be deemed a Group 3 location.

The key national policy considerations in assessing whether a site should be developed as a Wind Farm are set out within paragraph 169 with the 19 individual, but not exhaustive criteria covering all possible effects of a wind farm development.

3.1.3. *Scottish Government Online Advice: Onshore Wind Turbines (December 2013)*

In 2011 the Scottish Government initiated a series of online advice documents covering various aspects of renewable energy projects. This was intended to be a continuously updated source of advice and guidance for developers and Planning Authorities. The Onshore Wind Turbines guidance was last updated in December 2013[3] and this covers a variety of matters including guidance on suggested areas of focus for planning authorities and how planning authorities can best influence spatial planning for wind farms.

The guidance also helpfully sets out in a little more detail, the context for the consideration of individual planning application appraisal criteria. An update to the 2013 online guidance is awaited to reflect the publication of a revised version of SPP in 2014.

3.1.4. *Planning Advice Notes*

Planning Advice Notes are individual documents which provide advice and guidance on technical planning matters. PANs are useful in the definition of individual roles and responsibilities of the Local Planning Authority, consulting authorities and act as a point of reference for developers and their consultants.

A number of Planning Advice Notes will be relevant to the development of the wind farm at Cairnmore Hill:

- PAN 51: Planning and Environmental Protection and Regulation (revised 2006);
- PAN 60: Planning for Natural Heritage (2000, updated 2008);
- PAN 68: Design Statements (2003);

3. See: http://www.scotland.gov.uk/Resource/0044/00440315.pdf

- PAN 73: Rural Diversification (2005);
- PAN 1/2013 Environmental Impact Assessment;
- PAN 1/2011: Planning and Noise;
- PAN 2/2011: Planning and Archaeology; and
- PAN 3/2010: Community Engagement.

Each of these PANs will be taken into account, where relevant, throughout the assessments.

3.1.5. *Routemap for Renewable Energy for Scotland*[4]

In June 2011, the Scottish Government published its updated Routemap for Renewable Energy for Scotland, which updated and extended the Scottish Renewables Action Plan 2009.

The first annual update to the 2011 Routemap was published on 30 October 2012, and contained a new interim target to meet 50% of the country's energy needs from renewable sources by 2015. The latest Update published in September 2015 confirmed 49.8 MW of gross electricity consumption was generated in 2014, so Scotland is well on its way to meet the 2015 target. The headline target is to generate 100% of Scotland's electricity needs from renewables by 2020, which reflects the Scottish Government's commitment to create a sustainable and self-sufficient Scotland.

3.2. Regional and Local Planning Policy and Guidance

The statutory Development Plan for The Highland Council is comprised of the Highland Wide Local Development Plan (HwLDP) 2012 and certain aspects of the Caithness Local Plan continue to remain in force (these primarily relate to housing allocations).

The Highland Council has commenced a review of the various development allocations and the existing suite of local plans will be replaced by one of three area Local Development Plans; the Proposed Caithness and Sutherland Local Development Plan (CaSPlan) was published for consultation in early 2016. CaSPlan will update the development allocations that are currently set through the Caithness Local Plan and will require to be read alongside the HwLDP that defines the strategic policy context for the area.

3.2.1. *Highland-wide Local Development Plan*[5]

The Highland-wide Local Development Plan (2012) (HwLDP) sets out the overarching vision statement, spatial strategy and general planning policies for the whole of the Highland Council area, except the Cairngorms National Park. The Main Issues Report for HwLDP 2 was consulted upon early in 2016. HwLDP Policy 67 relates specifically to renewable energy and defines two key overarching policy expectations of a Renewable Energy Proposal:

- the contribution of the Proposal toward meeting renewable energy generation targets; and
- any positive or negative effects it is likely to have on the local and national economy.

It taking into account these two key expectations, the Policy also outlines The Highland Council's further policy requirements in terms of a series of criteria against which applications will be will assessed.

[4] See: http://www.scotland.gov.uk/Resource/Doc/917/0118802.pdf
[5] See: http://www.highland.gov.uk/downloads/file/1505/highland-wide_local_development_plan

In addition to HwLDP Policy 67, as the subject site is located within an area that contains features of local / regional importance (as listed within Appendix 2 of the HwLDP), HwLDP Policy 57 is also a key consideration. Accordingly, HwLDP Policy 57 states:

> *For features of local/regional importance we will allow developments if it can be satisfactorily demonstrated that they will not have an unacceptable impact on the natural environment, amenity and heritage resource.*

The defined features of local / regional importance include landscape, cultural heritage, natural heritage and other features of particular value to local communities.

3.2.2. *Onshore Wind Energy: Draft Supplementary Guidance (September 2015)*[6]

The Highland Council produced supplementary guidance on wind energy in 2012: Interim Supplementary Guidance: Onshore Wind Energy (ISG), which superseded parts of the Highland Renewable Energy Strategy & Planning Guidelines (2006). This Interim Supplementary Guidance has now itself been superseded by new supplementary guidance to primarily update the Council's guidance in accordance with national planning policy in SPP, and will be used as a material consideration for development management purposes. The weight to be attached to the SG will be dependent upon its status at the time of decision making on the planning application. The Council's spatial framework will not form part of the SG, but will be brought through as part of the emerging HwLDP 2.

See:
http://www.highland.gov.uk/info/178/local_and_statutory_development_plans/147/onshore_wind_energy_supplementary_guidancehttp://www.highland.gov.uk/downloads/file/981/onshore_wind_energy_interim_supplementary_guidance

4. THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

4.1. Introduction

The following sections summaries the intended approach to EIA and the methodology that will be used in the assessments. An assessment of alternatives and of potential cumulative effects with other Proposals is also required as part of EIA and the approach proposed to these aspects of the EIA is described below.

4.2. Alternatives and the 'Do Nothing' Scenario

The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011[7](the EIA Regulations) require the applicant to outline any alternatives that may have been considered in the course of the EIA and to give an indication of the main reasons for the resulting choice. Guidance does not define the meaning of alternatives, and in practice it is usually interpreted to mean alternative designs or layouts, rather than sites.

Consistent with this practice, it is intended, within the EIA, to describe the design process and to outline any alternative designs considered in the course of the evolution of the proposed wind farm and storage project.

Guidance also advocates that EIA considers the '*do nothing*' scenario, to provide context for the assessment of the Proposal. In some cases, the '*do nothing*' scenario might assume development in accordance with a Development Plan; in other cases, it might assume ecological succession. In this situation, however, we are unaware of any wider development proposals or local factors which would cause the character of the site to change in the absence of the proposed wind farm. Accordingly, we will assume that under the '*do nothing*' scenario, the character of the proposed site area will remain the same as it is today.

4.3. Cumulative Assessment

Cumulative impacts arise where the effects of one Proposal combine with the effects of another, with the result that, usually, a larger (and possibly more significant) effect might arise.

Cumulative effects should be considered in the case of operational and consented wind farms, as well as proposed wind farms which are the subject of undetermined applications. The cumulative assessment will, therefore, distinguish between predicted cumulative impacts arising from the proposed wind farm in combination with committed projects in the vicinity and those in combination with projects at an early stage in the planning process. This is because committed or consented proposals are less likely to change, and so impacts can be predicted with greater confidence; whereas projects at earlier stages of planning are less certain, in respect of layout or more fundamentally, simply their feasibility.

A baseline appraisal would identify any existing wind farms within the study area and would identify any consented (but presently unconstructed) schemes as well as any wind farms subject to currently undetermined wind farm applications. This would be agreed with both The Highland Council and other relevant stakeholders in advance of the submission of the ES and would form the basis for the cumulative assessments of the Proposal.

4.4. The Environmental Statement

The EIA will be undertaken with due cognisance to the following guidelines and regulations:

- the statutory requirements of the EIA Regulations, which define the information to be supplied within an ES;
- Scottish Planning Policy which includes guidance on how planning applications are to be considered; and

[7] See: http://www.legislation.gov.uk/ssi/2011/139/pdfs/ssi_20110139_en.pdf

- PAN1/2013 Environmental Impact Assessment which provides guidance on EIA.

In line with the requirements of the EIA Regulations, the key components of the ES will include:

- a description of the proposed works, comprising information on the site, design and size of the project;
- a description of the measures envisaged to avoid, reduce and, if possible, mitigate significant adverse effects;
- the data required to identify and assess the main effects which the work is likely to have on the environment;
- a description of any identified direct, indirect and secondary environmental effects including impacts on designated sites or their qualifying interests. The main alternative developments considered and reasons for their choice, taking into account the environmental effects; and
- a Non-Technical Summary (NTS) of the ES.

In addition, to the above a schedule of mitigation commitments will be provided within the ES. Future monitoring proposals will also be defined within the ES along with a timetable of proposed works.

4.5. Determining Potentially Significant Effects

Where possible all technical assessments will identify and characterise potentially significant effects following a standard methodology, as informed by the EIA Regulations.

The potentially significant effects of the Proposal will be proportionately assessed as a function of the magnitude of the impact and the sensitivity of the receptor.

Numerous different approaches for assigning impact magnitude are in circulation. Due to the nature of impacts, descriptions of impact magnitude are tailored to the specific and potential impacts identified. For the purposes of assessment however, all impacts will be classified in the following scale of magnitude:

- High;
- Medium;
- Low; and
- Negligible

Sensitivity of the receptor will be assessed in each case with recognition of receptors' susceptibility to change and the impact on the receptor as part of the wider receptor assemblage.

Once the magnitude of impact and receptor sensitivity has been identified, significance can be evaluated. Table 4.1 identifies the standardised matrix approach, which will be adopted throughout the technical assessments and when evaluating the significance of an effect.

