SCOTTISHPOWER
RENEWABLES

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Annex 1 Year 1 Ornithology Report

1. Introduction

1.1 Background

ScottishPower Renewables (SPR) is investigating the feasibility of a windfarm development on a site south of its operational Beinn an Tuirc Windfarm and adjacent to the extension to Beinn an Tuirc Windfarm (hereafter referred to as Beinn an Tuirc Windfarm Phase 2), currently under construction, located on the Kintyre Peninsula in Argyll and Bute. The potential development would be known as Beinn an Tuirc Windfarm Phase 3, hereafter referred to as the proposed development.

The project is at an early stage in the Environmental Impact Assessment (EIA) process and there is limited baseline site information available at this time. As such an initial site layout has not yet been produced, nor has a candidate turbine been selected.

1.2 The Applicant

SPR is part of Iberdrola, the world's largest wind energy developer, with an operating portfolio of over 14,000 megawatts (MW). SPR is responsible for progressing Iberdrola's onshore wind and marine energy projects in the UK and Ireland, and offshore windfarms throughout the world, managing the development, construction and operation of all projects. Securing its position at the forefront of the renewable energy industry, SPR became the first UK developer to reach an installed generating capacity of 1,000MW in 2011, in addition to receiving a second Queens Award for Enterprise for Sustainable Development. With a pipeline including 10,000MW of offshore wind, and the 10MW world-first tidal energy array in the Sound of Islay, SPR is firmly committed to the responsible development of renewable energy.

For more than a decade, the Argyll and Bute Council area has been a key region for SPR with the operation of three onshore windfarms (Beinn an Tuirc, Cruach Mhor and Clachan Flats) and the construction of a fourth (Beinn an Tuirc Windfarm Phase 2) currently underway. Furthermore, in progressing the construction of the tidal energy array in the Sound of Islay, a project which is at the forefront of marine energy development, SPR has cemented this region's position as a key player in the renewable energy industry.

1.3 Purpose of this Report

At this time the capacity of the proposed windfarm is not known; however, it may exceed the 50MW threshold above which an application would be considered under Section 36 of the Electricity Act and would be submitted to the Scottish Government's Energy Consents and Development Unit (ECDU). This request for a Scoping Opinion is therefore made to Scottish Government.

SPR has commissioned SKM Enviros to act as the Lead EIA and Planning Consultant for the proposed development, and to prepare the Environmental Statement (ES) that would be submitted with any future planning application for Section 36 consent with deemed planning

permission under Section 57 of the Town and Country Planning (Scotland) Act 1997. The first stage of the EIA process has been for SKM Enviros to prepare this report that forms a written request from SPR to the ECDU, under Regulation 7 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 ("the Regulations"), for its opinion as to the information to be provided in the ES (a "Scoping Opinion").

Regulation 7(2) requires a request for a Scoping Opinion to be accompanied by:

a) a plan sufficient to identify the site which is the subject of the proposed development;
b) a brief description of the nature and purpose of the proposed development and of its possible effect on the environment; and
c) such further information or representations as the person making the request may wish to provide or make.

As required by the Regulations, this request provides the necessary background information for the Scottish Ministers to prepare a Scoping Opinion.

The request for a Scoping Opinion is a key element of the EIA process and allows refinement of the proposed EIA methodology. It seeks to provide early identification of the key environmental issues relevant to the proposals, and seeks to agree the content and scope of the ES. Scoping also:

- Defines and describes the development to be assessed;
- Defines the regulatory and policy context;
- Outlines those issues that do not require further consideration, given the characteristics of the proposed development and the receiving environment, and which will not be taken further in the EIA; and
- Seeks views and identifies concerns of key stakeholders on the proposed scope of the EIA and method through which it will be undertaken.

In arriving at its formal Scoping Opinion, the ECDU will consult with a number of consultees and incorporate their views within the Scoping Opinion. The Scottish Ministers and consultees are also invited to identify any sources of information that they consider are of relevance and value to the EIA of the proposed Beinn an Tuirc Windfarm Phase 3.

1.4 Structure of this Report

This report is structured as follows:

- Section 2 describes the energy and planning policy context relevant to the development;
- Section 3 describes the site selection process and outlines the proposed development and associated infrastructure;

- Sections 4 to13 outline the EIA topic areas to be covered in the ES including the legislation and policy relevant to the topic area, any details of the baseline conditions, potential effects of the development and the proposed EIA methodology; and
- Section 14 provides a list of the consultees that will be approached for information that may be required to prepare the EIA or to comment on the approach proposed by this report.

The following figures are also included:

- Figure 1 presenting the site location;
- Figure 2 showing the indicative proposed development area;
- Figure 3 presents the statutory and non-statutory designations in the surrounding area;
- Figure 4 illustrates cumulative windfarm sites and proposed viewpoints; and
- Figure 5 shows the designated cultural heritage assets in the surrounding area.

2. Energy and Planning Policy Context

This section identifies the existing and emerging land use policies relevant to the development of a renewable energy project.

2.1 National Planning Policy

At this time, the national land use policy context is provided by the Scottish Government's National Planning Framework (NPF) 2 and Scottish Planning Policy (SPP) 2010. Both of these documents are the subject of a current review and a Main Issues Report for NPF3 and Consultative Draft SPP were published for comments at the end of April 2013. Until these latest documents are finalised and formally adopted by the Scottish Government they would form a further material consideration in the determination of any application for Section 36 consent with deemed planning permission under Section 57 of the Town & Country Planning (Scotland) Act 1997, but of lesser weight than the current versions.

NPF2 and SPP 2010 actively promote the deployment of renewable energy in appropriate locations given that this is a fundamental part of the Scottish Government's objective of achieving a low carbon economy. The macro policy aspiration is for the equivalent of all of Scotland's electricity needs to be met from renewable / decarbonised sources by 2020 (Scottish Government, 2012).

A fundamental part of the national policy on renewable energy is that the national targets are not seen as a cap and active encouragement is given within the national policy for planning authorities to set out where they expect sources of renewable energy to be located, specifically setting the expectation that "*an area's renewable energy potential is realised and optimised in a way that takes account of relevant economic, social, environmental and transport issues and maximises benefits"* (Scottish Government Scottish Planning Policy 2010 paragraph 184).

SPP 2010 sets out a series of considerations that may be relevant in varying degrees to windfarm proposals (landscape impact, effects on natural heritage etc.) and each of the relevant topics for the Beinn an Tuirc Windfarm Phase 3 are considered further in the following sections. Reference is also given below to the spatial guidance prepared by Argyll and Bute Council that is heavily advocated for within SPP 2010.

The basis of national policy as set out in SPP 2010 is not proposed to be fundamentally changed through the latest iteration of national policy (consultative draft SPP 2013). At present, one of the revisions of significance being proposed is that no windfarms would be permitted within a National Scenic Area or National Park; neither designation directly affecting the indicative proposed development area shown in **Figure 2** (Scottish Government Consultative Draft Scottish Planning Policy 2013 paragraph 218). There is also a new requirement proposed relating to "wild land" and any windfarm proposal in such locations

must demonstrate there are no significant effects on the wild land qualities; no part of the Kintyre Peninsula is identified as wild land.

In addition, the consultative draft SPP 2013 also intimates a possible community separation zone (Consultative Draft Scottish Planning Policy 2013 Group 2 locations - paragraph 218) between wind turbines and settlements identified in the development plan. The distance intimated at this time is 2.5km and that distance has been proposed to reflect the fact that turbine heights are increasing and there is then a potential increase in prominence. The potential relationship between wind turbines and all landscape / visual impact receptors will be considered in detail within the Landscape and Visual Impact Assessment which will consider the proposed national policy test that would support a windfarm *"where it can be demonstrated that any significant effects . . . can be subsequently overcome"* (Scottish Government, 2013). Any indicated separation distance is a factor to be borne in mind but the status of SPP 2013 in any decision making is, at this time, a material consideration of only modest weight with the spatial land use planning framework set out within the Development Plan (and SPP 2010) continuing to take precedence.

The emerging NPF3 re-affirms the Scottish Government's full commitment to the further deployment of renewable energy in appropriate locations as the means to achieve its first of 4 elements of its vision; "*A Low Carbon Place"* (Scottish Government, 2013). The expectation is that Scotland will need between 14GW and 16GW of renewable energy capacity in order to meet at least 100% of gross electricity consumption from such sources and as stated in NPF3; *onshore wind will play a significant role in achieving the target* (Scottish Government NPF3 Main Issues Report 2013 paragraph 2.14).

National land use planning policy on renewable energy is also supported by planning advice for individual technologies. The online advice for windfarms was updated in October 2012 and that advice is subsequently reflected in the detailed assessment approaches set out in this Scoping Report.

The Scottish Government's Policy on Woodland Removal is to firstly protect Scotland's woodland resource and to only allow its removal where *"it would achieve significant and clearly defined additional public benefits"* (Forestry Commission Scotland, Control of Woodland Removal 2009, page 6 & Scottish Government, National Planning Framework 2 2009, paragraph 94). The policy allows for woodland removal with compensatory planting where, amongst other things, this could help mitigate and adapt to Climate Change or enhance sustainable economic growth.

2.2 Regional and Local Planning Policy

As with National Policy, local land use planning policy within Argyll and Bute is also being reviewed. At present, the extant Development Plan is delivered through the Argyll and Bute Structure Plan 2002 (Argyll and Bute Council, 2002) and Argyll and Bute Local Plan 2009 (Argyll and Bute Council, 2009).

However, both of these documents will be repealed and replaced once the Argyll and Bute Local Development Plan (LDP) is Adopted. The LDP is currently at a proposed plan stage (Argyll and Bute Council, 2013) and as such is subject to a period for representation following which an LDP Examination will be held (likely to be late 2013 / early 2014) with Adoption of the new Plan then expected later in 2014.

Until such time that the LDP is formally Adopted, the 2002 Structure Plan and 2009 Local Plan will form the basis of any land use planning decisions and prior to its Adoption, the emerging LDP will form a material consideration. In addition, the extant development plan must also be set in context with the Scottish Government's NPF 2 that was published after the Structure Plan and Local Plan: Section 25(2)(b) of the 1997 Act requires that, "*in the event of any incompatibility between the National Planning Framework and the development plan, whichever of them is the later in date is to prevail"*.

In addition, the LDP's current "proposed plan" status also adds some weight to its relevance as will the nature of representations on windfarm policy which are likely to be known by the time an application for Section 36 consent with deemed planning permission under Section 57 of the Town & Country Planning (Scotland) Act 1997 is expected to be made (late 2013).

The extant Structure Plan recognises the relative economic and social imbalance between the east and west of the council area, and that the west is subject to more significant social and economic challenges. Part of the strategic response is to seek to promote general economic growth in the Kintyre area (Recommendation SI 3) and specifically to support renewable energy investment (Recommendation SI 4). The strategic objective for windfarms (Objective RE 1) is then "*to increase the use and to exploit the potential of renewable energy"* (Argyll and Bute Structure Plan 2002, page 35).

Structure Plan Policy is taken forward through the Local Plan 2009. This Plan identifies Broad Areas of Search in line with the predecessor advice to that now set out in SPP 2010 (and proposed to be updated in SPP 2013). The proposed development site is located within the southern most of these areas of search. In these Broad Areas of Search, Policy LP REN 1 states that "*proposals will be generally supported subject to addressing satisfactorily all other material considerations"* (Argyll and Bute Local Plan 2009, page 87).

The overall extant development plan position is therefore largely in line with the supportive national policy stance as set out within NPF2.

The emerging LDP continues the theme of re-invigorating the economy of the Kintyre Peninsula as set out in the extant Structure Plan. Part of that is to embrace the growth of, and potential for, various renewable energy technologies to be deployed in the area and that includes onshore windfarms. This point is underlined through emerging Policy LDP 6 (which expands on Local Plan Policy LP REN 1) by directing windfarm developments to the Broad Areas of Search.

A degree of growing support for large scale windfarms in Argyll and Bute and specifically the Kintyre Peninsula is evident since the introduction of the local policy on windfarms in 2002. The emerging LDP now proposes to identify almost the whole of the central part of the Kintyre Peninsula from south of Skipness to north of Campbeltown as a Broad Area of Search for larger wind turbines (Turbine Tip Height > 80 metres (m)) and that is generally more expansive than presently set out in the extant Local Plan. The proposed development site is also located within this expansive Broad Area of Search.

Emerging Policy LDP 6 (Proposed Argyll and Bute Local Development Plan 2013, page 40) summarises the overall land use planning policy assessment that would be applied, namely:

> *"The Council will support renewable energy developments where these are consistent with the principals of sustainable development and it can be adequately demonstrated that there is no significant adverse effect, including cumulative impacts, on local communities, natural and historic environments, landscape character, visual amenity and are compatible with adjacent land uses".*

The individual policy requirements are then set out in more detail in the supplementary guidance that supports the emerging LDP (Argyll and Bute Council, 2013). Specifically, SG LDP REN 1 reiterates the more detailed aspects of extant local plan policy LP REN 1 including the general support for windfarm developments within the Broad Areas of Search. This also provides a list of the various considerations that the Council would have in assessing all such proposals and which are covered in more detail in the following individual assessment sections.

Table 2.1 summarises the various individual policy considerations that are set out in the local land use planning policy documents as the key factors that should be considered for the Beinn an Tuirc Windfarm Phase 3 proposals.