Table 4.1: Evaluating Effect Significance				
Receptor Sensitivity	**Magnitude of Impact**			
	High	**Medium**	**Low**	**Negligible**
High	Major	Major/moderate	Moderate	Moderate/Minor
Medium	Major/moderate	Moderate	Moderate/minor	Minor
Low	Moderate	Moderate/minor	Minor	Minor/none

Each individual assessment will determine what effects are significant albeit these will generally be those that are assessed as having a **Major** or **Major / Moderate** significance.

4.6. The Environmental Statement (ES)

It is proposed that the following assessments will be included within the ES:

- Landscape and Visual Impacts;
- Terrestrial Ecology (Non-Avian);
- Ornithology;
- Archaeology and Cultural Heritage;
- Traffic and Transport;
- Geology, Hydrology and Hydrogeology; and
- Noise.

It is expected that Electromagnetic Interference, Aviation & Shadow Flicker together and potentially peat slide risk can be deemed non-significant effect; this is discussed further in Section 6 of this report.

5. POTENTIAL SIGNIFICANT ENVIRONMENTAL EFFECTS

5.1. Landscape and Visual Impacts

5.1.1. *Introduction*

The purpose of the Landscape and Visual Impact Assessment (LVIA) is to identify, predict and evaluate potential impacts on landscape fabric, character and visual amenity within the Development site and at a distance of up to 35 km from the outermost turbine. It will also consider potential cumulative effects, which are defined as defined in SNH's guidance on 'Assessing the Cumulative Impact of Wind Farms' (March 2012).

The assessment will involve desk study, field work, data processing and analysis as well as interpretation using professional judgment.

The Proposal will introduce a number of elements to the landscape which have the potential to generate significant effects on the landscape and/or visual amenity of the site and/or surrounding area. These include elements associated with the construction, operation and decommissioning of the Proposal. However, operational effects would be the longest in duration and are likely to be associated with the following elements of the Proposal:

- wind turbines;
- anemometer mast;
- access tracks;
- borrow pits;
- a substation and compound; and
- a control room and compound.

The scale of these elements also means that they are likely to be visible from a wide area within the surroundings, with consequent potential for effects on the visual amenity and character of the adjoining landscape. The LVIA will therefore address impacts on the Proposal area itself and wider study area. The LVIA will consider effects on:

- landscape fabric, caused by changes to the physical form of the landscape and its elements;
- landscape character, caused by changes in the key characteristics and qualities of the landscape as a result of the Proposal; and
- visual amenity, caused by changes in the appearance of the landscape as a result of the Proposal.

Impacts on landscape fabric occur when there is physical change to components of the landscape: landform, land use or land cover. Impacts on landscape character occur when there is change to the key characteristics of any landscape and the distinct and recognisable pattern of elements which give it a particular character. Visual impacts comprise changes in elements of views and the related effects on visual amenity.

Key issues to be considered in the LVIA will include:

- cumulative wind farm developments in the Highlands and the potential implications for the capacity of the landscape to accommodation of the Proposal;
- potential effects on landscape designations/sensitive landscapes such as the Special Landscape Areas, as described above; and

- potential effects on landscape character of the area, its visual amenity, and tourist and recreational land uses/interests.

5.1.2. *Consultations*

Representatives of The Highland Council (THC) and Scottish Natural Heritage (SNH) will be consulted in order to confirm the scope of the LVIA and methodology to be used in the LVIA, as well as the number and location of representative viewpoints to be included; for example, from settlements, recreational routes and cycleways, road and rail routes, and formal vantage points. These will be informed by the findings of Zones of Theoretical Visibility (ZTV) studies, augmented by field reconnaissance.

5.1.3. *Baseline Assessment*

Initially, a description of the existing landscape and visual context of the Proposal will be prepared against which to judge the potential effects of the development. This will be based on desktop reviews of mapping, aerial photography and available information and an initial site visit.

The baseline appraisal will also consider the planning policy and strategic guidance context for the Proposal, including:

- Strategic Locational Guidance for On-Shore Wind Farms (SNH, May 2002);
- Spatial Planning for Onshore Wind Turbines – Natural Heritage Considerations (SNH, 2015);
- The Highland Wide Local Development Plan 2012;
- Draft Supplementary Guidance: Onshore Wind Energy, (THC March 2015); and
- Landscape Strategy and Assessment Guidance for Wind Energy Development within Caithness and Sutherland, (SNH, 1998).

The baseline study will identify, review and assess the following:

- topography, land use and landcover at the site and in the wider area;
- the landscape character of the site and its surroundings, including seascape and coastal character, (based on the SNH Landscape Character Assessment documentation, verified, supplemented and amended where necessary);
- sensitive landscape receptors, including designated and classified landscapes;
- key visual elements including skyline, enclosure, focal points; and
- the location and distribution of visual receptors, including those within settlements, on key transportation and recreational routes, visitor attractions and vantage points.

The LVIA will incorporate an assessment of potential cumulative effects arising from the relationship between the Proposal and constructed, consented and planned wind farms within 60 km of the Proposal site that are capable of contributing to significant cumulative effects.

A further site visit will be carried out to refine the landscape, seascape and coastal character assessments of the study area and to visit each of the agreed viewpoints with wireline diagrams to assist the assessment process.

The key characteristics of each landscape character type within the study area with predicted visibility of the Proposal will be described, together with the nature of views and the sensitivity of each landscape character area to changes associated with wind farm development. A preliminary ZTV (125 m tip height) drawing is included as Figure 3 within Annex A. Baseline data sources will include:

- OS Terrain 5;

- OS 1:25,000 Raster Mapping;
- OS 1:50,000 Raster Mapping;
- OS 1:250,000 Raster Mapping;
- OS Meridian 2 data;
- OS Address Layer 2 data
- OS VectorMap District mapping;
- OS Landuse/landcover mapping;
- Caithness and Sutherland Landscape Character Assessment;
- SNH 'Landscape Strategy and Assessment Guidance for Wind Energy Development within Caithness and Sutherland;
- The Highland Council's Highland Wide Local Development Plan; and
- The Highland Council's Draft Onshore Wind Energy Supplementary Guidance.

5.1.4. *Assessment Methodology*

Landscape and visual effects will be assessed based on a comparison of visual or landscape receptor sensitivity and predicted magnitude of change.

Landscape Sensitivity

The sensitivity of the landscape to changes is defined as high, medium or low based on professional interpretation of a combination of parameters, including:

- the value placed on the landscape;
- landscape quality and condition;
- existing land-use;
- the pattern and scale of the landscape;
- visual enclosure/openness of views, scale of views, and the distribution of visual receptors;
- the scope for mitigation, which will be in character with the existing landscape; and
- the degree to which the particular element or characteristic contribution to the landscape character can be replaced or substituted.

In determining the sensitivity of the landscape within the study area reference will be made to The Highland Council's Draft Onshore Wind Energy Supplementary Guidance.

Viewpoint Sensitivity

Viewpoint sensitivity is defined as high, medium, or low based on an interpretation of a combination of parameters, as follows:

- location and land use at the viewpoint;
- landscape character and quality in the immediate vicinity of the viewpoint;
- landscape character and quality of the intervening landscape and backdrop to the Proposal;
- frequency of use; and
- whether the receptor is static or transitory.

In relation to land use at the viewpoint, visual sensitivity is defined as follows:

- High: Tourists and users of outdoor recreational facilities including formal vantage points, picnic sites and beauty spots. Additionally, strategic recreational trails, cycle routes and rights of way whose attention is focused on the landscape;
- Medium: Commuters, pedestrians in urban settings; and
- Low: People engaged in outdoor sports or recreation where their attention is not focused on appreciation of the landscape, receptors in commercial premises and other locations where their attention is on their work or other activity.

Magnitude of Change

The magnitude of change arising from the Proposal at any particular viewpoint is described as High, Medium, Low or Negligible based on the interpretation of a combination of largely quantifiable parameters, as follows:

- distance of the viewpoint from the Proposal;
- duration of the predicted impact;
- extent of the Proposal in the view, i.e. the horizontal angle subtended by the Proposal;
- angle of view in relation to main receptor activity;
- background to the Proposal; and
- extent of other built development visible, particularly vertical elements.

The varying scales of magnitude for change can be defined as follows:

- High: Total loss or considerable alteration to key elements, features or characteristics of the landscape and/or composition of views, resulting in in a substantial change to baseline conditions;
- Moderate: Partial Loss or alteration to one or more key features or characteristics of the baseline, resulting in localised change within a broader unaltered context, representing a notable change to baseline conditions;
- Slight: Discernible loss or alteration to one or more key elements, features or characteristics of baseline conditions. Change arising from the Proposal would be apparent, but the underlying landscape or view would be similar to that of the baseline;
- Negligible: Very limited or imperceptible loss or alteration to one or more key elements/characteristics of the baseline; and
- None: No change apparent as a result of the Proposal.

The parameters evaluated in relation to the magnitude of cumulative change include:

- the number of existing, consented and/or proposed wind farms visible;
- the distance to each of the existing, consented, and/or proposed wind farms;
- the direction and elevation of each wind farm in relation to the viewpoint;
- the horizontal subtended angle occupied by each wind farm (i.e. the angle between the left hand visible turbine and right hand visible turbine in each wind farm);
- the frequency and duration of cumulative visibility; and

- in the case of landscape character areas (LCAs) and transportation/recreational routes, the proportion of the area or route subject to cumulative views.

The magnitude for cumulative change attributable to the Proposal can be defined as follows:

- High: The Proposal would represent a considerable increase in the influence of wind farm development on the character of the landscape and/or composition of views;
- Moderate: The Proposal would represent a notable increase in the influence of wind farm development on the character of the landscape and/or composition of views. Moderate change equates to a localised change within a broader unaltered context;
- Slight: The Proposal would represent a minor addition to the cumulative context. Moderate change equates to a discernible change within a largely unaltered context;
- Negligible: Very limited or imperceptible addition to the cumulative context and landscape character or views. The baseline context would, to all intents, be unaffected; and
- None: No cumulative change apparent as a result of the Proposal.

5.1.5. *Impact Prediction and Evaluation*

Context

The LVIA will be produced to a standard suitable for submission within an ES, in accordance with the EIA Regulations and the third edition of the Guidelines for Landscape and Visual Impact Assessment (GLVIA) (Landscape Institute and Institute of Environmental Management and Assessment, 2013). In addition to the GLVIA, the assessment will take account of the following:

- Environmental Impact Assessment (Scotland) Regulations 2011 (The EIA Regulations) as amended (Scottish Government, 2011);
- Guidelines on the Environmental Effects of Wind Farms and Small Hydroelectric Schemes (Scottish Natural Heritage, 2001);
- Guidelines for Landscape and Visual Impact Assessment (GLVIA)[8];
- Landscape Character Assessment[9];
- Techniques for Judging Capacity and Sensitivity[10];
- Siting and Designing Wind Farms in the Landscape[11];
- Scottish Planning Policy[12];
- Guidance: Cumulative Effects of Wind Farms[13].
- Spatial Planning for Onshore Wind Turbines – natural heritage considerations[14];
- Advice Note 01/2011: Photography and Photomontage in Landscape and Visual Assessment;

[8] Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidance for Landscape and Visual Impact Assessment – Third Edition

[9] The Countryside Agency and Scottish Natural Heritage (2002) Landscape Character Assessment

[10] Scottish Natural Heritage and the Countryside Agency (2002) Topic Paper 6: Techniques and Criteria for Judging Capacity

[11] Scottish Natural Heritage (2014) Siting and Design of Wind Farms in the Landscape Version 2

[12] The Scottish Government (2014)

[13] Scottish Natural Heritage (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments

[14] Scottish Natural Heritage, (June 2015), Spatial Planning for Onshore Wind Turbines – Natural Heritage Considerations, Guidance

- Visual Representation of Wind farms - Good Practice Guidance (Horner + Maclennan & Envision for SNH, March 2006);
- Visual representation of wind farms (Scottish Natural Heritage, December 2014; and
- Visualisation Standards for Wind Energy Developments. The Highland Council, (March 2015).

The LVIA will consider the landscape and visual effects on receptors identified in the agreed study area during construction, operation and de-commissioning stages of the Proposal.

The potential impacts of construction and operational aspects of the Proposal, including ancillary elements (e.g. aviation lighting requirements, site infrastructure and any off site impacts associated with access or highways improvements related to the Proposal) will also be assessed.

Zones of Theoretical Visibility (ZTV)

In order to assist in evaluating the potential landscape and visual effects arising from the Proposal, blade tip and hub height ZTVs will be generated to identify the potential extent of the Proposal's visibility over the agreed study area. In order to assist initial consultations, a preliminary ZTV has been produced (Figure 3, Annex A). This ZTV was generated based on an initial development scenario comprising the largest number of turbines. Subsequent ZTVs will reflect the visibility of the optimised scheme and are likely to indicate a reduced viewshed.

Receptors

Based on the findings of the preliminary ZTV and the baseline study a range of landscape and visual receptors for assessment in the LVIA have been identified and agreed with The Highland Council and other relevant stakeholders. Landscape receptors will comprise all designated landscapes, GDLs, Wild Land and Landscape Character Types which are predicted to be subject to views of the Proposal.

Landscape character types with potential views of the Proposal will include character types from the following character assessments:

- Caithness and Sutherland Landscape Character Assessment (LCA) (SNH 1998)15 ; and
- An Assessment of the Sensitivity and Capacity of the Scottish Seascape in Relation to Offshore Windfarms (SNH Commissioned Report No. 103 2005)[16].

Visual receptors will comprise those individuals or groups of people which will experience views of the Proposal. The main groups of potential visual receptors are as follows:

- residential receptors in the main settlements in the study area with potential views of the Proposal e.g. at Thurso, Halkirk, Isauld;
- tourists or visitors, including users of outdoor recreational facilities including cycle routes such as National Cycleway 1;
- visitors to locations which have important physical, cultural or historic attributes including Dunnet Bay Seadrift Centre;
- visitors to beauty spots or' picnic areas and formal/mapped vantage points;
- hill walkers, which includes those walking on unmarked footpaths;
- passengers on boats such as the Stromness Vehicle Ferry; and

[15] Stanton, C. 1998. Caithness and Sutherland landscape character assessment. Scottish Natural Heritage Reyjew No 103

[16] Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R. (2005). An assessment of the Sensitivity Capacity of the Scottish seascape in relation to offshore windfarms. Scottish Natural Heritage Commissioned Report No.103 (ROAME No. F03AA06).

- road users including receptors in the A9, A836 (tourist route), B870, B874.

It should be noted, however, that the ZTV represents a worst case scenario as it doesn't reflect the screening effect of intervening vegetation or built structures. Consequently, a number of the receptors suggested above may provide no views of the Proposal.

Moreover, the viewshed for the final optimised scheme may be reduced with corresponding reductions in the number of potential receptors.

Table 5.1 outlines a proposed viewpoint list based on the findings of the preliminary ZTV and the above groups of receptors along with previous feedback from The Highland Council and SNH in 2014. RES welcomes further comments from stakeholders with regard to these viewpoints as part of the consultation process.

Table 5.1: Preliminary Viewpoints				
Vpt No.	**Location**	**Co-ordinates**	**Distance / Direction to Proposed Wind Farm**	**Receptors**
1	A836, Entrance to Ravenshill Moto-X Track	307134, 969550	940 m S	'A' road, Tourist route, Open Intensive Farmland LCT
2	Forss Business and Technology Park	302311, 969703	3.9 km E	'A' road, Tourist route & Forss House Hotel, Mixed Agriculture and Settlement LCT
3	A836, Western edge of Thurso	310933, 968807	4.1 km W	'A' Road, Tourist route, Settlement, Town LCT
4	NCR1, Westfield	306669, 964685	3.2 km N	NCR1 - Cyclists, Local minor road, Mixed Agriculture and Settlement LCT
5	NCR1/B874, South of Thurso	310091, 966375	3.9 km NW	NCR1 - Cyclists, 'B' road, Core path, Town LCT
6	NCR1, Shebster	301749, 963939	6.1 km NE	NCR1 - Cyclists, Local minor road, Settlement, Mixed Agriculture and Settlement LCT
7	NCR1/A836, Reay	296659, 964837	10 km ENE	NCR1 - Cyclists, 'A'/Local minor road, Tourist route, Mixed Agriculture and Settlement LCT
8	Stromness Vehicle Ferry	313014, 973967	8.1 km SW	Tourists, Rocky Coastline/Open Sea Views LCT
9	Ben Dorrery	306297, 955016	12.8 km NW	'B' road, Mixed Agriculture and Settlement LCT
10	A9, Georgemas Junction Railway Station	315567, 959298	12.6 km NW	'A' road, Rail users, Mixed Agriculture and Settlement LCT
11	Dunnet Bay Seadrift Centre (A836)	321901, 970318	15.1 km WSW	Tourists, Tourist route, 'A' road users, Dunnet Head SLA, Core path, Long Beaches Dunes and Links LCT
12	Dunnet Head Lighthouse	320364, 976446	15.6 km SW	Tourists, Dunnet Head SLA, Formalised viewpoint, Core path, Sweeping Moorland LCT
13	Beinn Ratha	295424, 961316	12.7 km NE	East Halladale Flows WLA, Walkers, Moorland Slopes and Hills LCT
14	Loch Watten	324746, 955027	22.4 km NW	Tourists, Mixed Agriculture and Settlement LCT
15	Strathy Point	282802, 969631	23.2 km E	SLA, Walkers, Tourists, High Cliffs and Sheltered Bays LCT

5.2. Terrestrial Ecology and Ornithology

5.2.1. *Introduction*

Two years of baseline ornithology surveys were undertaken between September 2012 and August 2014 (inclusive). The ornithology survey programme comprised year-round flight activity surveys, winter bird surveys (in 2012-13), foraging goose surveys (in 2013-14), breeding bird surveys (2013 and 2014), and breeding raptor and owl surveys (2013 and 2014). In addition, botanical surveys, protected species surveys and bat surveys were undertaken in 2014. All ecological surveys undertaken between 2012 and 2014 were based on an initial site boundary and five-turbine layout.

In order to give an indication of the potential level of target bird species mortality due to collision with turbines, preliminary collision risk modelling (CRM) using the first two years of flight activity data was undertaken for target bird species recorded flying across the initial site at potential collision height (PCH). The CRM was based on the initial five-turbine layout and turbine specifications.

Following a proposed extension of the site to the south-west, a third year of ornithology surveys commenced in October 2015 and will be completed in August 2016. The 2015-16 ornithology survey programme will comprise flight activity surveys, winter bird surveys, foraging goose surveys, breeding bird surveys, and breeding raptor and owl surveys. In addition, bat surveys will be undertaken across the site and extension area between May and September 2016, and protected species and botanical surveys of the extension area will also be completed in 2016.

During the preliminary stages of project development, detailed consultation, based on the initial five-turbine layout, was undertaken with SNH and the RSPB, in order to ensure that the ecological and ornithological survey programme was sufficiently comprehensive to allow production of a robust Ecological Impact Assessment (EcIA).

Upon completion of the 2016 surveys, a full EcIA will be undertaken to identify whether there are likely to be any direct or indirect impacts on ecological features as a result of progression of the Proposal. Direct effects may include the loss of an ecological feature (such as a particular habitat or a breeding, roosting or feeding location for fauna) as a result of progression of the Proposal. Indirect effects may include impacts on off-site breeding, feeding or roosting locations for fauna through disturbance or barrier effects arising as a result of the Proposal, or through a change in the off-site hydrological profile of the site.