The Argyll and Bute Woodland and Forestry Strategy takes forward a more localised application of the national objectives regarding woodlands and forestry. It reiterates the point regarding removal of woodlands as set out within the Scottish Government's Policy on Woodland Removal (Argyll and Bute Council, Woodland and Forestry Strategy 2011, paragraph 3.7) that removal for projects such as windfarm developments requires to be adequately compensated for. The specific priority action within the Strategy Priorities in this regard is set out as Climate Change priority action CC1.2: *"Ensure that woodland removal associated with developments such as windfarms is compensated for at a ratio of at least 1:1 in terms of area and quality of woodland."*

It is recognised that there will be additional land use planning considerations in relation to noise, hydrology and hydrogeology, aviation and telecommunications and transport. These aspects are covered within the development plan's general policies (on sustainable development and / or windfarms) and all relevant aspects will be considered in detail within the Planning Statement that will accompany the ES.

Table 2.1 Land Use Policy Considerations

	Strategy	Ecology	Landscape	Cultural Heritage	Renewable Energy
Argyll & Bute Structure Plan 2002	**Policy STRAT SI 1** Sustainable Development **Strategy Issue 7** West Argyll & Bute **Recommendation SI 3** Argyll Isles Rural Development Areas	**Policy STRAT DC 7** Nature Conservation and Development Control	**Policy STRAT DC 8** Landscape and Development Control	**Policy STRAT DC 9** Historic Environment and Development Control	**Recommendation SI 4** Renewable Energy Investments **Objective RE 1** Renewable Energy **Policy STRAT RE 1** Windfarm / Wind Turbine Development
Argyll & Bute Local Plan 2009		**Policy LP ENV 1** Development Impact on the General Environment **Policy LP ENV 2** Development Impact on Biodiversity **Policy LP ENV 3** Development Impact on European and Ramsar Sites	**Policy LP ENV 9** Development Impact on National Scenic Areas **Policy LP ENV 10** Development Impact on Areas of Panoramic Quality	**Policy LP ENV 17** Development Impact on Sites of Archaeological Importance	**Policy LP REN 1** Windfarms and Wind Turbines
Argyll and Bute Proposed Local Development Plan February 2013	**Key Objectives B, C, D, H & I** **Policy LDP STRAT 1** Sustainable Development **Section 2.5** Mid Argyll, Kintyre and the Islands Spatial Strategy	**Policy LDP 3** Supporting the Protection, Conservation and Enhancement of our Environment **SG LDP ENV 1** Development Impact on Habitats etc **SG LDP ENV 2** Development Impact on European Sites	**SG LDP ENV 12** Development Impact on National Scenic Areas **SG LDP ENV 13** Development Impact on Areas of Panoramic Quality **SG LDP ENV 14** Landscape	**SG LDP ENV 20** Development Impact on Sites of Archaeological Importance	**Policy LDP 6** Supporting the Sustainable Growth of Renewables **SG LDP REN 1** Windfarm and Wind Turbine Development Over 50 metres High

3. Site Selection, Project Description and Potential Effects

3.1 Site Selection

SPR's site selection process is designed to identify potential windfarm sites that are economically and technically viable, environmentally acceptable and that will make meaningful contributions to Government targets for renewable energy generation.

Potential sites are screened against a series of technical, environmental and economic factors. These factors include wind speed and energy yields, proximity to environmental designations, site access and proximity to electricity grid.

The location of the Beinn an Tuirc Windfarm Phase 3 site was selected by SPR for a number of reasons, including the following:

- It has a good wind resource;
- There are no landscape/ecological designations within the site;
- The site lies in a Broad Area of Search as defined in the Local Plan and emerging Local Development Plan;
- Direct impacts on nationally designated features of cultural heritage (such as Scheduled Monuments and Listed Buildings) can be avoided;
- Connection to the national grid is feasible; and
- The area is accessible for construction traffic and turbine deliveries.

3.2 Existing Environment

The site being considered for the Beinn an Tuirc Windfarm Phase 3 development is located on forested upland, adjacent and to the south of the Beinn an Tuirc Windfarm and Beinn an Tuirc Windfarm Phase 2, currently under construction. The closest residential centres are:

- Carradale - approximately 7 kilometres (km) north east of the site;
- Peninver - approximately 4km south east of the site;
- Glenbarr - approximately 5km north west of the site;
- Saddell – approximately 2km due west of the site boundary; and
- Campbeltown - approximately 10km south of the site.

Figure 1 presents the proposed site location.

Grid references for the site are:

- Northern boundary of the site 172270, 633925; and
- Southern boundary of the site 173550, 627797.

The existing land use is productive forestry.

There are no designations within the site boundary however Lussa Loch (approximately 0.5km to the west of the site boundary) and Tangy Loch (approximately 2.5km to the south

west of the site boundary) are designated Special Protection Areas (SPA), Sites of Special Scientific Interest (SSSI) and Ramsar sites for their population of Greenland white-fronted Geese. Other nearby statutory and non statutory designations are indicated on **Figure 3.**

There are numerous small watercourses on site that feed six sub-catchments. The main watercourses include Saddell Water to the north and Glenlussa Water to the south. Lussa Loch flows into Glenlussa Water. All of these catchments ultimately drain eastwards to Kilbrannan Sound, located approximately 2.5km from the site boundary.

3.3 Forestry Management and Felling

Areas of woodland will need to be cleared for the construction and operation of the windfarm including access tracks, turbine locations and other infrastructure including civil engineering operations associated with the project such as quarries. This could result in changes to the structure of the woodlands, which may result in a loss of woodland area. In the UK there is a strong presumption against permanent deforestation unless it addresses other environmental concerns. In Scotland such deforestation is dealt with under the Scottish Government's "Control of Woodland Removal Policy" (Scottish Government, 2009). The purpose of the policy is to provide direction for decisions on woodland removal in Scotland. It will be essential that the requirements of the policy are addressed within the EIA and reported in the ES, whilst ensuring that the forestry proposals do not compromise the wind flow and yield for the proposed windfarm. The integration of the windfarm and the associated required tree felling and compensatory planting into the forest design plan will be a key part of the development process.

The main forestry consultee is Forestry Commission Scotland (FCS) who will be consulted throughout the development of the proposals to ensure that the proposed changes to the woodlands are appropriate and address the requirements of the Control of Woodland Removal Policy.

The forestry proposals will be prepared in accordance with the current industry best practice and guidance including, but not limited to:

- The UK Forestry Standard: The Government's Approach to Sustainable Forestry 3rd Edition (Forestry Commission, 2011);
- The Scottish Forestry Strategy (Forestry Commission Scotland, 2006);
- The UK Woodland Assurance Standard 3rd Edition (UKWAS, 20120);
- The Scottish Government's Policy on Control of Woodland Removal (Forestry Commission Scotland, 2009);
- Forests and Water Guidelines (Fourth Edition) (Forestry Commission, 2003); and
- Forests and Archaeology Guidelines (and other guidelines in the same series) (Forestry Commission, 1995).

Proposed Methodology for use in EIA

Productive forests are dynamic and constantly changing through landowner activities. The forestry baseline will describe the crops existing at the time of preparation of the ES. This will include species composition; age class structure; yield class; other relevant crop information; baseline felling and restocking plans, as available. The baseline will be prepared from existing records, site surveys and aerial photographs.

The principal output will be the preparation of the Windfarm Forest Design Plan. This will include a felling plan to show which woodlands are to be felled and when they are to be felled during the life of the proposed development. It will further include a restocking plan showing which woodlands are to be replanted and when during the life of the proposed development. The changes to the woodland structure will be analysed and described including changes to species composition, age class structure, timber production, traffic movements and the felling and restocking plans.

The Windfarm Forest Design Plan will be presented in a separate Forestry Technical Appendix, together with a summary in the main project description chapter of the ES and the description of the design strategy. Information will be presented in text, tables and diagrams together with maps as necessary.

The effects of felling (including the issues of keyholing) and any compensatory planting will be considered within the relevant chapters of the ES as described in sections 4 to 13 of this document.

3.4 Main Elements of the Proposed Development

Based on preliminary feasibility work, the proposed development may consist of the following components:

- Up to 30 three blade horizontal axis wind turbines;
- Upgrading of existing road infrastructure to allow turbine/infrastructure delivery and site access;
- Control building(s), substation and associated external compound;
- Permanent meteorological masts;
- Temporary construction compound(s);
- Borrow pits (if a suitable stone source is available on site);
- New and upgraded site tracks; and
- Associated infrastructure (such as cabling, utility services and external transformers).

Turbines

At this early stage the maximum tip height of turbines has not yet been decided; however, the final turbine tip heights and site layout will be informed by the EIA process and feedback from consultees and this maximum tip height will be used in the impact assessments.

An indicative turbine development area that represents the proposed envelope within which turbines will be located is presented in **Figure 2** as the 'Indicative Development Area'. Please note that this is subject to change depending on the outcome of site surveys.

Site Access

It is proposed that the existing access to the Beinn an Tuirc Windfarm and Beinn an Tuirc Windfarm Phase 2 located on the eastern side of the A83, north of Bellochantuy will be used. The access will continue to be developed and informed as part of the EIA and design processes, taking into account environmental and other technical constraints.

Site Tracks

Site tracks will be required to link turbines and other infrastructure and to connect the site to the existing access to Beinn an Tuirc Windfarm. Existing tracks will be upgraded where possible however there will still be a requirement for new access tracks to be constructed. The method of construction used for the tracks will depend upon local ground conditions.

The site tracks will have a running width of approximately 5m wide with local widening at corners and passing places. Stone for track construction will be sourced from an onsite borrow pit(s) where possible.

Control Building and Substation Compound

A control building and car parking area will be required on site to provide welfare facilities, site communications and a storage area for windfarm personnel and will form part of the application for Section 36 consent with deemed planning permission under Section 57 of the Town & Country Planning (Scotland) Act 1997.

Electricity generated by each turbine will be transferred to an on-site substation via underground cabling along the sides of the access tracks where electricity is likely to be transformed from 33 kilovolts (kv) to 132kv for export to the electricity grid network.

The final choice of connection to the electricity network has not yet been established, however it is likely that the development will be connected via the transmission network operated by the electricity network operator. The location and size of the control building and substation will reflect requirements of the network operator and will be in line with legislation and guidance.

Anemometry Masts

Temporary and permanent anemometer masts will be erected for wind monitoring purposes, and for turbine performance testing. These masts will typically reflect turbine hub height.

Details of the location and construction of the proposed infrastructure will be provided in the ES in addition to a description of the construction, operation and outline decommissioning phases of the project.

Construction Compounds and Borrow Pits

A number of temporary works will be required during construction and commissioning. These will include construction compound(s) and laydown area(s) and borrow pit(s) for stone to create new access tracks. The location of these will be informed through the EIA and design process and will be fully described in the ES.

3.5 Potential Environmental Effects

Previous experience at other windfarm development sites, combined with knowledge of the proposed site and possible effects of the proposed windfarm development, has identified the following topics for consideration in the EIA. A summary of known baseline conditions of relevance, predicted effects, any outline mitigation measures that can be recommended at this stage and the proposed scope for the EIA is provided for each of these topic areas in the following sections 4 to 13. These are:

- Landscape and Visual Assessment;
- Hydrology, Hydrogeology, Geology and Soils;
- Non-avian Ecology;
- Ornithology;
- Noise and Vibration;
- Cultural Heritage;
- Access, Traffic and Transport;
- Aviation;
- Socio Economics, Tourism, Recreation and Land Use; and
- Other Considerations – Shadow Flicker, Ice Throw and Health and Safety, Air Quality, Climate Change and Carbon Balance and Telecommunications.

The EIA will cover all phases of the proposed development: construction, operation and decommissioning.

4. Landscape and Visual Assessment

A Landscape and Visual Impact Assessment (LVIA) will be undertaken for the EIA that will address the direct and indirect effects of the proposed development on the landscape resource (capacity, character, quality and value) and the effects on the visual resource and amenity with the aim of identifying where significant impacts will occur. The assessment will be undertaken by a professionally qualified practitioner, the assessment and supporting visualisations, including visibility mapping, being prepared in accordance with current best practice guidance.

In order to undertake the identification of significant effects on both landscape and visual receptors, the LVIA will adopt a staged approach in keeping with good practice guidance.

The landscape and visual assessment will provide input to the iterative design process in order to reduce and minimise potentially significant effects on both landscape and visual receptors.

4.1 Legislation, Policy and Guidance

The LVIA will make reference to national planning policy guidance where relevant. The LVIA will also give consideration to local planning policy and guidance as presented in section 2, and additionally to the Isle of Arran Local Plan 2005 and the Argyll and Bute Wind Energy Capacity Study (Argyll and Bute Council and SNH, 2012).