Potential cumulative impacts arising from effects of the Proposal in conjunction with those from existing and planned developments in the wider area will also be considered as part of the EcIA.

The EcIA will be informed by the baseline survey data, along with data generated by a detailed desk study, which will provide context.

Further details of the completed and ongoing consultation, desk study and survey methods are provided below, along with a brief summary of the results of the first two years of surveys undertaken between August 2012 and September 2014. In addition, an outline of the EcIA methods is presented at the end of this section.

5.2.2. *Consultation*

Preliminary consultation has already been undertaken with SNH and the RSPB on the proposed approach to baseline assessments that have been completed during the initial two years of surveys (2012-14). This included submission of a consultation document to SNH and the RSPB detailing the completed and proposed ornithology and non-avian ecology methods for the initial five-turbine scheme, and including a brief summary of results/key sensitivities, on 31st March 2014.

Further consultation with SNH and the RSPB is proposed in the form of an addendum to the original consultation document, describing the various changes to the site layout, and summarising the survey programme to be completed in 2015-16. The addendum will also include an update of the

preliminary CRM (using the first two years of flight data) based on the revised ten turbine layout, and changes to the turbine specifications since the initial CRM was undertaken.

5.2.3. *Desk Study*

A specific desk study for bats was undertaken in 2014 and will be updated in 2016 to include the extension area and more recent records. A full desk-based study for all other ecological features will be undertaken in 2016, in order to obtain relevant ecological data for the site and surrounding area and provide context. Based on the results of the initial baseline surveys undertaken in 2012-14, it is proposed that relevant records will be sought from to the RSPB, Wildfowl and Wetlands Trust (WWT), Greenland White-fronted Goose Study (GWFGS), Highland Raptor Study Group (HRSG), British Trust for Ornithology (BTO), Highland Biological Recording Group (HBRG), Caithness Biodiversity Group, Scottish Badgers and Amphibian and Reptile Conservation Trust.

5.2.4. *Baseline Surveys*

Completed Surveys

Details of the ornithology surveys completed between September 2012 and August 2014 are presented in Table 5.2.1, along with a brief summary of the results. All surveys followed the SNH guidance that was current at the time (i.e. SNH 201017 for the first year of surveys and SNH 201318 for the second year of surveys) and standard survey methods, as recommended in the SNH guidance. Note that there was a gap in ornithology survey coverage during the spring 2013 migration period. However, a full season of spring surveys was completed in 2014.

A summary of non-avian ecology surveys completed in 2014 is presented in Table 5.2.2, along with a brief summary of results. All surveys followed standard guidance/methods current at the time.

Table 5.2.1: Summary of Ornithology Surveys Completed between September 2012 and August 2014

Survey	Survey period/effort	Survey area	Summary of results
Flight activity surveys	A minimum of 36 hours of observations during each of the following periods: • Autumn migration 2012-13; • Winter 2012-13; • Breeding season 2013; • Autumn migration 2013-14; • Winter 2013-14; • Spring migration 2014; and • Breeding season 2014	Visible area within 2 km of a single vantage point, which covered the initial site boundary (and five-turbine layout)	A total of 803 flights of 16 target species, with lapwing the species recorded most frequently (386 flights), followed by greylag goose (116 flights) and curlew (91 flights). Golden plover (39 flights) snipe (36 flights) and pink-footed goose (32 flights) were also recorded relatively often. Target species recorded less frequently included hen harrier (16 flights) and whooper swan (nine flights).
Winter bird surveys	Three visits between Sep 2012 and Feb 2013	500 m buffer of initial site boundary	A total of 32 species recorded, including six target species: greylag goose, hen harrier, golden plover, snipe, redshank and grey heron. Other notable species included great black-backed gull, herring gull, fieldfare, redwing, song thrush,

[17] SNH. 2010. *Survey Methods for Use in assessing the Impacts of Onshore Wind farms on Bird Communities. November 2005 (revised December 2010)*. SNH, Battleby.

[18] SNH 2013. *Recommended bird survey methods to inform impact assessment of onshore wind farms*. SNH, August 2013.

Table 5.2.1: Summary of Ornithology Surveys Completed between September 2012 and August 2014			
			starling, house sparrow, twite and yellowhammer. However, none of these species were recorded in exceptional numbers.
Foraging goose surveys	Fortnightly visits between Sep 2013 and mid-May 2014	3 km buffer of initial site boundary	Greylag and pink-footed geese were regularly recorded foraging in fields within the survey area, with Greenland white-fronted goose, bean goose and whooper swan recorded less frequently. There were no records of birds foraging within the initial site boundary itself, although small numbers of greylag and pink-footed geese were occasionally recorded foraging in fields within 500 m, to the north of the A836 road.
Breeding raptor and owl surveys	• Monthly visits between Apr and Jul 2013; and • Monthly visits between Apr and Jul 2014	1 km buffer of initial site boundary for barn owl and 2 km buffer of initial site boundary for all other raptor and owl species	No target raptor species were confirmed as breeding within the survey areas, and suitable breeding habitat for target raptor species within the survey areas was relatively limited.
Breeding bird surveys	• Three survey visits between Apr and Jul 2013; and • Four visits between Apr and Jul 2014	500 m buffer of initial site boundary	Low numbers of breeding wader territories were identified within the survey area, with curlew and lapwing territories recorded in both 2013 and 2014, while oystercatcher, redshank and snipe territories were recorded in 2013 only. Large numbers of meadow pipit and skylark territories were also recorded; other notable breeding species included cuckoo, dunnock, house sparrow, twite and yellowhammer.

Table 5.2.2: Summary of Non-avian Ecology Surveys Completed in 2014			
Survey	**Survey period/ effort**	**Survey area**	**Summary of results**
Extended Phase 1 Habitat Survey (including a search for protected mammals)	Jul-Aug 2014	Area within initial site boundary	Fourteen habitats were identified. The findings indicated that the site may support Groundwater Dependent Terrestrial Ecosystems (GWDTE), and habitats that correspond with those listed Annex I of the Habitats Directive. No signs of protected mammals were found, and no habitat likely to support protected mammals was identified.
National Vegetation Classification (NVC) survey	Jul-Aug 2014	Area within initial site boundary	The NVC survey showed that the site is roughly divided between heathland (predominately wet heath) on the higher ground, and grassland in and around the enclosed fields at the north of the survey area. The heathland present within the survey area corresponds with habitats listed on Annex I of the Habitats Directive. Highly groundwater-dependent terrestrial ecosystems were not found within the survey area, although wet heath is considered to be moderately groundwater-dependant (SEPA 2012[19]). Very small areas of habitat within the survey area also correspond with Annex I listed swamp and blanket bog communities.
Bat habitat assessment survey	May-Sep 2014	200 m buffer of initial site boundary	The majority of the survey area consisted of a mosaic of upland heath and grassland habitats, which were very open and windswept, with no trees or broad-leaved woodland present. A small pond was located near the centre of the site. The majority of the survey area was therefore assessed as being of low potential for foraging and commuting bats. However, the hedges to the north-west of the survey area provide

[19] Scottish Environmental Protection Agency (SEPA). 2012. *Land Use Planning System SEPA Guidance Note 4: Planning Guidance on Windfarm Developments*. SEPA.

Table 5.2.2: Summary of Non-avian Ecology Surveys Completed in 2014			
			shelter for insects, and were therefore assessed as being of medium value for foraging bats. Linear features such as hedges, dry stone dykes and small watercourses present within the survey area all provide medium value commuting opportunities for bats. Other than the buildings described below, no potential bat roosting sites were identified. The majority of the survey area was therefore assessed as having low value for roosting bats.
Survey of buildings for bat roost suitability	May-Sep 2014	200 m buffer of initial site boundary	There were several individual or groups of buildings located on the A836 which were outside the initial site boundary but within 200 m. All of these buildings were assessed as having high potential for roosting bats. In addition, a single derelict farm building within the survey area was assessed as having high potential for roosting bats.
Bat transect surveys	Three visits between May and Jul 2014	A single transect within the initial site boundary	A single, faint Natterer's bat pass recorded during the Sep 2014 survey was the only bat call recorded; no bats were recorded during the two earlier transects in May and July.
Static bat detector surveys	Three periods between May and Sep 2014, with a total of 36 nights of data collected across the four locations	Four locations within the initial site boundary	Four bat species were recorded: Natterer's bat, Daubenton's bat, soprano pipistrelle and common pipistrelle. All four species were recorded in relatively low numbers, with common pipistrelle the most abundant species (98 passes in total across the three survey periods), followed by soprano pipistrelle (six passes in total).

Ongoing Surveys

Following a proposed extension of the initial site to the south-west, ornithology surveys resumed in October 2015 and will continue until (and including) August 2016. All surveys follow the revised SNH guidance (SNH 2014[20]) and standard survey methods, as recommended in the guidance. A summary of the ongoing ornithology surveys is presented in Table 5.2.3.

Repeat bat surveys of the initial site boundary and extension area to the south-west, along with botanical surveys of the extension area will also be undertaken in 2016. Proposed surveys are summarised in Table 5.2.4.

[20] Scottish Natural Heritage. 2014. *Recommended bird survey methods to inform impact assessment of onshore wind farms*. SNH, May 2014.