The LVIA will follow accepted best practice guidance in order to determine the nature of effects on landscape and visual receptors. In this regard the following guidance will be utilised in the methodology and production of the assessment:

- Guidelines for the Assessment of Landscape and Visual Impacts (The Landscape Institute with the Institute of Environmental Management and Assessment (IEMA), 2013);
- Landscape Character Assessment (The Countryside Agency and SNH, 2002);
- Siting and Designing Wind Farms in the Landscape. Version 1 (SNH, December 2009);
- Assessing the Impacts on Wildland: Interim Guidance Note (SNH, 2007);
- A guide to the assessment of cumulative effect of wind farm developments (ETSU/DTI, 2000);
- Assessing the Cumulative Effects of Onshore Wind Energy Developments (SNH, 2012);
- Visual Representation of Wind Farms Good Practice Guidance (SNH, 2006);
- Visual Representation of Wind Farms – Consultation Draft (SNH, 2013);
- Photography and Photomontage in Landscape and Visual Impact Assessment (Landscape Institute, 2011); and

- Landscape Assessment of Argyll and the Firth of Clyde SNH Review No. 78 (Environmental Resources Management, 1996).

4.2 Baseline

The Proposed Development Site

The proposed development site lies to the immediate south of the existing Beinn an Tuirc Windfarm and the Beinn an Tuirc Windfarm Phase 2, which is currently under construction (**Figures 2 and 4**). The proposed development site is largely forested but also includes areas of open moorland. It is located in a wider area with extensive productive woodlands, both private and publicly owned, and farmland.

Within the site development area there are three main hills; Sgreadan Hill at 397m, Meall Buidhe at 375m and A' Chruach at 343m. The site is not located within any internationally or nationally designated landscapes.

The proposed development site is located within a Very Sensitive and Sensitive Countryside area as defined within the Argyll and Bute Structure Plan 2002. It also falls within a Broad Area of Search for turbines with tip height greater than 80m, defined by Argyll and Bute Local Plan 2009 and the emerging Argyll and Bute Local Development Plan.

The proposed development site falls within the Upland Forest Moor Mosaic (as indicated within the Argyll and Bute Wind Energy Capacity Study) which is identified as being an area of lower sensitivity to large (80m – 130m high turbines) windfarm typologies.

Wider Site Context

Within the 30km surrounding the proposed development site, the area is comprised of four distinct areas of land; the Kintyre Peninsula, the southern part of the Knapdale Peninsula, the Isle of Arran to the east and the Isle of Gigha to the west of the Kintyre Peninsula as indicated in **Figure 3**. The landform of the surrounding area is both dramatic and varied, shaped by volcanic activity and the processes of glaciation.

Topographical extremes vary between sea level and the summit of Goatfell at 825m above ordnance datum (AOD) on the Isle of Arran. The character of the land within the wider area surrounding the site is dominated by the sea with the large coastal water bodies of the Kilbrannan Sound and Sound of Jura edged by sea lochs, sheltered bays and raised beaches to form a diverse coastline.

The inland topography of the Kintyre Peninsula is characterised by upland plateaux with rounded ridges, craggy outcrops, upland lochs, winding narrow glens and wider river valleys, the hills rising from sea level to a central spine of up to 454m AOD at Beinn an Tuirc.

The Isle of Arran comprises dramatic eastern peaks linked by a heavily serrated and knife edge ridge, with more rounded summits in the west. The coastal areas of Arran comprise

raised beach in the north and coastal lowland in the south of narrow rocky ridges, horseshoe shaped narrow sandy bays and extensive mudflats.

The Isle of Gigha, lies 3km off the west coast of Kintyre and comprises a low island with rocky bays and a central spine which reaches to its highest elevation at Creag Bhàn at 100m AOD.

The site and environs are covered by the "Landscape Assessment of Argyll and the Firth of Clyde Scottish Natural Heritage Review No. 78" (Environmental Resources Management, 1996).

National Landscape Designations

There is one National Scenic Area (NSA), the North Arran NSA which lies approximately 13km to the northeast (**Figure 3**) and is characterised by its granite massif that displays impressive sharp peaks in areas of the more resistant coarse grained granite and lower more rounded hills and u-shaped valleys in areas of the softer fine grained granite.

Gardens and Designed Landscapes (GDLs) are designated by Historic Scotland to protect and if possible enhance their landscape settings. There are two GDLs within the wider area surrounding the site, Brodick Castle on Arran and Achamore House on the Isle of Gigha.

Search Areas for Wild Land (SAWLs) are defined in SNH's "Wildness in Scotland's Countryside Policy Statement No. 02/03" (SNH, 2002). The concept of SAWL is not a designation, but will be considered within the assessment, taking guidance from the ongoing work by SNH on Wild Land and the identification of 'core areas of wild land character'. The northern part of the Isle of Arran is indicated as a search area (**Figure 3**) that largely coincides with the central area of the NSA.

Local Landscape Designations

Areas of Panoramic Quality (APQ's) were designated within the Argyll and Bute Local Plan 2009 to protect landscapes from significant adverse impacts on their character from adjacent developments. Four APQs are currently anticipated to be relevant to the LVIA: an eastern Kintyre coastal strip between Carradale and Campbeltown; a western Kintyre coastal strip between Clachan and Kilchenzie; the south east coast of Knapdale; and, an area covering the southern tip of the Mull of Kintyre. The location of these in relation to the proposed development is indicated in **Figure 3**.

Visual Receptors and Visual Amenity

A number of potential visual receptors exist within the area surrounding the proposed development site. The landscape and visual assessment will include consideration of the receptors associated with settlements, roads, ferries, long distance walking routes and cycle routes. It should be noted that these are not intended to be a comprehensive list of receptors, but are rather examples of locations that may be included. Detailed lists of

receptors will be identified through the scoping, consultation and assessment process described in section 4.4.

Settlements

The main settlement on the Kintyre Peninsula is Campbeltown which is situated about 10km south of the proposed site. The village of Carradale, approximately 7km northeast of the site, is the next largest centre of population. Other settlements likely to be considered in the assessment include the villages of Saddell approximately 2km to the east, Peniver approximately 4km to the southeast, Machrihanish approximately 13km to the southwest, Glenbarr approximately 5km to the north west and Blackwaterfoot on the Isle of Arran approximately 15km to the east.

Roads

The road network within the area is generally confined to the coastlines. Where landform permits some minor routes occur inland often along valleys, passing through farms and small settlements. The principal ('A' Class) roads in the area surrounding the proposed development site include the A83 and the A841. In addition to these a number of 'B' class roads provide local access and alternative scenic routes, these include the B8001, the B8024, the B843 and the B880.

Ferries

Ferry routes form important connections within the region's transport network. These include:

- Claonaig on the northeast coast of Kintyre, across the Kilbrannan Sound, to Lochranza on Arran (summer only);
- Lochranza to Tarbert (winter only);
- Campbeltown to Ardrossan and Ballycastle;
- Kennacraig on the northwest coast of Kintyre, across the Sound of Jura, to Port Askaig and Port Ellen on Islay; and
- Tayinloan on the west coast of Kintyre, across the Sound of Gigha, to Ardminish Bay on the Isle of Gigha.

Long Distance Walking Routes

There are two regionally important long distance walking routes within the wider area. These include:

- The Kintyre Way: A 142km route from Tarbert Harbour in the north to Dunaverty Bay in the south, which criss-crosses the peninsula; and
- The Isle of Arran Coastal Way: A 104km circular route around the Arran coast, starting and finishing in Brodick.

National Cycle Routes

There are two National Cycle Routes (NCRs) within the wider area surrounding the proposed development site. These are:

- NCR 78: An on-road cycle route that follows the B842 along the east coast of Kintyre from Campbeltown to Claonaig, where it crosses over to Knapdale on the B8001 and follows the south and east coast along the B8024; and
- NCR 73: An on-road cycle route on the Isle of Arran that follows the route of the A841 from Newton to Brodick.

4.3 Potential Effects

Potential effects will comprise effects on the site and landscape and visual receptors in the surrounding area resulting from the construction, operational and decommissioning phases of the development. These will include:

- Effects of the construction of the wind turbines and ancillary development on the existing character of the site and its surroundings, its landscape features and land cover;
- Effects of the construction of the wind turbines and ancillary infrastructure on the visual amenity experienced in the wider landscape;
- Operational effects of the wind turbines and associated infrastructure upon the existing features and land cover of the site and upon landscape character;
- Operational effects of the wind turbines and associated infrastructure upon the visibility of the windfarm in the wider landscape, particularly from visually sensitive locations. These locations may include designated landscapes and tourist destinations; interpreted viewpoints; well-frequented roads such as the A83, and way marked walking routes such as the Kintyre Way;
- Decommissioning effects of the wind turbines and associated infrastructure upon the existing features and landcover of the site and upon landscape character; and
- Decommissioning effects of the wind turbines and associated infrastructure (including access tracks), on the visual amenity experienced in the wider landscape.

4.4 Proposed EIA Methodology

The assessment will be carried out using a methodology that has been devised by SKM Enviros for the landscape and visual assessment of windfarms. This methodology accords with Guidelines for the Assessment of Landscape and Visual Impacts: Third Edition (The Landscape Institute with the Institute of Environmental Management and Assessment, 2013).

The extent of the study area to the proposed development will relate to the height of the proposed turbines and extend from the outermost turbines of the windfarm in line with best practice guidance. While the turbine height is not yet confirmed it is anticipated that the

study area will extend to at least 30km. The extent of the study area will be agreed in advance of the assessment with Argyll and Bute Council and Scottish Natural Heritage.

The assessment and reporting of the landscape and visual effects of the proposed development will be set out in a structured and coherent manner as detailed below:

- Guidance and methodology – an outline of general methodology, with reference to established guidance;
- Review of scoping responses and consultation undertaken;
- Baseline description – to identify/ confirm the fabric, character and quality of the landscape that would be affected by the proposed development, including a review of the extent, purposes and special characteristics of landscape planning designations within the study area;
- Project description and mitigation – a description of the aspects of the proposed development that have the potential to cause a landscape and / or visual effect, and the measures that have been incorporated into the project design to mitigate these potential effects;
- Visual analysis – comprising an assessment of the visual effects of the proposed development with reference to computer generated Zone of Theoretical Visibility (ZTV) maps to ascertain from where the proposed development could be visible and those potential receptors that could be affected by changes in views, together with a viewpoint analysis to determine the magnitude and significance of the changes in the view from a selection of viewpoint locations that represent the main landscape and visual receptors in the study area;
- Assessment of effects on the landscape resource – an assessment of the significance of effects arising from the impacts of the proposed development on the landscape fabric, landscape character and quality of the landscape types and designated areas within the study area;
- Assessment of effects on the visual resource – an assessment of the significance of effects arising from the impacts of the proposed development on the visual amenity, receptors and viewpoints in the study area;
- Assessment of cumulative effects on landscape receptors;
- Assessment of cumulative effects on visual receptors; and
- Summary and conclusions – a summary of the assessment.

The assessment of potential impacts will be supported by viewpoint analysis. The range of viewpoints proposed for inclusion within the LVIA will be chosen to ensure that the viewpoint assessment includes representative coverage in respect of the following parameters:

- type of receptor (based on the above and including different landscape character types identified in the study area);
- distance from the proposed development;

- direction from the proposed development, with the aim of achieving a distribution from different compass points around the proposed development area; and
- altitude.

The final locations of the viewpoints will be agreed through consultation with Argyll and Bute Council and SNH. It is anticipated that the viewpoint locations will include a number of those adopted for the LVIA of Beinn an Tuirc Windfarm Phase 2 and a list is proposed in Table 4.1 below and their location is presented in **Figure 4.**

Table 4.1 Proposed Viewpoint Locations

Viewpoint		Grid Reference	
1.	Saddell	178908	632765
2.	Carradale Point	181558	632765
3.	Cnoc nan Gabhar/Deer Hill Walk	180300	639629
4.	Ballochgair Cycle Route	169829	632496
5.	Lussa Loch	170770	629905
6.	Carradale	181632	637931
7.	Skipness Castle	190808	657752
8.	Tarbert to Lochranza Ferry	192805	654634
9.	Goat Fell	199135	641625
10.	Glen Iorsa	190566	638116
11.	A841, Arran	187178	638835
12.	String Road, Arran	197700	635671
13.	Blackwaterfoot, Arran	189582	628067
14.	Islay Ferry	160000	675000
15.	South Pier, Gigha	164365	646324
16.	Machrihanish	163563	620718
17.	B842 to Southend	168424	617442

Viewpoint		Grid Reference	
18.	Beinn Ghuilean Walk	172079	618567
19.	Coast road south of Campbeltown	176840	614100
20.	Kilbrannan Sound	185756	617939

The LVIA will also assess cumulative effects, focussing on the effects the proposed development would have in combination with other developments within the region, with a focus on wind energy developments, particularly in regard to the existing Beinn an Tuirc developments and other windfarms in close proximity to the site. Listed below are the constructed, consented and proposed windfarm sites that have been identified within the wider area that will be included in the detailed cumulative assessment. Consultees are invited to identify other windfarm sites that should be considered for inclusion in the cumulative assessment.

Table 4.2 Cumulative Sites

Windfarm Name	Status
Beinn an Tuirc	Operational
Beinn an Tuirc Phase 2	Approved and under construction
Tangy	Operational
Tangy Ext.	Operational
Deucheran Hill	Operational
Gigha Community Wind Farm	Operational
Allt Dearg	Operational
Cour	Approved and awaiting construction
Blary Hill	In scoping
Meall Mhor	Planning application submitted
Freasdale	Planning application submitted
Cnoc an Fleidh	In scoping

Windfarm Name	Status
Glen Barr	Planning application submitted
Creggan	In scoping

The study area for the assessment of potential cumulative effects on landscape and visual amenity usually comprises the same study area assessed in the LVIA. However, in accordance with SNH guidance, cumulative sites between 35km and 60km radius will be considered to assess if significant effects may occur in combination with these more distant developments, and the study area modified accordingly. The objective is to identify potentially significant cumulative effects that will occur within this study area arising from the additional impact of the proposed development along with other existing / consented and proposed windfarms.

5. Geology, Hydrology, Hydrogeology and Soils

This section details the approach that will be used in the EIA for the proposed development with respect to geology, hydrology, hydrogeology and soils. The assessment will consider potential effects during the construction, operation and decommissioning of the proposed development.

5.1 Legislation, Policy and Guidance

Scottish Planning Policy (SPP) 2010 and the Draft SPP for Consultation (Scottish Government, 2013), the Water Environment and Water Services (Scotland) Act 2003 and the Water Environment (Controlled Activities) (Scotland) Regulations 2011, as well relevant as policies outlined in section 2.2 will be used in preparation of this assessment.

In addition, Planning Advice Notes issued by the Scottish Government also provide advice on good practice and other relevant information. Of particular relevance to this development proposal is PAN 61, Planning and Sustainable Urban Drainage Systems (Scottish Government, 2001).

Further general guidance relating to the water environment will also be considered for relevance to the proposed development, including the following:

- Forest and Water Guidelines Fourth Edition (Forestry Commission, 2000);
- Construction Industry Research and Information Association (CIRIA) Report C650: Environmental Good Practice on Site (CIRIA, 2005);
- CIRIA Report C532: Control of Water Pollution from Construction Sites (CIRIA, 2001);
- CIRIA Report C689: Culvert Design and Operation Guide (CIRIA, 1997);
- CIRIA Report C697: The SUDS Manual (CIRIA, 2007);
- BS6031: 2009 Code of Practice for Earth Works (BSI, 2009);
- Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (DEFRA, 2009);
- Good Practice during Windfarm Construction (SNH, 2010);
- Floating Roads on Peat (SNH/FCS, 2010);
- SEPA Pollution Prevention Guidelines (PPGs);
- Peat Landslide Hazard and Risk Assessment – Best Practice Guide for Proposed Electricity Generation Developments (Scottish Government, 2006); and
- SEPA Position Statement – Developments on Peat (SEPA, 2010).

5.2 Baseline

A preliminary desktop review of available data has been undertaken. There are numerous small watercourses on site that feed six sub-catchments, draining the three main peaks of Meall Buidhe, A' Chruach and Sgreadan Hill. Main watercourses include Saddell Water to the north and Glenlussa Water to the south. Lussa Loch is located to the west of the site and

flows into Glenlussa Water. All of these catchments ultimately drain eastwards to Kilbrannan Sound, located approximately 2.5km from the site boundary.

According to SNH mapping (SNH, 2013), there are no water dependent statutorily designated sites within the development area. However Lussa Loch, located approximately 500m to the south west of the site (**Figure 3**) has SSSI, SPA and Ramsar status.

Indicative flood mapping provided by the Scottish Environmental Protection Agency (SEPA, 2013) shows the approximate extent and location of a 1 in 200 year flood (or 0.5% probability of occurrence in any one year). Mapping indicates that there is minor risk of flooding within the development area along the lower reaches of Strathduie Water and Bordadubh Water, immediately upstream of Lussa Loch. The flooding indicated on these watercourses is confined to the immediate river corridors only. However, the SEPA mapping does not assess flood risk on catchments less than 3km².

5.3 Potential Effects

There is potential for effects on hydrology, hydrogeology, geology and soils during the construction, operation and decommissioning of the proposed development. Potential effects will be addressed during the environmental impact assessment and will include the following:

- A decrease of water quality in downstream watercourses and /or waterbodies from entrained sediment in runoff from excavation areas or watercourse crossings;
- A decrease of water quality in downstream watercourses and /or waterbodies from oil and fuel spills or leaks from temporary compound areas, vehicles and construction machinery;
- Pollution of any identified private or public water supplies or any other downstream water dependent environments;
- Pollution of groundwater;
- Modifications to drainage patterns, runoff rates and runoff volumes potentially altering flood risk;
- Potential blockage of existing forestry drainage channels or culverts during forestry clearance or construction activities;
- Decrease in water quality or sedimentation from felling activities;
- Interference with groundwater flow paths any associated ground water dependent terrestrial ecosystems (GWDTEs);
- Impacts to any licensed or unlicensed abstractions; and
- Changes to soil hydrology, particularly peat hydrology.

5.4 Proposed EIA Methodology

Data will be collected to undertake a baseline assessment of conditions on site and will be used to develop a conceptual understanding of the site's hydrology, hydrogeology, geology and soils. This will include the collection of data on licensed abstractions and discharge consents as well as the location of any private and public water supplies. This will be used

along with details of the proposed development to assess potential effects on the hydrological, hydrogeological, geological and soil environment, including rivurine and pluvial flooding. The baseline assessment will include:

- A desk based study reviewing a range of published resources;
- Consultation with external stakeholders to collect and confirm data required for the EIA including:
    - SEPA – flooding, licensed abstractions and discharge consents, surface water and ground water monitoring data;
    - Scottish Water – public water supplies and Scottish Water assets;
    - Argyll and Bute Council – private water supplies; and
    - Fishery boards including Associated Salmon Fisheries Board, Argyll District Fisheries Board – fisheries data; and
- A site visit to gain a further understanding of the hydrology, hydrogeology, geology and soils both within the proposed development site and, where deemed necessary, outside this area.

The assessment will also utilise data that will be collected on site during the EIA process including peat depth and ecological data such as National Vegetation Classification (NVC) survey information.

The hydrology and ecology teams will work together to identify known and potential GWDTEs through habitat, national vegetation survey and conceptual modelling, to address the potential effects and to design the windfarm to minimise the impacts on these habitats. Where infrastructure is proposed within the buffer zones recommended by SEPA (SEPA, 2012), a qualitative assessment may be required to demonstrate the risks to the GWDTE are not significant.

Areas of peat that may be present in the vicinity of turbine locations or access tracks will need to be quantified to allow assessment of potential impacts associated with instability, potentially including peat slide risk, and also to ensure excess peat that is excavated can be appropriately managed onsite. The extent and depth of peat deposits encountered on the site will be recorded to also allow the most appropriate design of site tracks, hardstandings, drainage and foundations to be adopted.

An initial phase of peat probing at 100m intervals will cover the indicative development area, allowing peat depth contouring of the site, which will inform the conceptual windfarm layout. Once the turbine and site track layouts have been frozen, more detailed peat probing along infrastructure routes and at specific turbine, hardstanding and building locations will be undertaken (to greater depth if necessary) at 50m centres to further inform the design of the individual elements and allow the volume of peat to be excavated during construction to be calculated. The assessment of peat will use appropriate guidance where necessary, including SNH's Good Practice during Wind farm Construction (SNH, 2010).

A peat slide risk assessment will be appended to the Hydrology, Hydrogeology, Geology and Soils Chapter of the ES.

Hydrological, hydrogeological, geological and soil receptors identified during the baseline assessment will be assessed using standard EIA methodology. There are no published technical guidelines or criteria for assessing and evaluating effects on hydrology or hydrogeology within the context of an EIA. However the Institute of Environmental Management and Assessment (IEMA) broadly outlines the process of assessing potential impacts and determining the significance of any impacts. Based on these guidelines SKM Enviros has developed a methodology which has been used on numerous windfarm hydrology assessments. Criteria as listed below will be used to evaluate effects, as follows:

- The type of effect (i.e. whether it is positive, negative, neutral or uncertain);
- The policy importance of the resource under consideration in a geographical context (i.e. international, national, regional or local), and on a scale of sensitivity (i.e. high, medium or low);
- The magnitude of the impact in relation to the resource that has been evaluated, quantified using the scale high, medium or low; and
- The probability of the impact occurring based on the scale of certain, likely, unlikely or rare.

The chapter will also assess any potential cumulative effects the proposed development would have in combination with other developments in the region. This will include other wind farm sites (as detailed in Table 4.2) where a hydrological connection with any of these sites is identified.

The design of the mitigation measures will be based on relevant guidance provided by SNH, SEPA and others, such as Construction Industry Research and Information Association (CIRIA) guidance. Mitigation will be achieved through appropriate design and reference to baseline studies.

Specific measures will also be detailed within the Construction Environmental Management Plan (CEMP) and will include as a minimum:

- Adoption of best practice pollution prevention, drainage control and waste management procedures;
- Control of drainage and sediment runoff from excavation areas and access tracks;
- Control of drainage and sediment runoff during the construction of watercourse crossings;
- Control of concrete pouring; and
- Appropriate design of foundation installation, taking into account the presence of peat across the site, the management of soil water levels and the potential to generate excessive quantities of groundwater contaminated with sediments.

Drainage control on site will involve various surface water management measures to manage the flow and provide treatment as required. These measures will reflect current best practice in the industry and experience from other SPR windfarm sites. Site design and proposed surface water management measures will also consider site specific issues, such as areas of peat, so as not to increase the potential for peat slide risk and minimise the potential for changes to peat hydrology.

Standard construction practices adopted on windfarm developments will be assessed and modified where necessary, to provide appropriate controls. Guidance on the protection of the water environment including relevant SEPA and CIRIA guidance will also be used to assist with the development of mitigation.

6. Non-avian Ecology

The non-avian ecology section of the ES will include an assessment of potential effects arising from the proposed development on protected or otherwise notable species (other than birds, which will be covered separately - see section 7), fisheries and aquatic species, notable habitats and statutory and non-statutory designated nature conservation sites.

6.1 Legislation, Policy and Guidance

In addition to the plans and policies referenced in section 2, the non-avian ecology assessment will be undertaken with reference to the following legislation:

- The EC Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora);
- The Wildlife & Countryside Act 1981 (as amended);
- The Protection of Badgers Act 1992 (as amended);
- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland);
- The Nature Conservation (Scotland) Act 2004; and
- The Wildlife and Natural Environment (Scotland) Act 2011.

In addition, the assessment will be undertaken with reference to the following key guidance:

- The Scottish Biodiversity List (Scottish Executive, 2005);
- The Argyll and Byte Local Biodiversity Action Plan 2010-2015 (Argyll and Byte Local Biodiversity Partnership, 2010);
- Guidelines for Ecological Impact Assessment in the United Kingdom (Institute of Ecology and Environmental Management (IEEM), 2006);
- Guidance Note 4: Planning advice on wind farm developments (SEPA, 2012);
- Bats and onshore wind turbines: Interim guidance (Natural England, 2012) (in the absence of a Scottish equivalent, Natural England guidance is assumed to apply to Scotland too); and
- Bats and wind turbines. Joint agency position statement. Version 2 (Walsh, Matthews and Raynor, 2012).

6.2 Baseline

Baseline information presented below has been obtained from the ES for Beinn an Tuirc Windfarm Phase 2, scoping responses for that development and other information in the public domain.

The following two statutory nature conservation sites designated for non-avian biological interests occur within 10km of the site (**Figure 4**). They comprise:

- Tangy Loch SSSI (2.5km SW of the site boundary): designated for oligotrophic loch habitat and the plant species slender naiad (*Najas flexilis*); and

- Torrisdale Cliff SSSI (3.5km NE of the site boundary): designated for upland mixed ash woodland.

No statutory designated site more than 10km from the proposed development site is likely to be hydrologically connected to it.

The proposed development site and immediate surroundings are characterised by a series of upland habitats, including peatlands that have been partly afforested, especially on the lower slopes, with conifer plantation of relatively low ecological value. Freshwater habitats also occur on site or within a 2km distance that comprise Lussa Loch, Lussa Water, Saddell Water (**Figure 3**) and a number of tributaries.

Several protected or otherwise notable species have been recorded in the local area in recent years. Protected species include bats, otter (*Lutra lutra*), water vole (*Arvicola amphibius*) and red squirrel (*Sciurus vulgaris*). Notable species include Scottish Biodiversity List species, such as small cow-wheat (*Melampyrum sylvaticum*), and nationally scarce species such as enchanter's-nightshade (*Circaea alpina*) and the bryophyte (*Plagiothecium laetum)*. Additional terrestrial species, including protected species, such as badger (*Meles meles*), pine marten (*Martes martes*) and wildcat (*Felis sylvestris*), could potentially be present in the local area, and this will be investigated as part of the EIA, as described below.

Based on habitat suitability assessments for lamprey (*Lampetra* spp.) and freshwater pearl mussel (*Margaritifera margaritifera*), the ES for Beinn an Tuirc Windfarm Phase 2 from 2005 concluded that their presence in Saddell Water was unlikely, because suitable habitat was not available along sufficient linear extents of watercourse to ensure the long-term survival of either species. Areas of suitable substrate were found to be very patchily distributed within the system and of very limited extent. If extant populations were present, they were considered likely to be very small and distant from the nearest proposed development. These conclusions are also considered to be valid for the Beinn an Tuirc Windfarm Phase 3 site. Habitats in Lussa Water below Lussa Dam were not assessed in detail for the Beinn an Tuirc Phase 2 submission, because any suitable habitat for lamprey or freshwater pearl mussel would be at least 5km from the Beinn an Tuirc Windfarm Phase 2 site boundary and separated from the site by the dam itself. Beinn an Tuirc Windfarm Phase 3 will be partly located within the Lussa catchment, therefore the potential for lamprey or freshwater pearl mussel to be present will be further investigated as part of the EIA, as described below.