Table 5.2.3: Summary of Ongoing Ornithology Surveys to be Completed between October 2015 and August 2016

Survey	Survey period/effort	Survey area
Flight activity surveys	A minimum of 36 hours of observations during each of the following periods: • Autumn migration 2015-16; • Winter 2015-16; • Spring migration 2016; and • Breeding season 2016	Visible area within 2 km of a single vantage point, which covered the initial site boundary (and five-turbine layout). Note that the ten-turbine layout currently under consideration is within the existing 2 km viewshed visible at 20 m.
Winter bird surveys	Three visits between Sep 2015 and Feb 2016 (now complete)	500 m buffer of initial site boundary and extension to south-west
Foraging goose surveys	Fortnightly visits between Oct 2015 and mid-May 2016 (now complete)	3 km buffer of initial site boundary and extension to south-west
Breeding raptor and owl surveys	Monthly visits between Apr and Jul 2016	2 km buffer of initial site boundary and extension to south-west
Breeding bird surveys	Four visits between Apr and Jul 2016	500 m buffer of initial site boundary and extension to south-west

Table 5.2.4: Summary of Ongoing Non-avian Ecology Surveys to be Completed in 2016

Survey	Survey period/effort	Survey area
Extended Phase 1 Habitat Survey (including a search for protected mammals)	Jun-Aug 2016	Extension area only
NVC survey (including identification of GWDTE and habitats corresponding with those listed on Annex I of the Habitats Directive)	Jun-Aug 2016	Extension area only
Assessment of habitat suitability for roosting, foraging and commuting bats	May-Sep 2016	200m buffer of initial site boundary and extension area
Bat transect surveys	Three visits between May and Sep 2016	Initial site boundary and extension area
Static bat detector surveys	Four remote bat recording units deployed for five nights during three sample periods between May and Sep 2016	Initial site boundary and extension area

5.2.5. *Assessment Methodology*

In line with recently published guidance for EcIA produced by CIEEM (CIEEM 2016[21]), the approach adopted for the assessment of impacts on ecological features will involve the following stages: determination of the importance of ecological features, through desk study and surveys; identification and characterisation of potential effects to determine the overall level of effect; assessment of likely significant impacts; identification of requirement for measures to avoid and mitigate (reduce) these impacts; and assessment of the significance of any residual impacts after mitigation.

The latest CIEEM guidance (CIEEM 2016) avoids and discourages use of the matrix approach to determine significance, and describes only two categories: '*significant*' or '*not significant*'. According to the guidance, for the purpose of EcIA, 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general. Effects can be considered significant at a wide range of scales from international to local. The guidance further states that "*In broad terms, significant effects encompass impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution)*".

In line with this guidance, rather than using a matrix to determine significance, the approach used for the EcIA will be to consider the importance and sensitivity of the ecological feature and the characteristics (extent, magnitude, duration, timing etc.) and severity of the effect, and applying professional judgement as to whether the ecological integrity of the feature will be affected. For the purposes of the assessment, an effect that threatens the integrity of an ecological feature will be considered to be significant. Effects that do not threaten the integrity of an ecological feature will be considered to be not significant.

Where appropriate, mitigation measures will be identified in order to avoid and reduce potentially significant effects. It is also good practice to propose mitigation measures to reduce negative effects that are not significant. The significance of residual effects on an ecological feature following implementation of mitigation will then be determined, along with any monitoring requirements.

Potential cumulative impacts on ecological features will also be included in the EcIA.

The results of the EcIA will be presented in separate ES chapters for ornithology and non-avian ecology, together with the production of relevant appendices.

[21] CIEEM (2016) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal*, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.

5.3. Archaeology and Cultural Heritage

5.3.1. *Introduction*

The archaeology and cultural heritage assessment will be undertaken with reference to national, regional and local planning policy, legislation and guidance, and will be conducted in accordance with the Chartered Institute for Archaeologists' 'Code of Conduct' (CIfA 2014) and 'Standard and Guidance for Historic Environment desk-based assessment' (CIfA 2014), and with the Highland Council Standards for Archaeological Work (The Highland Council, 2012).

Direct Effects

Direct effects on known (or on unknown and buried) archaeological remains relate to the possibility of disturbing, removing or destroying in situ remains and artefacts during ground works associated with the construction phase; e.g. excavations for turbine and building foundations, access tracks and the development of borrow pits.

Preliminary collation of baseline data indicates that there are 24 heritage assets recorded in the HER within the Proposal site, most of which were identified during a survey of the area conducted in 1981 (Mercer 1981). Such assets include one possible prehistoric hut circle, two possible prehistoric cairns and a burial cist.

Other sites identified are more recent and represent farming settlement remains and sites associated with agricultural activity from the post-medieval period. These sites include former farmsteads, sheepfolds, quarries, and wells. Preliminary results of a walkover field survey, undertaken in 2014 over the northern part of the site, indicate that much of that part of the Proposal area is now improved pasture and that the land along the Hill of Forss ridgeline and hill-slope is of semi / unimproved pasture and upland heather moorland.

Possible prehistoric assets previously recorded in the HER that lie within the 2014 survey area have become denuded through time as a result of land improvement, cattle trampling and farm vehicle movement; at least two (the possible prehistoric cairns) are now no longer visible. Only very faint traces of the possible hut circle were found. Other assets, such as the wells, have fallen out of use and are no longer visible; the ruinous remains of three former farmsteads or buildings and two sheepfolds were found to still survive.

The Proposal will seek to avoid direct impacts upon any known heritage assets through careful siting of infrastructure during the design process. However, depending upon other constraints there is a possibility that some assets could be subject to some level of direct impact. There is also a possibility that hitherto unknown archaeological remains survive below the current ground surface and there is a possibility that these could be affected during the construction phase of the Proposal.

Indirect Effects

Indirect effects include visual impacts upon the setting of heritage assets, including: Listed Buildings, Scheduled Monuments and Historic Gardens and Designed Landscapes.

Depending upon the final turbine layout and configuration there is the potential that a number of designated heritage assets in the vicinity of the wind farm could be subject to visual impact upon their settings.

In particular, there are a number of scheduled sites within 5km of the Proposal which belong to monument types that are particularly sensitive to change within their settings. These assets include:

- Thing's Va and Scrabster Mains broch (Index No 587 and 579), located to the east and north-east of the Proposal;
- a group of three prehistoric burial cairns and Knockglass broch (Index Nos. 469, 470, 471, and 562), located at Westfield to the south of the Proposal;

- the chambered cairns located at Cnoc Freiceadain and Hill of Shebster (Index Nos. 90078 and 476), to the south-west of the Proposal;
- the scheduled remains of the medieval chapel of St. Mary (Index No. 90086); and
- the late 16th century tower house of Brims castle (Index No. 5510), both located along the coast to the north-west of the Proposal.

The extent of visibility from these and other identified heritage assets will be assessed following the receipt of the Zone of Theoretical Visibility (ZTV) data based on the final turbine layout. World Heritage Sites, Scheduled Monuments, Listed Buildings, Conservation Areas, Inventory Gardens and Designed Landscapes, and Inventory Battlefields at distances up to 10 km from the outermost turbines, and which might be subject to impacts upon their settings will be identified and included in the assessment. Subject to scoping responses from Historic Environment Scotland (HES) and the Highland Council's Historic Environment Team (THC-HET), other assets at greater distances may be included in the setting assessment.

5.3.2. *Consultations*

Following receipt of Scoping Opinions, further consultation will be carried out HES and THC-HET to agree the scope of the assessment (including options for mitigation where relevant) and to discuss visualisation requirements and agree relevant viewpoints.

5.3.3. *Baseline Assessments*

Desk-based Assessment

A desk-based appraisal of the Proposal area will be undertaken, to identify all known cultural heritage features, designated or otherwise, within the Proposal area, and to inform the assessment of the archaeological potential of the land. The assessment will use the following sources:

- Highland Council Historic Environment Record (HER);
- Historic Scotland's on-line GIS database;
- Canmore (the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) database);
- National Library of Scotland: Library for Ordnance Survey maps (principally 1st and 2nd edition) and other published historic maps;
- National Archives of Scotland for unpublished historic maps (Estate Plans, etc);
- RCAHMS archives for oblique and vertical aerial photographs;
- Published bibliographic sources, including The Statistical Accounts of Scotland;
- The Scottish Palaeoecological Archive Database (SPAD) (http://xweb.geos.ed.ac.uk/~ajn/spad); and
- The Historic Land-use Assessment data for Scotland (HLAMAP) (jura.rcahms.gov.uk/HLA).

Field Survey

A reconnaissance walk-over field survey has been undertaken of the northern part of the proposed wind farm area. That survey will be extended to include the whole of the Proposal site as part of the assessment.

The aims of the field survey will be to locate and record the character, extent and current condition of all visible cultural heritage sites, monuments, landscape features. The survey would also aim to identify areas that may provide evidence for potential unrecorded, buried archaeological remains.

Weather and any other conditions affecting the surveys will be recorded. All individual features will be recorded and photographed. A hand-held DGPS Navigator system will be used to record the position, and where relevant the extent, of each feature. All features will be marked on plans, at a relevant scale, keyed by means of Grid References to the Ordnance Survey mapping.

Site visits to key receptors for the setting assessment will be undertaken to assess the character and sensitivity of the setting of potentially sensitive assets and to assess the potential effects of the Proposal on those settings.

5.3.4. *Assessment Methodology*

Sensitivity

Cultural Heritage sensitivity is defined as follows:

- **High:** Assets of national importance including:
  - *Scheduled Monuments, and sites proposed for scheduling;*
  - *Undesignated archaeological sites and areas of likely national importance identified in HERs/SMRs;*
  - *Category A Listed Buildings;*
  - *Gardens and Designed Landscapes (Inventory sites); and*
  - *Historic Battlefields (Inventory sites).*
- **Medium:** Assets of regional importance including:
  - *Archaeological sites and areas of distinctive regional importance;*
  - *Category B Listed Buildings; and*
  - *Conservation Areas.*
- **Low:** Assets of local importance including:
  - *Category C Listed Buildings;*
  - *Archaeological sites of local importance; and*
  - *Unlisted historic buildings and townscapes with local (vernacular) characteristics.*
- **Negligible:** Assets of little or no importance including:
  - *Sites of former archaeological features;*
  - *Unlisted buildings of minor historic or architectural interest;*
  - *Poorly preserved examples of particular types of feature; and*
  - *Artefact Find-spots.*

Magnitude of Change

The varying scales of magnitude for change can be defined as follows:

- **High:** A fundamental change to the physical condition of a heritage asset, leading to total loss or major alteration of its character / Comprehensive change in the surroundings of an asset, such that its baseline setting is substantially or totally altered and key visual links and relationships with the surroundings are lost or substantially affected;
- **Medium:** A material change to the physical condition of a heritage asset, resulting in partial loss or some alteration of its character / An impact discernibly changing the surroundings of an asset, such that its baseline setting is partly and materially

altered and key visual links and relationships with the surroundings are materially affected;

- **Low:** A slight but detectable change to the physical condition of a heritage asset, resulting in minor alteration of its character / A slight but detectable change in the surroundings of an asset, resulting in superficial alteration of its baseline setting and key visual links and relationships with the surroundings are unaffected; and
- **Negligible:** A barely distinguishable change to the physical condition of a heritage asset / A very slight and barely distinguishable change in the surroundings of an asset, resulting in no obvious alteration of its baseline setting or to key visual links and relationships with the surroundings.

5.3.5. *Impact Prediction and Evaluation*

The impacts of the Proposal on cultural heritage assets will be assessed as follows:

- identification and assessment of direct effects on heritage assets and proposals for mitigation of effects;
- assessment of potential for impacts on buried archaeological remains and proposals for mitigation of such effects;
- assessment of effects on the settings of heritage assets; and
- assessment of cumulative impacts on the settings of heritage assets in combination with other wind farm schemes (as identified by the LVIA through consultation).

The results of the assessment will be presented in an ES chapter together with the production of appendices, which would include gazetteers of on-site constraints and of off-site receptors from which there would be theoretical visibility of the Proposal (based on the blade tip height ZTV) within 10 km of the proposed wind turbines. Assessment distances will be agreed with HES and THC-HET. Depending upon the outcome of the analysis of the final ZTV, and following consultation with HES and THC-HET, visualisations (either wireframes or photomontages) may also be produced for key receptors to aid in assessment and representation of visual impacts.

5.4. Traffic and Transport

5.4.1. *Intro / Context including impacts*

The traffic impact of the proposals will be assessed as part of the ES. This will focus on the proposed delivery route which will see deliveries arrive at Port of Scrabster and be transported to site first via the A9 (T) and then the A836 at the 'Weigh Inn' junction. The delivery vehicles will then continue approximately 6km on the A836 to a new priority access junction to the site.

This is a tried and tested route, with the Port of Scrabster having handled numerous Oil and Gas deliveries as well as several abnormal loads to the operational Baillie Hill and Strathy North wind farms. It is therefore envisaged that little to no physical works would be required between the Port of Scrabster and the site access junction on the A836.

5.4.2. *Consultations*

Scoping discussions will be held with The Highland Council (THC) (as local roads authority) and Transport Scotland (TS) and their agents BEAR Scotland (as trunk roads agencies) with regards to transport on the A836 and the A9 trunk road respectively. The scoping discussions will identify the extent of the study area, agree the methodologies and identify data sources for use in the project. As the proposed delivery route is approximately 8 km, average flows on the A9 and A836 will be used to inform the requirement for incorporating hold points on the route.

5.4.3. *Baseline Assessment*

With regard to abnormal load deliveries to the proposed site, a detailed review will be undertaken for the chosen route through to the proposed site access to include assessment of existing information, site visit, swept path analysis and gradient checks at constrained locations where existing information is not available. All horizontal, vertical and weight constraints will be noted for assessment.

Traffic flow and speed data on the A836 and on the A9 (T) will be obtained from the relevant authorities and supplemented with new automatic traffic count surveys if scoping discussions identify a necessity for additional data to be collected. Accident data will also be procured from THC and TS.

5.4.4. *Assessment Methodology*

The Traffic and Transport chapter of the ES will cover the construction, operational and decommissioning phases of the project. The worst case scenario for traffic impact occurs during construction; the operational and decommissioning phases usually generating far fewer trips than the construction phase. The impact assessment will be undertaken in line with the IEMA Guidelines for the Environmental Assessment of Road Traffic (1994) and will incorporate a high level sensitivity and statistical review of the construction phase impact. This will include the following:

- A summary of relevant policy;
- A summary of the methodology adopted for the assessment;
- A description of the existing and future baseline conditions;
- An estimate of trip generation during the construction, operational and decommissioning phases of the development;
- An assessment of the impacts that are likely to occur;
- Identification of appropriate mitigation measures;
- Identification of any residual impacts;
- Identification of any cumulative impacts from surrounding consented wind farms;
- Provision of a preliminary site access design; and

- Framework Traffic Management Plan.

Magnitude of Effect

IEMA guidelines identify changes in traffic in excess of 30%, 60% and 90% as being representative of "slight", "moderate" and "substantial" impacts respectively. This approach will be adopted within the ES Traffic and Transport chapter.

Magnitude	Impact
Substantial	Considerable deterioration/improvement in local conditions or circumstances (+90% increase in traffic)
Moderate	Readily apparent change in conditions or circumstances (60 – 90% increase in traffic)
Slight	Perceptible change in conditions or circumstances (30 – 60% increase in traffic)
Negligible	Very small change in conditions or circumstances (10 – 30% increase in traffic); and
No Impact	No discernible change in traffic (- 10% increase in traffic)

Sensitive Receptors

Receptors are locations or land uses categorised by their qualitative degree of sensitivity (or Environmental Value)). The sensitivity of a receptor can be defined by the user groups who would be affected by change with vulnerable user groups such as school children and the elderly generally regarded as the most sensitive to change.

The ES Traffic and Transport chapter will define sensitivity in accordance with the following criteria table.

Sensitivity	Receptor Description
Very High	Nationally or internationally important site with special sensitivity to increases in road traffic.
High	Regionally important site with special sensitivity to increases in road traffic.
Medium	Residential (with frontage onto road under consideration), educational, healthcare, leisure, public open space or town centre/local centre land use
Low (or Lower)	Employment or out of town retail land use, such as retail park
Negligible	Very low importance and rarity, local scale

5.4.5. *Impact prediction and Evaluation*

Assessment of Significance

The assessment of significance in relation to the environmental impact of traffic should take cognisance of both the magnitude of effect and sensitive receptor criteria. The level of significance will be assessed in accordance with Table 2.4 of the Design Manual for Roads and Bridges (DMRB), Volume 11, Section 2 (Part 5, HA 205/08).

		Magnitude of Impact (Degree of Change)				
		No Change	Negligible	Slight	Moderate	Substantial
Receptor Sensitivity	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral	Neutral or Slight	Neutral or Slight

Dependent upon the sensitivity of the receptor, significance levels of "Moderate" and above are regarded as requiring further consideration.

Potential Effects

Should the statement of significance indicate that a link requires further consideration, they will then be assessed to determine the potential effects. The relevant potential effects in terms of traffic and transport as described in the IEMA Guidelines are listed below:

- Severance;
- Driver Delay;
- Pedestrian delay, intimidation, loss of amenity;
- Road accidents and safety; and
- Hazardous loads.

5.5. Hydrology, Hydrogeology & Geology

5.5.1. *Intro / Context including impacts*

This section considers the scope of potential effects on the geology, controlled waters (groundwater and surface water) during the construction, operation and decommissioning phases of the Proposal. This assessment, and preparation of the ES chapter, would be undertaken by an independent consultant. The following outlines the intended approach to be used within the assessment.

5.5.2. *Methodology and Consultations*

A desktop study and site visit will be undertaken to confirm the hydrological, hydrogeological, geological and peat characteristics of the site.

The following sources of information and guidance will also be consulted as part of the desk study assessment:

- The British Geological Survey (BGS) website- www.bgs.ac.uk;
- The Scottish Environment Protection Agency- www.sepa.org.uk;
- Any other published information on existing ground conditions in the vicinity of the site;
- Peat probing reports to be provided by RES;
-
- The Highland Council Draft Onshore Wind Energy Supplementary Guidance, 2015;
- Development on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of excavated Peat and Minimisation of Waste, SEPA, 2012';
- Water Framework Directive;
- Baseline assessment reports prepared by Caledonian Conservation for RES, including a NVC habitat survey of Potential Ground Water Dependent Terrestrial Ecosystems (GWTDE) and habitats listed under Annex 1 of the Habitats Directive; and
- SEPA's LUPS GU 31 Planning Guidance on Groundwater Abstractions GWDTE V2 (October, 2014).

5.5.3. *Baseline Assessment*

The detailed hydrological, hydrogeological, geological and peat characteristics will be defined along with an outline of likely significant effects. An initial review of the geological conditions at the site is provided below.

Superficial Geology

The BGS 1:50:000 scale map sheet 115E (Reay) shows a variable thickness of peat overlie a large part of the site underlying the Lythmore Moss. Glacial Till (Forse Member) is also present across the site, particularly in the upper reaches of the Forss Water River and its tributaries. Alluvium associated with the river is present to the west of the site.

Bedrock Geology

The site and the surrounding area are underlain by the Devonian bedrocks comprising the Scrabster Flagstone Member which consists of interbedded siltstones and sandstone. The Scrabster Flagstone Member outcrops on parts of the site where the superficial cover is absent. Holborn Sandstone Member which also comprises interbedded sandstone and siltstone is present to the west of the site. There is a disused quarry in the south eastern edge of the site extending beyond the site boundary.