The ES for Beinn an Tuirc Windfarm Phase 2 also reported that both natural and man-made barriers restrict the movement of migratory salmonids in both the Saddell and Lussa catchments, although Atlantic salmon (*Salmo salar*) and sea trout (*Salmo trutta* morpha *trutta*) are known from the lower reaches of both catchments. As such the potential for Atlantic salmon and sea trout to be present will be further investigated.

6.3 Potential Effects

The proposal will be unlikely to have significant impacts on statutory nature conservation sites designated for non-avian biological interest: Tangy Loch SSSI is located within a separate watershed 2.5km from the site, and Torrisdale Cliff SSSI is 3.5km distance from the site boundary.

Although the footprint of the windfarm will comprise a relatively small proportion of the site, in the absence of mitigation the proposed development has a potential for significant impacts on GWDTEs and other habitats of conservation interest through land take, changes to drainage regimes and pollution from silt-laden runoff or spillages of pollutants. Potentially significant impacts are most likely during tree felling, construction and (to a lesser extent) decommissioning.

In addition, in the absence of mitigation, the development could have a negative impact on protected or notable species of animals. Such impacts could include loss or physical damage to habitat, including resting places; accidental harm to animals through collision with vehicles or other contact with construction works; and disturbance. Silt-laden runoff or spillages of pollutants could also impact on aquatic species. Potentially significant impacts would be most likely during tree felling, construction and (to a lesser extent) decommissioning of the windfarm extension. In addition, bats could be at risk from barotrauma or collision with turbine blades during operation.

6.4 Proposed EIA Methodology

A series of baseline studies will be undertaken, as follows:

- Desk study to identify any non-statutory designations and existing records of protected or otherwise notable species within 2km of the site (extended to 5km for non-high risk bat species and 10km for high-risk species);
- Extended Phase 1 habitat survey of the site and a 200m buffer (access permitting) undertaken using standard JNCC methodology (JNCC, 2010) and carried out between April and September;
- NVC survey of habitats identified in the Phase 1 habitat survey as being potential GWDTEs and/or other habitats of potential conservation importance. The survey will follow the standard methodology (Rodwell, 2006 and Rodwell, 1991) and will be carried out between May and September. It will include all potentially sensitive habitats within a minimum of 250m of potential turbine and borrow pit locations (access permitting) and a minimum of 100m of other potential windfarm infrastructure in line with SEPA guidance (SEPA, 2012);
- Bat surveys will be carried out with reference to the current Bat Conservation Trust (BCT) guidelines for onshore windfarms (BTC, 2012). Although this will be verified following a daytime assessment of the site, the site is considered to be of low risk in accordance with BCT definitions due to its location on the west coast of Scotland, which has relatively high wind and precipitation rates and by being within an area

dominated by coniferous forestry plantation which is likely to provide low value roosting habitat. In addition to this, the Bat Distribution Atlas (Richardson, 2000) shows that a reduced number of species occur in this area, with high risk species such as the noctule (*Nyctalus noctula*) being very rarely recorded. The daytime assessment will investigate potential roost potential within a minimum of 250m of potential turbine locations, with follow-up roost surveys (emergence / return surveys) being undertaken of potential roost sites, if required. It is anticipated that site conditions will prevent the safe undertaking of transect surveys due to the dense nature of the forestry across the development area and difficulty of traversing this habitat during hours of darkness, and therefore survey will be comprised of static monitoring using six remote recorders, which will record for a minimum of five nights per season (spring, summer and autumn). We do not anticipate monitoring at height to be required for a low-risk, upland site such as this, although this will be verified following the daytime assessment of the site;

- A combined protected mammal survey will be undertaken to investigate signs of protected species, such as badger, otter, water vole, pine marten red squirrel. The survey will be carried out between April and September. The badger survey will be undertaken in accordance with standard methodology (Harris, Cresswell and Jeffries, 1989) and will cover the site plus a buffer zone of circa 50m, within which a search for field evidence including faeces, latrines, footprints, hairs, snuffle holes, scratching posts, setts and paths. The otter and water vole surveys will be undertaken with reference to the standard methods (Lenton, Chanin and Jeffries, 1980 and Strachan, Moorhouse and Gelling, 2011) and will include searching for field evidence and recording potentially suitable habitat features on all potentially suitable watercourses within 250m of potential work areas (access permitting). During the survey, red squirrel will be surveyed in transects within suitable woodland habitat using standard methods (Gurnell et al, 2009), and this methodology is likely also to find any evidence of pine marten. If any evidence is found of either red squirrel or pine marten, more detailed surveys could be required. Wildcat is not known from the local area. However, if evidence is found of wildcat during the mammal survey, more detailed survey could be required of this species also; and
- Aquatic and fisheries surveys could be required in the Saddell and Lussa Water catchment, although the scope of these surveys, if required, will be determined following completion of the desk study, scoping consultation and an initial site assessment. If required, the surveys will likely comprise a freshwater pearl mussel survey in Lussa Water carried out using standard methodology (Young et al 2003, SNH, n.d.) and a focused survey of fisheries habitat and possibly juvenile lamprey habitat and juvenile lamprey in Lussa Water. Any fisheries surveys in Saddell Water or Lussa Water will be carried out in line with Scottish Fisheries Co-ordination Centre guidelines for fisheries habitat surveying and electro-fishing and other relevant guidance (Harvey and Cowx, 2003; Cowx and Fraser, 2003 and British Standards, 2003).

It is not proposed to carry out a survey for reptiles, because survey across the proposed development site is unlikely to provide meaningful results. Instead incidental records will be collected and, based on the habitats present, reptiles may be assumed to be present, and mitigation will be developed accordingly. Great crested newts (*Triturus cristatus*) are assumed not to be present but suitability of any waterbodies for the species will be assessed during the extended Phase 1 habitat survey to determine this. Finally, surveys for terrestrial invertebrates are not considered necessary given the very small footprint of the proposed development and the corresponding limited potential for impacts.

The non-avian ecology ES chapter will summarise the relevant ecological baseline data and identify valued ecological receptors (VERs) of particular nature conservation importance (and / or subject to special legal protection) that will be subject to detailed assessment. The assessment of impacts will be carried out based on the IEEM Guidelines (IEEM, 2006) and draw on other, more specific guidance as appropriate (see above). Where required, liaison with other technical specialists (e.g. with hydrologists with respect to GWDTEs) will be carried out. The potential for cumulative impacts with other proposals shown in Table 4.2 will also be considered and will include potential effectss on all VERs within 2km of the site but extended to 10km in the case of bats. If necessary, potential mitigation, compensation and enhancement measures will be identified. Mitigation measures will be described in an Outline CEMP included within the ES, whereas an outline Habitat Management Plan (HMP), if required, would describe any recommended compensation and enhancement measures. The outline HMP would be fully integrated with the Forestry Management Plan.

7. Ornithology

7.1 Legislation, Policy and Guidance

The ornithological impact assessment will follow the process set out in the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 and government guidance on the implementation of the Birds and Habitats Directives (SERAD 2000). The assessment will be undertaken by Natural Research Projects Ltd (NRP).

The following legislation will be taken into consideration during this assessment:

- The Council Directive on the Conservation of Wild Birds 2009/147/EC (EU Birds Directive, amended from 1979);
- The Wildlife and Countryside Act 1981 (as amended) (WCA);
- The Conservation (Natural Habitats & c.) Regulations 1994 (as amended); ('The Habitats Regulations');
- The Nature Conservation (Scotland) Act 2004 (amended); and
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 ('The EIA Regulations').

The following guidance will be followed during the assessment:

- SNH Guidance: Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities (SNH, 2005);
- SNH Guidance: Assessing the Cumulative Impact of Onshore Windfarm Developments (SNH, 2012);
- SNH Guidance: Assessing the Significance of Impacts from Onshore Windfarms on Birds outwith Designated Areas (SNH, 2006); and
- SNH Guidance: Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model (SNH, 2010).

7.2 Baseline

Baseline information on bird populations that may be affected by the proposed development site has been obtained through an ongoing field survey programme. This commenced in September 2011 and is due to be completed in September 2013. Survey methods follow SNH guidance (SNH, 2005) and baseline surveys have been informed by knowledge of local bird populations on and around the proposed development site, gained through NRP's previous work on adjacent windfarms (Beinn an Tuirc Windfarm and Beinn an Tuirc Windfarm Phase 2).

Baseline data on bird flight activity and on the distribution of breeding and wintering birds of conservation importance have been collected using a range of survey methods, summarised here:

- Generic vantage point (VP) observations – data on bird flight activity at the proposed development site has been collected from eight fixed VP locations throughout the year. The data will be used to assess the risk to birds of collision with rotating turbine blades when the windfarm becomes operational. The data will also help identify areas on or near the proposed development site that are important for key bird populations;
- Migration VP observations – data on the movements of migratory bird populations have been collected during the main autumn and spring passage periods;
- Greenland white-fronted goose roost watches – information on the habitual flight routes and roosting areas of Greenland white-fronted geese are collected through monthly dawn and dusk observations from October to April, overlooking a known roosting location adjacent to the proposed development site;
- Walked transects / scans – wintering bird populations are surveyed between September and March by undertaking a series of shortened vantage point watches linked by a walk route designed to maximise coverage of the survey area;
- Moorland breeding bird survey – breeding moorland birds within 500m of the proposed development site are surveyed by visiting suitable habitats four times between April and late June;
- Breeding diurnal raptor surveys – searches are made to determine the distribution of breeding attempts by key raptors in the vicinity of the proposed development site (hen harrier, merlin, peregrine and short-eared owl);
- Field vole survey – data are collected to assess the abundance of field voles that are important prey for some raptors and owls;
- Black grouse survey – searches are undertaken to determine the location of leks and estimate the number of male black grouse by surveying areas within around 1.5km of the proposed development site; and
- Barn owl survey – suitable areas are located and searched to identify breeding and roosting sites.

Results of the first year of baseline surveys are available in Annex 1 of this report.

Additional information on baseline bird populations has been obtained through consultation with SNH, Royal Scoiety for the Protection of Birds (RSPB) Scotland, the Argyll Raptor Study Group, Forestry Commission Scotland and the local Bird Recorder.

7.3 Potential Effects

Taking account of the findings of the work undertaken to date, whilst still adopting a precautionary approach at this preliminary stage, potential impacts on birds associated with the construction, decommissioning and / or operation of the proposed development include:

- a short-term reduction in breeding or wintering bird populations due to construction and decommissioning disturbance (causing chilling, predation, damage or loss of eggs/chicks and the premature fledging of young);

- a long-term reduction in breeding or wintering bird populations due to the direct loss of habitat critical for nesting or feeding through land-take;
- a long-term reduction in breeding or wintering bird populations due to the indirect loss of habitat critical for nesting or feeding through displacement effects engendered by operational disturbance;
- a long-term reduction in breeding or wintering bird populations due to collision mortality;
- impacts on the designated features at the Kintyre Goose Roosts Special Protection Area (SPA), namely Greenland white-fronted geese; and
- cumulative impacts with other nearby development proposals that pose a potential risk to birds through collision and/or displacement.

7.4 Proposed EIA Methodology

Following collation of baseline information from all sources, the assessment will identify likely impacts on bird species of Nature Conservation Importance (NCI) arising from the construction, operation and decommissioning of the proposed development.

In accordance with the EIA Regulations, each likely impact will be evaluated and classified as either 'significant' or 'not significant'. The significance of potential impacts will be determined by integrating the assessments of NCI and magnitude of impact in a reasoned way using professional judgement. Establishing the magnitude of the likely impacts will require consideration of the behavioural sensitivity of the species involved, together with the spatial and temporal magnitude of the likely impacts. In making judgements on significance, consideration will be given to national and regional trends within potentially affected populations, insofar as the impacts may impinge on the conservation status of the species involved at these geographical levels.

At a regional level, and in the case of non-designated sites, impact will be assessed in respect of an appropriate ecological unit, which in the present case is taken to be the Argyll West and Islands Natural Heritage Zone (NHZ 14), as defined by SNH (SNH 2002). Where the available data on bird populations allows, the conservation status of each potentially impacted species will be evaluated within NHZ 14. Conservation status will then be used to inform judgements on the likely magnitude of effect on relevant regional populations.

If, following the process outlined above, detectable adverse changes in regional populations of NCI were predicted as a result of the proposed development, these would be automatically considered significant impacts under the EIA Regulations. Impacts deemed of 'major' and 'moderate' significance (i.e. those leading to detectable changes) will be deemed a significant effect. If a potential impact is deemed to be significant, mitigation measures to avoid, reduce or remedy the impact will be suggested wherever possible and the residual effect following this mitigation will be assessed.

In respect of the Kintyre Goose Roosts SPA and its qualifying interest (Greenland white-fronted goose *Anser albifrons flavirostris*), the Habitats Regulations state that an assessment of effects should be the responsibility of the competent authority. Regulation 48 of the Habitats Regulations refers to three assessment steps, with the outcome of the first two steps determining whether or not the third needs to be implemented. The three steps, set out below as questions, are:

- Step 1: Is the proposal directly connected with or necessary to the management of the SPA?
- Step 2: Is the proposal, alone or in combination, likely to have a significant effect on the SPA? If a significant effect is likely, then an appropriate assessment is necessary; and
- Step 3: Can it be demonstrated in light of the conservation objectives that the proposal will not adversely affect the integrity of the SPA?