Hydrogeology and Hydrology

The BGS Hydrogeological Map of Scotland 1:625,000, sheet 18 indicates that the bedrock beneath the site is classified as locally important aquifer. However, it also indicates that in Caithness area, groundwater is confined to shallow zones of weathered rock with limited yields from boreholes. Several potential spring discharges are likely to be present across the site. Groundwater flow is likely to be in a west / north westerly direction.

A number of surface water drains and ditches are present across the site and the surrounding areas. Some of the watercourses are tributaries of the Burn of Brim to the north west, the Thusater Burn to the north east and the Burn of Brimside to the south of the site.

The Burns of Brim and Brimside are likely to be discharging The Forss Water River which flows in a north/north westerly direction approximately 1 km west of the site. The river discharges to the coast to the north of the area. The Forss Water River was classified overall as 'Poor' in 2015. The Forss water is protected for freshwater fish and the Caithness Lochs in the catchment are part of a Special Protection Area (SPA).

A waterbody is present on the Hill of Forss in the central part of the site. Scapster Loch is approximately 2 km to the north east and Lochan Bidhe is approximately 1.2 km north west of the site. A number of dams are shown within 1 km of the site.

Topography and Drainage

The site's topography is dominated by the Hill of Forss at an elevation of 138 m AOD in the central part. The ground level falls away from the hill to approximately 60 m AOD and 120 m AOD in northerly and southerly directions respectively.

The surface water ditches and drains across the site are likely to be draining in a westerly direction towards Forss Water River as wells as in a northerly towards the smaller tributaries. The presence of GWDTE will be identified using data collected during the baseline assessments and confirmed from the site walkover by a hydrogeologist.

5.5.4. *Assessment of Effects*

The sensitivity of receptors and likely magnitude of impacts of the Proposal will be discussed with Scottish Environment Protection Agency (SEPA) and The Highland Council (THC) prior to the assessment being undertaken. The following will be considered in the assessment.

Ground Conditions, Peat and Wetland areas

The peat characteristics will be defined in the baseline EIA study, using information gathered during a desk study and site visit. An outline of potential impacts the development may have in relation to peat during construction, operation and decommissioning will be provided as well as guidance for the mitigation of the potential impacts.

Preliminary peat probing has already been undertaken on the site. This information will be reviewed and will inform a Phase 1 Peat Stability Risk Assessment (PSRA), which will be included in the EIA. It is unlikely that a more detailed peat probing and peat coring survey targeting areas of greatest potential impacts (e.g. infrastructure locations) will be required following design freeze.

If any infrastructure is located on a significant area of peat a Phase 2 PSRA will be compiled based on the findings of the Phase 1 report and supplementary detailed probing / coring exercise.

If significant peat is identified at the site, a Peat Management Plan would be required in general accordance with the guidelines set out in 'Development on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of excavated Peat and Minimisation of Waste, SEPA, 2012'.

Where GWDTE are identified, recommendations would be made for monitoring of the most sensitive sites and which would follow the guidance set out by SEPA in its LUPS GU 31 Planning Guidance on Groundwater Abstractions GWDTE V2 (October 2014).

It is unknown if the quarry in the south eastern corner of the current red line boundary has been backfilled. Historical information on the land uses for the site and the immediate vicinity will be obtained from published records and any records held by The Highland Council. An assessment of the potential impacts of the Proposal on the current and historical land use will be undertaken particularly with respect to potential risk of the presence of or the potential of mobilising ground contamination from backfilled areas.

Private Water Supplies

Information on private water supplies within a 5 km radius of the site will be sourced from The Highland Council. The study will also aim at identifying any other private water supplies, including associated infrastructures in the vicinity of the site that may not be included in the records held by The Highland Council. The assessment of the potential impacts of the Proposal will be concentrated on those private supplies within 1 km of the red line boundary.

As part of this assessment, a hydrogeologist and geotechnical specialist will consider the effects of any piled foundations on the quantity and quality of both private water supplies and wider groundwater resources.

Surface Water Resources and Quality

During construction there is a risk of:

- Silt-laden runoff entering surface water receptors directly and indirectly via land drains; and
- Spillages polluting nearby surface water receptors directly and indirectly via land drains.

Site runoff may be contaminated with fine particulates (silt) from disturbed ground and earthworks. These pollutants may flow into existing watercourses/ponds and lakes/drains and may ultimately discharge into the nearby watercourses in vicinity of the site.

Consideration of any potential morphological effects on drains and surface watercourses as part of the development will be assessed. An assessment of potential risk of polluting watercourses associated with the Proposal will be assessed based on the proposed construction methods.

Protected Sites / Conservation Areas / Fisheries

The western and southern edges of the site lies within the Forss Water SPA designated for fresh water fisheries. The Caithness Lochs in the area are also designated as SPA. Detailed information relating to the protected areas and fisheries designations will be used to assist in determining the importance of water bodies which will be included in the assessment.

Flooding

The site is not within an area identified by SEPA to be at risk of flooding from both rivers and coastal waters. However, it is located within 1 km of flood risk zone for the Forss Water River. Additionally, due to the presence of watercourses within the site, there are areas of the site that are at medium to low risk of fluvial flooding. A review of the potential fluvial risk on the site will be carried out as part of the EIA. The Highland Council Flood Management Team will be consulted as part of any flood assessment undertaken.

5.5.5. *Impact Prediction and Evaluation*

The outcomes of the hydrological impact assessments will be used to influence and guide the infrastructure layout to be submitted as part of the planning application. Where any significant adverse effects cannot be mitigated through design iterations, these will be clearly identified within the ES and a view offered regarding the overall effect on receptors.

5.6. Noise

5.6.1. *Introduction - Context including Impacts*

Noise can have an effect on the environment and on the quality of life enjoyed by individuals and communities. The effect of noise, both in the construction and operational phase, is therefore a material consideration in the determination of planning applications.

Operational noise emitted by wind turbines can be associated with two types of noise source: aerodynamic sources due to the passage of air over the turbine blades; and mechanical sources associated with the gearbox, generator and other parts of the drive train.

The main focus of the acoustic impact assessment of operational noise will be the most relevant type of noise emission for modern wind turbines: aerodynamic noise, which is broadband in nature. Mechanical noise, which can be tonal in nature, is also considered albeit less relevant to modern wind turbines. Implicitly incorporated within this assessment is the normal character of the noise associated with wind turbines (commonly referred to as 'blade swish') and consideration of a range of noise frequencies, including low frequencies.

An assessment of the impact of construction noise, due to the operation of machinery and movement of traffic, will also be undertaken.

5.6.2. *Consultations*

The Highland Council's Environmental Health Department has been consulted regarding the proposed acoustic assessment methodology. This included discussion of the background noise survey locations in advance of the survey being undertaken and the attendance of an Environmental Health Officer during survey setup.

5.6.3. *Baseline Assessment*

Background noise measurements have been made at four properties geographically spread around the proposed wind farm site. Wind speed and direction were recorded concurrently on the proposed site to allow correlations with the noise data to be established. Rain data was also measured on-site using a rain gauge to allow any periods of rainfall to be excluded from the subsequent analysis.

5.6.4. *Assessment Methodology*

Within Scotland, noise is defined within the planning context by 'Planning Advice Note 1/2011: Planning and Noise'. Planning Advice Note 1/2011 refers to web-based planning advice for onshore wind turbines which states that the Department of Trade and Industry's 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97) should be used to assess and rate noise from wind energy developments. It is therefore considered that the use of ETSU-R-97 fulfils the requirements of Planning Advice Note 1/2011.

The guidance makes it clear that the noise restrictions placed on a wind farm must balance the environmental impacts of the development (particularly in relation to residential amenity) with the widely recognised and policy driven benefits that would arise through the development of renewable energy resources.

'A Good Practice Guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise', issued by the Institute of Acoustics in May 2013 and endorsed by the Scottish Executive, provides guidance on all aspects of the use of ETSU-R-97.

The operational noise assessment process can be outlined as follows:

- identify the nearest residential properties;
- identify the type and noise emission characteristics for the candidate wind turbine;
- calculate the noise levels predicted due to the operation of the proposed wind turbines at the properties being considered;
- determine the need for a background noise survey;
- agree the acoustic assessment methodology, and discuss background noise survey locations if required, with The Highland Council's Environmental Health Department;
- carry out baseline survey, if required;
- derive noise limits in accordance with relevant planning guidance;
- assess the predicted noise levels due to the operation of the proposed wind farm against the derived limits;
- assess the cumulative acoustic impact of the proposed wind farm in conjunction with neighboring schemes; and
- The web-based Technical Advice Note: Assessment of Noise, Appendix 1: Legislative Background, Technical Standards and Codes of Practice identifies BS 5228:2009 as being applicable to the assessment of construction noise. Predictions of construction noise levels will therefore be compared to significance criteria consistent with this standard.

5.6.5. *Impact Prediction and Evaluation*

An assessment will be carried out to determine the impact of construction and operational noise in accordance with appropriate guidance. The following guidance is relevant to the assessment of operational noise:

- PAN 1/2011, Planning and Noise;
- Onshore wind turbines, online renewables planning advice;
- ETSU-R-97, The Assessment and Rating of Noise from Wind Farms;
- Institute of Acoustics (2009), Acoustics Bulletin Article, Prediction and Assessment of Noise from Wind Farms; Bowdler et al, Vol. 34, No. 2; and Institute of Acoustics (2013), A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise.

With regard to construction noise, the following legislation and standards are relevant:

- The Control of Pollution Act 1974; and
- BS 5228:2009, Code of Practice for Noise and Vibration Control on Construction and Open Sites.

6. LIKELY NON-SIGNIFICANT ENVIRONMENTAL EFFECTS

Initial reviews of the site have indicated that a number of Environmental Impact Assessment subjects sometimes associated with Wind Farms, would not lead to likely significant effects at this site. Accordingly, it is proposed that no further assessment is undertaken on the following EIA topics.