The proposal, i.e. the proposed development, is not connected with or necessary to the management of the SPA, prompting consideration of Step 2. In answer to the question posed in Step 2, the proposed development could have a significant effect on the SPA, due to its proximity or 'connectivity' (it lies less than 1km from the SPA). This may result in, for example, flights by Greenland white-fronted geese passing over the development and subject to the risk of collision with turbines. Hence, it will be necessary to consider Step 3 and the ornithological impact assessment will also therefore include an examination of the relevant issues pertaining to likely impacts on the SPA and will provide the competent authority with the information necessary to undertake an appropriate assessment.

8. Noise and Vibration

The noise and vibration impact assessment will identify and assess potential effects of the proposed development on nearby sensitive receptors.

8.1 Legislation, Policy and Guidance

Relevant policies in the Argyll and Bute Structure Plan, the Argyll and Bute Local Plan and the proposed Argyll and Bute Local Development Plan will be considered in the noise assessment, however in general, it is proposed to follow the guidance provided in the following documents:

- Planning Advice Note, PAN1/2011 "Planning And Noise" (Scottish Government, 2011);
- Online planning advice note in relation to onshore wind turbines (Scottish Government, currently dated October 2012);
- ETSU-R-97 The Assessment and Rating of Noise from Wind Farms (Department of Trade and Industry (DTI), 1996);
- Prediction and assessment of wind turbine noise (Acoustics Bulletin, March-April 2009);
- Good Practice Guide to the Application of ETSU-R-97 for Wind Turbine Noise Assessment (Institute of Acoustics, (expected May 2013));
- Acoustics - Attenuation of Sound during Propagation Outdoors ISO 9613-2 (ISO, 1996);
- BS 5228 Code of Practice for Noise and Vibration Control on Construction and Open Sites (British Standards Institute (BSI), 2009); and
- Calculation of Road Traffic Noise (Department of Transport, 1988).

8.2 Baseline

The site is in a remote area, and as such, the existing background noise levels are expected to be low. The main sources of background noise at lower wind speeds are expected to be traffic using local roads and wildlife. At higher wind speeds, noise will be generated by turbulence around objects such as buildings, trees and other landscape features.

The site is located within a sparsely populated area, and based on current information, the development boundary is estimated to be located at least 1 - 1.5km from the nearest residential properties.

8.3 Potential Effects

Noise

Noise effects caused by the proposed development could occur as a result of the following:

- The on-site construction of the proposed development;
- Increased traffic on the local road network during the construction period for the proposed windfarm; and
- Operation of the proposed development.

The noise impacts of the above elements will be considered in the noise assessment.

Vibration

In relation to operational vibration, the results of a review of published literature undertaken by Bowdler et al in 2009 (presented in the March-April 2009 edition of the Institute of Acoustics Bulletin) concluded that: "*there is no robust evidence that low frequency noise (including 'infrasound') or ground-borne vibration from wind farms, generally has adverse effects on wind farm neighbours*."

It is therefore not proposed to consider operational vibration as part of the assessment.

8.4 Proposed EIA Methodology

Initial Modelling

A noise modelling exercise will be undertaken to confirm the requirement (or otherwise) for background noise monitoring based on the initial proposed layout and turbine type. The model will be undertaken using SoundPlan, a commercially available software package that employs the noise propagation algorithms defined within ISO 9613-2:1996 (ISO, 1996).

The initial calculation will be represent a 'worst-case' assessment of noise levels at the nearest receptors from the operation of the proposed turbines, together with any existing or proposed turbines, within the proposed development area at wind speeds up to 10 metres per second (m/s).

The noise from the following wind developments which are either currently operational, under construction, in planning and in scoping will be considered for inclusion in the noise model:

- Beinn an Tuirc;
- Beinn an Tuirc Phase 2;
- Creggan;
- Tangy;
- Tangy Extension;
- Blary Hill; and
- Glen Barr.

These developments have been selected from those presented in Table 4.2 based on their potential to give rise to cumulative noise impacts within the study area.

The initial noise model indicates the proposed development is may cause the wind turbine noise levels at any property to exceed 35 decibels (dB) L_{A90}, therefore a site noise survey will be undertaken to determine the appropriate noise limits in accordance with ETSU-R-97. The L_{A90} noise levels are those noise levels that are exceeded for 90 percent of each sample period and are used to describe background noise levels. The survey methodology and

precise location of any noise monitoring locations will be agreed with Argyll and Bute Council in advance of the survey.

Site Survey

Suitably calibrated Class 1 sound level meters will be set up to record $L_{A90,10min}$ values within the curtilage of each identified property for a period of at least two weeks, until a suitable number of noise measurements have been captured at each required wind speed. $L_{A90,10min}$ is the metric used for windfarm sound. This metric avoids sound measurements being dominated by sound levels only present for a small part of the time and reduces contamination by the sound of wind on the microphone when levels are being measured. The microphone will be mounted at 1.2 – 1.5 metres above ground level, fitted with a suitable wind shield for the purpose of wind noise measurement. The measurements will be time synchronised with 10 minute wind speed and direction measurements and will be logged using either an anemometry mast or using SODAR / LIDAR. Rain measurements will also be logged for each 10 minute interval using a tipping bucket rain gauge.

The noise measurement position within each property will be selected to be representative of the amenity spaces at each property, away from any local sources of wind induced noise unrepresentative of noise levels at the property, or any other local sources of noise that might be sufficient to elevate the measured levels and misrepresent the wider area (for example, local machinery, boiler flues, streams, etc). The measurement positions will also aim to minimise the potential influence of any currently operational wind turbines. Detailed photos of the equipment in-situ would be taken and included in the assessment report. The relevant Environmental Health Officer at Argyll and Bute Council will be invited to attend the site visit to install the noise monitoring equipment.

Assessment

Noise limits for local properties would then be derived in accordance with ETSU-R-97, taking into account the advice on wind shear contained in "Prediction and assessment of wind turbine noise" (Acoustics Bulletin, March-April 2009).

The report will assess compliance of the final turbine layout with the ETSU-R-97 limits, detailing any mitigation for the candidate turbines required to meet the limits. If the final construction design requires the use of heavy construction plant or piling in close proximity to nearby receptors, then the potential construction vibration impact will be considered in the assessment.

9. Cultural Heritage

The Cultural Heritage impact assessment will identify archaeological and cultural heritage assets that may be subject to impacts, both within the limits of the development site and beyond, establish the archaeological potential of the development site, assess the predicted impacts and propose a programme of mitigation where appropriate. It will consider both indirect and direct effects, including impacts on the setting of cultural heritage assets.

9.1 Legislation, Policy and Guidance

The assessment will be undertaken with reference to relevant legislation, National Planning Policy and Guidance, and Regional and Local Planning Policy relating to Cultural Heritage, as referred in section 2 and additionally:

- The Ancient Monuments and Archaeological Areas Act 1979;
- The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997;
- The Historic Environment (Amendment) (Scotland) Act 2011;
- Scottish Planning Policy (Scottish Government, 2010);
- Scottish Historic Environment Policy (SHEP)(SHEP, 2011);
- PAN2 / 2011 Planning and Archaeology (Scottish Government, July 2011); and
- Managing Change in the Historic Environment: Setting (Historic Scotland, 2010).

9.2 Baseline

To date, data concerning designated assets has been acquired remotely and existing databases have been reviewed, but desk-based research, survey and site visits have not been carried out. This work will be undertaken in advance of producing the ES.

There is one Scheduled Monument immediately adjacent to the site boundary: Dun a'Bhuic (Index no. 3315), the remains of a dun (or fort) thought to be of Iron Age date, which is located beside the access road close to the junction with the A83. There are no other designated heritage assets within the site boundary.

There are a number of undesignated assets, including shieling huts, a sheepfold and a cairn, within the proposed development area. The crash site of a World War II Wellington bomber has also been recorded on Easach Hill; wreckage and large amounts of ammunition were identified and reported by staff from the West Argyll Forest District in January 2007. The potential for further, previously unrecorded subsurface assets will be assessed during the course of the assessment.

There are 21 scheduled monuments (Table 9.1 and **Figure 5**) within 5km of the proposed development areas. These include examples of standing stones, chambered cairns, duns, forts, hut circles and the remains of a medieval abbey.

Table 9.1 Scheduled Monuments within 5km of proposed development area

Index No	Name
208	Highpark, standing stone
219	Glenlussa Lodge, standing stone
229	Standing stone 275m N of Skeroblingarry
243	Kildonan, dun
251	Crois Mhic Aoidh, standing stone
2484	Gort na h-Ulaidhe, long cairn 900m NE of Gartgreillan, Glen Lussa
3100	Rudha nan Sgarbh, dun
3108	Skeroblin Hill, cairn
3109	Dun W of Kilkeddan
3110	Kildonald Point, fort & cairn
3178	Dun SE of Cleongart
3180	Tangy Loch, fortified dwelling
3221	Ballywilline Hill, fort
3225	Ugadale Point, dun
3539	Fort 450m NE of Saddell House
3619	Trench Knowe, dun, Glen Lussa
3642	Puball Burn, enclosure 580m SE of Skeroblingarry
3645	Saddell Abbey
3646	Long cairn 340m SSE of Ardnacross
3721	Chambered cairn 800m NNW of Ardnacross
7434	Hut circles E of Corputechan

There are also one Category A-, eight Category B- and three Category C(S)- listed buildings (Table 9.2 and **Figure 5**) within 5km of the proposed development area.

Table 9.2 Listed buildings within 5km of proposed development area

HB No	Name	Category	NGR
18396	Torrisdale Castle	B	179348, 636137
18397	Gate-House and Stable ('The Arch') near Torrisdale Castle	B	179272, 636094
18398	Bridge I, Lephin Corrach Burn, Torrisdale Estate	C	179325, 636005
18399	Bridge II, Torrisdale Estate	C	179439, 636148
18400	Torrisdale Gate-Lodge and Gateway Torrisdale Estate Saddell - Skipness Road	B	179657, 635829
18401	Torrisdale Bridge Torrisdale Water Saddell - Skipness Road	B	179686, 635850
18402	Saddell Abbey	B	178466, 632069
18403	Saddell Castle	A	178906, 631545
18404	Saddell House	B	179123, 631801
18482	Saddell Burial Ground, Campbell of Glen Carradale Burial Enclosure	C	178488, 632068
18483	Saddell Burial Ground, Campbell of Glen Saddell Burial Enclosure	B	178409, 632070
51689	Lussa Hyrdo Electric Scheme, Lussa Power Station, including Boundary Walls	B	173563, 626095

There are no inventory gardens and designed landscapes, inventory battlefields or conservation areas within 5km of the proposed development area.

9.3 Potential Effects

Construction work has the potential to damage or destroy cultural heritage assets. This may occur either as a result of the design of the development or as an accidental consequence of

construction plant movement. The impacts may be direct; for instance where an archaeological deposit is removed or damaged during ground-breaking works, or indirect; for example where changes in hydrology may lead to waterlogged archaeological deposits becoming desiccated and degraded. As a large part of the indicative development area is plantation forestry it is possible that cultural heritage assets in this area will have previously been subject to direct and indirect impacts from the ploughing, planting, growing and felling of productive forestry.

There is also the potential for the operational phase of this development to have an impact on the setting of cultural heritage assets that are present within the surrounding area.

The cumulative effects on cultural heritage and archaeological assets will be assessed with regard to any planned or committed development close to the proposed development.

9.4 Proposed EIA Methodology

For the purposes of this assessment, cultural heritage assets will be taken to include all elements of the historic built environment predating the earliest Ordnance Survey mapping in this area, and selected sites of more recent date. This includes all Scheduled Monuments, Listed Buildings, Conservation Areas, Inventory Gardens and Designed Landscapes, and Inventory Historic Battlefields. Further assets, such as those of special military or industrial interest, will also be considered where appropriate.

The study area for the assessment will take in three concentric areas:

- The Inner Study Area (**Figure 5**) extends 100m beyond the site boundary (including the access road corridor). Within this area all cultural heritage assets are considered for construction and operational impacts; including direct impacts and impacts on setting;
- The Middle Study Area (**Figure 5**) extends 5km from the proposed turbine development areas. Within this area all nationally important cultural heritage assets are considered for operational impacts. All cultural heritage assets within this area will be considered to inform the potential for previously unrecorded cultural heritage assets within the Inner Study Area; and
- The Outer Study Area (not illustrated) is based on the Zone of Theoretical Visibility (ZTV) as defined in the Landscape and Visual Chapter. Within this area sites raised by consultees and / or sites considered to be of exceptional importance are considered in terms of impacts on their setting.

Relevant bodies will be consulted regarding the proposed development and its impacts. These will include:

- Historic Scotland **–** in relation to potential setting impacts upon Scheduled Monuments, Inventory Gardens and Designed Landscapes, Listed Buildings and Inventory Historic Battlefields; and

- West of Scotland Archaeology Service (WoSAS), as archaeological advisors to Argyll and Bute Council – in relation to potential physical and setting impacts upon cultural heritage assets.

The following data sources will be used:

- National Monuments Record of Scotland (NMRS);
- Vertical aerial photographs held by the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS);
- Argyll and Bute Council / WoSAS Historic Environment Record (HER);
- Databases of designated cultural heritage assets (scheduled monuments, listed buildings, battlefields, inventory historic gardens and designed landscapes and conservation areas) maintained by Historic Scotland;
- Maps held by National Library of Scotland; and
- Other readily accessible published sources.

Given the presence of extensive and dense productive forestry plantation across the development site, the walkover survey will target areas of open ground and known assets. This will check the results of the documentary research and record any previously unrecorded assets and their current condition. The cultural heritage chapter will include a detailed description of the character, extent and cultural significance of all known heritage assets within the development site, and an assessment of the potential for currently undiscovered archaeological remains.

Cultural heritage assets with potential for significant effects on their settings will be visited to establish baseline conditions. If necessary, the cultural heritage assessor will liaise with the landscape and visual team to select appropriate viewpoints for the assessment of impacts on the setting of heritage assets, and to ensure consistency of approach and cross-referencing where the same locations are assessed with respect to landscape and visual, and cultural heritage effects.

The sensitivity of assets potentially affected by the development will be assessed on the basis of their cultural significance, taking into account statutory designations and the professional judgement of the assessor. The magnitude of impacts will be assessed, reflecting the extent to which the cultural significance of assets will be changed by the development. The significance of effects will be assessed by combining the sensitivity of the asset and the magnitude of the impact. Recommendations will be made for the mitigation of any effects, and an assessment made of the magnitude and significance of any residual effects following implementation of mitigation measures.

10. Access, Traffic and Transport

The construction of a windfarm requires the transportation of large turbine components and plant items used to construct the infrastructure, including access tracks. Quantities of building materials including aggregate and concrete also need to be transported to site by Heavy Goods Vehicles (HGVs) unless sourced and batched on-site. There may also be traffic generated by forestry felling.

The wind turbine components for the proposed development will be classified as abnormal loads when delivered to site and in order to minimise road haulage requirements, the turbine components would be delivered to Campbeltown Harbour, and then delivered to site via the existing road network. The use of public roads for the transportation of abnormal loads will require consultation with Argyll and Bute Council.

10.1 Legislation, Policy and Guidance

In undertaking the assessment of the potential traffic and transport effects of the proposed development on the local road network, the following guidance documents will be taken into account:

- Guidelines for the Environmental Assessment of Road Traffic (IEMA, 1993);
- Guidelines for Traffic Impact Assessment (The Institution of Highways and Transportation (IHT), 1994);
- Transport Assessment and Implementation: A Guide (Scottish Government, 2005); and
- Scottish Planning Policy (SPP) (Scottish Government, 2010).

Relevant policies contained in the Argyll and Bute Structure and Local Plans and the proposed Argyll and Bute Local Development Plan will also be considered.

10.2 Baseline

As outlined above, it is proposed that the turbine components will be transported by road from Campbeltown Harbour, which is established as a suitable delivery port for abnormal loads for windfarm developments in this region. It is proposed that the Turbine Delivery Vehicles (TDVs) will access the proposed development via the same route as used for both the operational Beinn an Tuirc and the Beinn an Tuirc Windfarm Phase 2. The route is as follows:

- Arrive at Campbeltown Harbour;
- North on the A83; and
- Existing site access located on the eastern side of the A83, north of Bellochantuy.

Given that the proposed turbine specifications may differ to those associated with the Beinn an Tuirc Windfarm and Beinn an Tuirc Windfarm Phase 2 developments, the suitability of the

proposed access route will require further investigation through a comprehensive desk-top study and swept path analysis of the proposed route.

10.3 Potential Effects

It is not expected that there will be any significant impacts resulting from operational traffic. The potential effects are anticipated to be the increase in traffic on the existing road network associated with construction and felling activities.

For the purposes of this assessment and in accordance with the criteria set out within the IEMA guidelines, the scale (magnitude) of any increase in traffic flows on a particular section of the road network as a result of the development construction activities will determine the significance of any effects associated with such increases. For example an increase in traffic flows of more than 90% on a particular section of the road network, will likely have a major effect on the road section being assessed.

The IEMA Guidelines identify that the following environmental effects may be considered when assessing the traffic related to developments:

- Accidents and safety;
- Air pollution;
- Driver delay;
- Dust and dirt:
- Hazardous loads;
- Noise;
- Pedestrian amenity;
- Pedestrian delay;
- Severance (of communities);
- Heritage and conservation;
- Visual effects;
- Ecological effects; and
- Vibration.

The effect of the proposed development construction activities in relation to the above environmental effects will be considered within the assessment, or in other chapters of the ES as appropriate.

10.4 Proposed EIA Methodology

The methodology that will be adopted within the assessment has been developed from guidance provided within the IHT 'Guidelines for Traffic Impact Assessment' (IHT, 1994) and also the IEMA 'Guidelines for the Environmental Assessment of Road Traffic' (IEMA, 1993). Methodologies detailed in the IHT guidelines recommend that, for EIA, large developments should be assessed in accordance with the IEMA guidelines.

The potential traffic effects of the proposed development will be assessed utilising the following approach:

- Relevant transport policies will be reviewed;
- The road sections likely to be affected by the development will be identified;
- The existing character of the road network will be determined;
- Existing traffic levels on the road network will be determined;
- The additional traffic generated by the development will be estimated;
- The effect of the additional traffic will be assessed; and
- An appropriate mitigation strategy will be prepared in order to ensure that any potential traffic effects are kept to a minimum.

Two broad principles outlined within the IEMA guidelines are advised for use as a screening process to limit the scale and extent of the assessment. These are to:

- *"include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%)";* and
- *"include any other specifically sensitive areas where traffic flows will increase by 10% or more."*

The effects of the additional traffic generation associated with the development can be categorised as:

- Additional traffic volumes associated with the development construction programme travelling on the existing road network; and
- Delays to non-development related journeys as a result of slow moving vehicles i.e. abnormal loads.

The assessment will aim to identify the types of vehicle needed to transport loads associated with the construction activities and potential transportation routes, where possible. The volume of all construction traffic movements will then be quantified along with the projected schedule of movements. This will then be used to determine daily vehicle numbers.

As mentioned previously, until supply contracts have been placed for the materials needed on site, details of the origin of construction vehicles and the route they will take will not be known for certain. To account for this, robust assumptions will be made regarding the proportion of construction vehicles using any particular route, most notably that 100% of construction traffic will pass all assessed locations on the local road network. However it is predicted that on-site borrow pit(s) will be used if possible, which will considerably reduce the import of construction materials and therefore the number of vehicles required to visit the site.

Construction vehicle volumes will then be assessed against existing baseline traffic levels, the data for which will be obtained from Transport Scotland and commissioned traffic

surveys. This will be used to determine the impact of the traffic associated with construction of the proposed development in terms of increases in traffic flows on the local road network.

The cumulative assessment will appraise cumulative conditions on public roads (local or trunk) within a defined study area. This comprises route sections that might reasonably be expected to accommodate construction phase traffic from the proposed development site in addition to traffic generated by other developments.

It is proposed that the operational Beinn an Tuirc Windfarm and the Beinn an Tuirc Windfarm Phase 2 site access will be used for the proposed development. The assessment will consider the requirement for any mitigation given the potential difference in turbine specifications.

11. Aviation

11.1 Legislation, Policy and Guidance

The Aviation Industry and the provision of Air Navigation Services (including radar services) are regulated through extensive legislation; however the main mechanism for regulating the relationship between aviation and onshore wind, through the Planning Process, lies predominantly with the Civil Aviation Authority (CAA) in guidance outlined below. The following guidance documents will be reviewed to establish the assessment baseline:

- CAP032 UK IAIP (United Kingdom Integrated Aeronautical Information Publication) (CAA, n.d.);
- CAP168 Licensing of Aerodromes (CAA, 2011);
- CAP393 Air Navigation: The Order and the Regulations (CAA, 2012);
- CAP670 Air Traffic Services Safety Requirements (CAA, 2013);
- CAP738 Safeguarding of Aerodromes (CAA, 2012);
- CAP764 Policy and Guidelines on Wind Farms (CAA, 2012);
- Lockyears Farm Strips and Private Airfields Guide (Lockyear, 2013);
- Military Aeronautical Information Publication (Mil AIP) (AIDU, n.d.); and
- Pooleys Flight Guide United Kingdom (CAA, 2013).

11.2 Baseline

Wind turbines have the potential to interfere with military and civil aviation operations, primarily through effects on radar systems but also in respect of their location, relative to aerodromes and within military low flying areas. Various aviation interests, including the Ministry of Defence (MoD) and the CAA joined with RenewableUK to publish guidance on these issues: Wind Energy and Aviation Interests: Interim Guidelines of the Wind Energy, Defence & Civil Aviation Interest Working Group (DTI, 2002). Any potential effects will be fully investigated in the EIA.

Campbeltown Airport is situated approximately 11.7km from the centre of the proposed site and the proposed development may affect the operation of the airport and established safeguarded obstacle limitation surfaces.

The site is located within Military Low Flying Area (LFA) 14 an area used for military low flying training and exercises.

The main method of establishing the baseline environment and assessing the potential impact upon military and civilian aviation and radar is to consult with those who own and operate the potentially affected systems and infrastructure.

Consultation with the MoD, NATS En Route (NERL), CAA, and the relevant airport(s), will be conducted as necessary. Assessment will clearly identify systems that are likely to be affected by the proposed development. Mitigation measures will be identified where appropriate.

11.3 Potential Effects

The potential effects of wind turbines on aviation interests have been widely publicised and there are two dominant scenarios that lead to the potential for objection from aviation stakeholders:

- Physical Obstruction: turbines can present a physical obstruction at or close to an aerodrome or other landing/take-off point, or to military aircraft conducting low flying training exercises; and
- Radar / Air Traffic Services (ATS): turbine clutter appearing on radar display can affect the safe provision of ATS as it can mask unidentified aircraft from the air traffic controller and/or prevent him from accurately identifying aircraft under his control. In some cases, radar reflections from the turbines can affect the performance of the radar system itself.

The proposed development is within the operational range of the Primary Surveillance Radars (PSRs) at Glasgow Prestwick Airport (GPA) and the NERL's Lowther Hill and Tiree PSRs. However the proposed development is outside GPA's radar consultation safeguarding zone as the area is terrain shielded from its PSR. NERL uses the Lowther Hill and Tiree PSRs to support their provision of navigational services to aircraft operating between the UK and mainland Europe and to those overflying the UK Flight Information Region (FIR). Surveillance data from the NERL's radars are also used by other air traffic service providers such as the MoD. The MoD has a role to provide unimpeded airspace surveillance and early warning of air attack and intrusion into UK airspace. The development is within the operational range of the Benbecula Air Defence Radar for turbines exceeding 140m blade to tip. Turbines below this height will not be detected.

Cumulative impacts may arise from other windfarms in the vicinity.

11.4 Proposed EIA Methodology

Potential aviation stakeholders are identified in accordance with guidance in CAP764. The extents of expected effects quoted in the guidance are used as a guide and a minimum; the guidance states that any wind turbine development within 30km of an aerodrome with a surveillance radar facility, might have an effect upon civil aerodrome related operations. The guidance goes on to say that the distance can, however, be far greater than 30km depending upon a number of factors including the type and coverage of the radar and the particular operation at the aerodrome.

Consideration is given to any en-route and air defence radars that are within operational range of the site. Operational range varies by radar and by using a database of all Air Traffic Control (ATC) and air defence radars in the UK, the study areas for assessment can be defined on a case by case basis in this respect. Definition of the study area for aviation can often be a subjective process. The assessment will address the likely effect of the windfarm on aircraft safety through:

- identification of airspace structure and flight paths in the area; and
- analysis of the potential effect on the region's major aviation stakeholders; civil airports, MoD and NERL.

An Aviation Impact Assessment will be conducted as part of the EIA process. This will identify the relevant aviation stakeholders, the nature of any potential effects identified and will provide a brief assessment of any areas of suitable mitigation if required. This will include line of sight analysis to relevant radars operated by the local Air Navigation Service Providers. Consultation will be carried out with the relevant aviation stakeholders to discuss the results and understand any concerns they may express.

12. Socio-economics, Tourism, Recreation and Land Use

12.1 Legislation, Policy and Guidance

There is currently no prescribed methodology for the assessment of socio-economic or tourism and recreation impacts in an EIA. However, the methodology used for the assessment will be based upon best-practice for such assessments.

The assessment methodology follows guidance in Her Majesty's Treasury's Green Book for Economic Appraisal and Evaluation (HMSO, 2003), and also good practice guidance for economic assessment used by both the Scottish Government and Scottish Enterprise (Scottish Enterprise, 2008).

For the tourism element the assessment follows the recommendations of the 2008 Economic Impacts of Wind Farms on Scottish Tourism Study research for the Scottish Government (Scottish Government, 2008), which called for an assessment of the:

- Number of tourists travelling past en route elsewhere;
- Impacts on views from tourist accommodation in the area;
- Relative scale of tourism impact – local to national;
- Potential positive impacts; and
- Impacts on outdoor activities in the area.

Further, this also follows the approach to tourism and recreation impact assessment as referred to in the Good Practice Wind guide: Assessing Impacts on Tourism 2012 (GP Wind, 2012).

The recreational impact element follows the approach to outdoor access impact assessment as covered by guidance contained within SNH's publication A Handbook on Environmental Impact Assessment (SNH, 2006).