6.1. Electromagnetic Interference, Aviation & Shadow Flicker

6.1.1. *Electromagnetic Interference*

Wind farm developments have the potential to interfere with electro-magnetic signals passing above ground and existing infrastructure that is buried below ground.

However, an initial review has indicated that it is unlikely that impacts on telecommunications would arise as a result of the proposed wind farm.

Further consultation will be carried out with OFCOM, television and telecommunication providers to clarify that there are no links crossing the proposed site or that turbine development within this area is likely to impact on digital TV signals. Information obtained from the consultees will be taken into account and if necessary the proposed wind farm layout will be designed to take on board existing telecommunication links.

Consultation would lead to confirmation of existing links and transmitters and the requirement of mitigation measures to offset any disruption such as:

- reflection / scatter of point-to-point microwave radio links; and
- reflection of television signals leading to 'ghosting' images.

Investigation would be undertaken to examine any potential problems with interference and ways to minimise interference through site layout. Arrangements with the telecommunications and transmitting companies would be described to cover any mitigation measures necessary.

6.1.2. *Aviation*

In the wake of recent, Government-led consultation with the aviation organisations such as NATS, BAA, CAA, and the MOD, it is clear that large scale wind farm proposals can impact significantly on primary, secondary or weather radar stations and thus affect operational safety. Developers are encouraged to engage with these organisations and airport operators at an early stage in the design process, to establish the potential impacts and agree acceptable technical solutions. Where actual or potential conflicts exist, it is important that a solution is identified and that the relevant consultee agrees to that solution being realised within a suitable timescale.

Further consultation will be carried out with the CAA, NATS and the MOD as part of the EIA process. Consultation would lead to greater knowledge of existing links and transmitters and the requirement of mitigation measures to offset any disruption such as radar and obstacle effects for aircraft.

Information obtained from the consultees will be taken into account and, if necessary, the Applicant will begin discussions with the relevant operators over the likelihood and practicalities of radar mitigation. The conclusions of any discussions or agreements with relevant operators will be presented in the ES.

6.1.3. *Shadow Flicker*

In sunny conditions, any shadow cast by a wind turbine will mirror the movement of the rotor. When the sun is high, any shadows will be confined to the proposed wind farm area, but when the sun sinks to a lower position, moving shadows can be cast further afield and potentially over adjacent properties. Shadow flicker is generally not a disturbance in the open as light outdoors is reflected from all directions. The possibility of disturbance is greater for occupants of buildings

when the moving shadow is cast over an open door or window, since the light source is more directional.

Using proprietary specialist modelling software, Wind farm V4.1.2.2, an analysis of shadow flicker throughout the year from the proposed wind farm will be carried out, taking into account the trajectory of the sun, the local topography and the turbine layout and dimensions.

The modelling exercise for shadow flicker will confirm whether any property would be materially affected by shadow flicker. The results of a shadow flicker assessment of the final layout will be included as a technical appendix to the ES and commented on as part of the project description section within the ES.

6.2. Peat and Peat Slide Risk

As discussed previously in Section 5.5.4, preliminary peat probing has been undertaken to establish the baseline peat environment. If the preliminary results confirm that the site is typified by shallow deposits of peat across the surveyed areas of the site, a further detailed peat depth assessment (Phase 2) is unlikely to be required as part of the assessment.

6.3. Carbon Assessment

If the proposed wind farm at Cairnmore Hill is typified by shallow peat deposits as discussed above and following full consideration of the pattern of peat and the habitat baseline, it is unlikely that a full carbon balance assessment, using the Nayak et al carbon calculator, will be required.

7. NEXT STEPS

This report is provided to the Highland Council in support of a request by RES for a 'Scoping Opinion' regarding the information to be provided within the Environmental Statement (ES) which will accompany the planning application.

In forming its opinion, the Highland Council will seek the views of various organisations with an interest in the proposed wind farm, inviting comments on the proposed scope of and approach to the EIA proposed herein.

In submitting your comments to the Highland Council on this report, RES would be grateful if you could send a copy of your response to the address below.

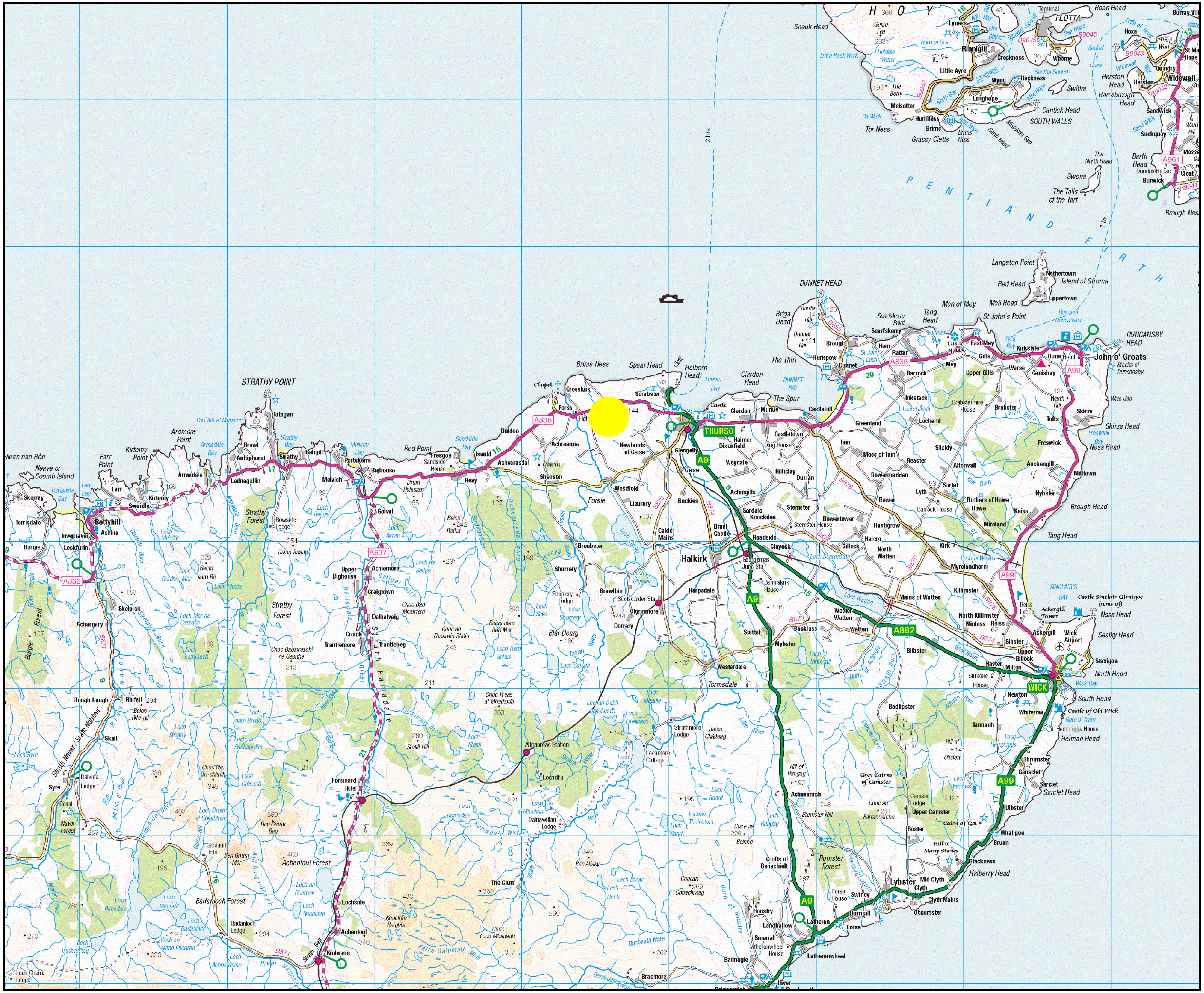
Lisa Miller
RES Ltd
3rd Floor
STV
Pacific Quay
Glasgow
G51 1PQ

lisa.miller@res-group.com

T: 0141 404 5588

Appendix A: Figures 1-3

- Figure 1: Site Location
- Figure 2: Indicative Turbine Layout
- Figure 3: Zone of Theoretical Visibility (ZTV)



CAIRNMORE HILL WIND FARM

FIGURE 1

SITE LOCATION

KEY

SITE LOCATION

LAYOUT DWG	N/A	T-LAYOUT NO.	N/A

DRAWING NUMBER

03022D2204-02

SCALE - 1 : 250,000 @ A3

SCOPING REPORT
2016

CAIRNMORE HILL WIND FARM

FIGURE 2

TURBINE LAYOUT

Project Area

Turbine Location

Turbine ID	Easting	Northing
T1	306983	968600
T2	306585	968655
T3	306689	968299
T4	306321	968338
T5	306378	967927
T6	305877	967676
T7	306246	967532
T8	306049	968094
T9	305928	967298
T10	306306	967171

LAYOUT DWG	T-LAYOUT NO.
N/A	PSCOhof016

DRAWING NUMBER
03022D0101-03

SCALE - 1 : 15,000 @ A3

SCOPING REPORT
2016

CAIRNMORE HILL WIND FARM

FIGURE 3

BLADE TIP ZTV

- Preliminary Turbine Location
- 35km Radius From Outer Turbine
- Preliminary Viewpoint Location

Number of turbines visible at Blade Tip Level (125m)

1 - 2	5 - 6	9 - 10
3 - 4	7 - 8	

1. Predicted visibility is for observer eye level 2m above ground level
2. The analysis does not take into account the screening effects of vegetation, buildings or other surface features
3. Created using Ordnance Survey digital terrain data on a 50m grid

0 2 4 8 km

N

LAYOUT DWG	T-LAYOUT NO.

DRAWING NUMBER

FIGURE 3

SCALE - 1:300,000 @ A3

SCOPING SUBMISSION