12.2 Baseline

The wider area of central / southern Kintyre is generally rural with a mixture of open countryside, agriculture and forestry. The proposed development site is located in proximity of Lussa Loch with the main A83 route between Tarbert and Campbeltown to the west and the B842 to the east, the latter being the route of the Kintyre Way, the National Cycling Route 78 and a number of other longer distance walking and cycling routes. The largest settlement of Campbeltown lies some 10km to the south with its range of industrial, commercial, retail and community facilities, and there are a number of scattered villages and other settlements in the surrounding area including Carradale, Bridgend and Saddell to the east and north east, Peniver to the south east, and Glenbarr and Muasdale to the north west. There are a number of tourist and recreational visitor attractions, activities and paths in the surrounding area, the majority of which are located to the east of the proposed development around Carradale, Bridgend, Torrisdale-Square and Saddell.

The assessment will also take the Isle of Arran into consideration, where the western shore is a focus for visitors.

12.3 Potential Effects

The potential effects of the proposed development may include:

- The generation of local and wider direct, indirect and induced employment and business opportunities during the development, manufacturing, construction, operational and maintenance, and de-commissioning phases of the development;
- Impacts on local tourism, visitor and recreational amenity, and land use; and
- Wider direct and indirect economic benefits and dis-benefits from the proposed scheme.

Cumulative effects on employment opportunities, and tourism and recreation and their amenity will also be considered.

12.4 Proposed EIA Methodology

The assessment will consider the likely impacts of the proposed development on the baseline socio-economic and tourism and recreation conditions in the area, defined for the purposes of the assessment at two levels:

- The wider Argyll and Bute Council administrative area for the contextual socio-economic structure of the area, and Western Scotland and Argyll and the Islands for the tourism and recreation wider context; and
- A 15km radius catchment area, which forms the basis of the local study area for the local impact assessment.

The baseline will comprise data collected from a wide range of sources including those for the socio-economic structure and for tourism volume and value.

Detailed information on the likely effects on the tourism business economy and visitor numbers will be collected, which will assess impacts post-development of the operational Beinn an Tuirc Windfarm, from the current construction of Beinn an Tuirc Windfarm Phase 2, and also assess the likely impacts from the proposed Beinn an Tuirc Windfarm Phase 3. Likely impacts on visitors and recreational users will be derived from a recreational impact assessment that will consider the physical disturbance to the users or severance of the recreational resource and be co-ordinated with the Landscape and Visual Impact Assessment on visual amenity grounds.

An assessment of comparative research into the potential impacts and effects of windfarm development on tourism and recreational activities and public perceptions across the UK will be provided to provide a context for understanding the likely effects from the proposed development.

Mitigation proposals will be set out where the effects identified are assessed as significant, and through which any identified post-mitigated residual effects can be reduced in significance.

13. Other Issues

13.1 Shadow Flicker

Under certain combinations of geographical position and time of day, sunlight may pass behind the rotors of a wind turbine and cast a shadow over neighbouring properties. When the blades rotate, the shadow flicks on and off resulting in an effect known as "shadow flicker".

This effect only occurs inside buildings and under a limited set of circumstances, e.g. when meteorological conditions are clear, the sun is low in the sky and the moving shadow of a turbine is cast onto a narrow window. Due to the movement of the sun, these shadows pass any point quickly and the effect only lasts a short period of time.

Legislation, Policy and Guidance

The impact of shadow flicker on the local community is discussed in the Scottish Government's web based renewable advice note on onshore wind turbines (Scottish Government, 2012). The renewable advice note states that "*In most cases, where separation is provided between wind turbines and nearby dwellings (as a general rule 10 rotor diameters), "shadow flicker" should not be a problem."* In the case of the proposed development, this would be a radius of potentially up to 900m, depending on turbine / rotor size chosen for the site.

In the absence of any specific Scottish Government guidance, and if detailed modelling is necessary, it is proposed that the shadow flicker assessment will take account of Planning Policy Statement (PPS) 18: Renewable Energy (Department of the Environment for Northern recommendations relating to shadow flicker. It states that shadow flicker at neighbouring offices and dwellings within 500m of turbines should not exceed 30 hours per year or 30 minutes per day.

Baseline

An initial review of the OS mapping indicates that are no residential properties within 900m of the proposed development area and therefore a shadow flicker assessment may not be required.

Potential Effects

Shadow flicker only occurs inside buildings within 10 rotor diameters of turbines. In the case of this development, this would be a maximum radius of up to 900m, depending on the final selected turbine / rotor size. The effect occurs under a limited set of circumstances and due to the movement of the sun, these shadows pass any point quickly and the effect therefore only lasts a short period of time.

Proposed Methodology

A site visit will be undertaken to confirm the location of sensitive receptors and to identify if there are any representative properties where shadow flicker has the potential to occur and will then be the subject of further assessment to determine shadow flicker effects.

Should properties be identified within 900m of a turbine location, the number of hours of shadow flicker predicted to result from the proposed windfarm will then be calculated using a commercial software programme. This model takes into account the movement of the sun with time of day and time of year and, through the accurate positioning of the wind turbines and potentially affected property, predicts the time and duration that shadow flicker is expected to occur at a representative window within the property, assuming clear, sunny conditions and the required turbine alignment to cause shadow flicker to occur. The guidance provided in PPS18 will be used to assess the significance of the predicted shadow flicker.

13.2 Ice Throw and Health and Safety

Properly designed and maintained wind turbines are generally a safe technology. However there is the potential safety risk to humans from the following:

- Ice build-up on turbine blades falling or being thrown from the blades;
- Lightning strike;
- A blade, or a piece of the blade becoming detached from the turbine, and
- Structural failure, leading to collapse of the turbine.

Further detailed assessment of the health and safety risks is not proposed to be undertaken as part of the impact assessment. The site design will follow the industry and Scottish Government policy in siting turbines a minimum of tip height plus 10% (the topple zone) from roads, public footpaths and buildings to minimise the risk to humans from turbines or parts of turbines falling. Risks associated with ice build up and lightning strike are removed or reduced through turbine manufacturer's design and will be detailed further in the proposal description of the ES.

13.3 Air Quality

The proposed development is not considered likely to give rise to significant effects on air quality. The main activities will be limited to construction works (dust from soil stripping and earthworks, from excavation, potentially including occasional blasting, and from vehicles running over unsurfaced ground) and exhaust emissions from fixed and mobile construction plant and construction vehicles. Construction works will be localised, short term, intermittent and controllable through the application of good construction practice. Fixed and mobile plant will be limited in size and number, and operate for short periods. Construction vehicles are expected to be few in number (<25 per day). The contribution of exhaust emissions (nitrogen dioxide (NO_2) and particulate matter (PM_{10})) will be de minimus, and are likely to be

orders of magnitude below current Air Quality Objectives. Therefore, it is proposed that the EIA will not address air quality impacts.

13.4 Climate Change and Carbon Balance

The rationale for developing onshore windfarms is the beneficial effect of reducing net greenhouse gas emissions by displacing electricity produced from conventional fossil fuel sources. However, no method of electricity generation is completely carbon free; there will be emissions as a result of manufacture of wind turbines and construction materials, as well as emissions from construction activities and transport. In addition to the lifecycle emissions from the windfarm infrastructure, where a proposed development is located on carbon rich soils such as peat, there are potential impacts resulting from direct action of removing peat for construction and also the indirect changes to hydrology that can result in losses of stored carbon. The footprint of the windfarm could also have an impact on future carbon uptake by vegetation. Therefore the EIA will look at the benefits accruing from displacement of conventionally generated electricity compared to the predicted direct and indirect losses of carbon from construction, operation and decommissioning and will provide an estimate of the carbon payback time for the proposed development.

Legislation, Policy and Guidance

The Scottish Government have funded the development of a excel tool and associated report "*Calculating carbon savings from wind farms on Scottish peat lands – a new approach"* (Nayak et al, 2008) for calculating the potential carbon losses and savings from windfarms on Scottish peat lands and this calculator is currently seen as best practice for gauging the payback time for carbon emissions from windfarm projects. The current version of the carbon calculator is V2.1.0 (30 September 2011).

Applications for windfarms submitted under Section 36 of the Electricity Act (50MW capacity or above) that are proposed for sites where there is likely to be peat areas greater than 0.5m in depth, and where loss or disturbance to peat could occur are expected to use the carbon calculator in the new format provided by the refined tool in preparing the application for Section 36 consent with deemed planning permission under Section 57 of the Town and Country Planning (Scotland) Act 1997.

Baseline

The baseline for the environmental parameter is two-fold: firstly, the current percentage of renewable electricity generation in Scotland will be used as the baseline to determine the significance of the proposed development to reaching Scotland's renewable generation targets (31% of Scottish gross electricity consumption from renewable sources by 2011, rising to 80% by 2020). Secondly, an estimate of the current quantity of stored carbon in the soil at this site will be used to help determine the significance of the estimated carbon losses from the site.

Potential Effects

There will be carbon losses and gains during the construction and lifetime of the windfarm, and the long term effect on stored carbon in peat soils. There will also be contribution of renewable energy to the grid. It is anticipated that the overall effect of the proposed development on climate change will be positive and one of the key focuses of the climate change assessment within the ES will be to identify ways to enhance the positive impact and minimise any carbon losses through construction methodologies and site restoration.

Proposed Methodology

The positive effect of the proposed development on climate change in terms of the avoided emissions of greenhouse gases will be described. Carbon losses and gains during the construction and lifetime of the, proposed development and the long term effect on stored carbon in peat soils, will be evaluated in order to ensure that the benefits of the proposed development in terms of mitigating climate change through contribution of renewable energy to the grid are not outweighed by the losses of carbon stored in soils and released by construction activities. The assessment will use the carbon calculator described above, ensuring that where feasible, robust and thorough survey methodologies are employed to produce the input data.

13.5 Telecommunications

Wind turbines, as with any large structure, can interfere with electromagnetic signals. This can affect radio communication and control networks and television reception.

Legislation, Policy and Guidance

The following will be used as part of the survey and assessment process for the study of telecommunications and aviation impacts:

- Scottish Government web-based guidance on onshore wind turbines (which replaces PAN 45 Renewable Energy Technologies) (Scottish Government, 2012);
- A proposed method for establishing an exclusion zone around a terrestrial fixed radio link outside of which a wind turbine will cause negligible degradation of the radio link performance, Bacon, D.F., Version 1.1 (Radiocommunications Agency, 2002);
- The Impact of Large Buildings and Structures (including Wind Farms) on Terrestrial Television Reception (BBC/Ofcom, 2006); and
- Tall structures and their impact on broadcast and other wireless services (Ofcom, 2009).

Baseline

Consultations have yet to take place with Joint Radio Company (JRC), utilities or telecommunications operators to establish the baseline for facilities in the area.

Potential Effects

Microwave radio and Ultra High Frequency (UHF) scanning telemetry links passing close enough to the wind turbines may experience interference to their signals.

Domestic properties that have the windfarm located between them and the television transmitter from which they receive signals may experience interference to their TV reception.

Proposed EIA Methodology

Assessment of the impact of the proposed development on fixed telecommunications links will be conducted by establishing the locations of radio link paths in the vicinity of the site and calculating the separation distances between the turbines and each link. These distances will be evaluated against operator-requested separation distances and the Ofcom-recommended formula for calculating the required separation from wind turbines (Bacon, 2002).

The significance of effects on fixed telecommunications links will be determined by whether turbines are located closer than the operator-requested and Ofcom-recommended separation distances.

Assessment of the impact of the proposed development on television reception will be conducted by an analysis of the geographical area where interference may be experienced using the criteria set out in BBC / Ofcom (2006) and Ofcom (2009). The significance of effects on television reception will be determined by the number of domestic properties located within predicted interference zones.

Consultations will be carried out with Ofcom, the JRC, WS Atkins and any telecommunications operators identified by Ofcom.

14. Proposed Consultees

This request for a Scoping Opinion will be forwarded to the following consultees that have been identified from the ECDU standard consultee list and additional organisations considered relevant to the Beinn an Tuirc Windfarm Phase 3 development.

Argyll and Bute Council Environmental Health

Argyll and Bute Council Roads Operations

Argyll District Salmon Fisheries Board

Argyll Fisheries Trust

Association of Salmon Fishery Boards

BAA Glasgow Airport

Bat Conservation Trust

British Horse Society

BT

Campbeltown Airport

Campbeltown Harbour

Civil Aviation Authority

Community Councils (Campbeltown, East Kintyre, West Kintrye, The Laggan and Tarbert and Skipness)

The Crown Estate

Defence Infrastructure Organisation

Glasgow Prestwick Airport

Health and Safety Executive

Historic Scotland

John Muir Trust

Joint Radio Company

Marine Scotland

Ministry of Defence

Mountaineering Council of Scotland

National Air Traffic Services

Ofcom

Perth and Argyll Conservancy, Forestry Commission Scotland

RSPB Scotland

Ramblers Association Scotland

Scottish Canoe Association

Scottish Environmental Protection Agency

Scottish Natural Heritage

Scottish Rights of Way and Access Society

Scottish Water

The Scottish Wildlife Trust

Transport Scotland and/or Transerv (operating Agents for A83 Trunk Road)

Visit Scotland

West Argyll Forest District

West of Scotland Archaeology

WS Atkins

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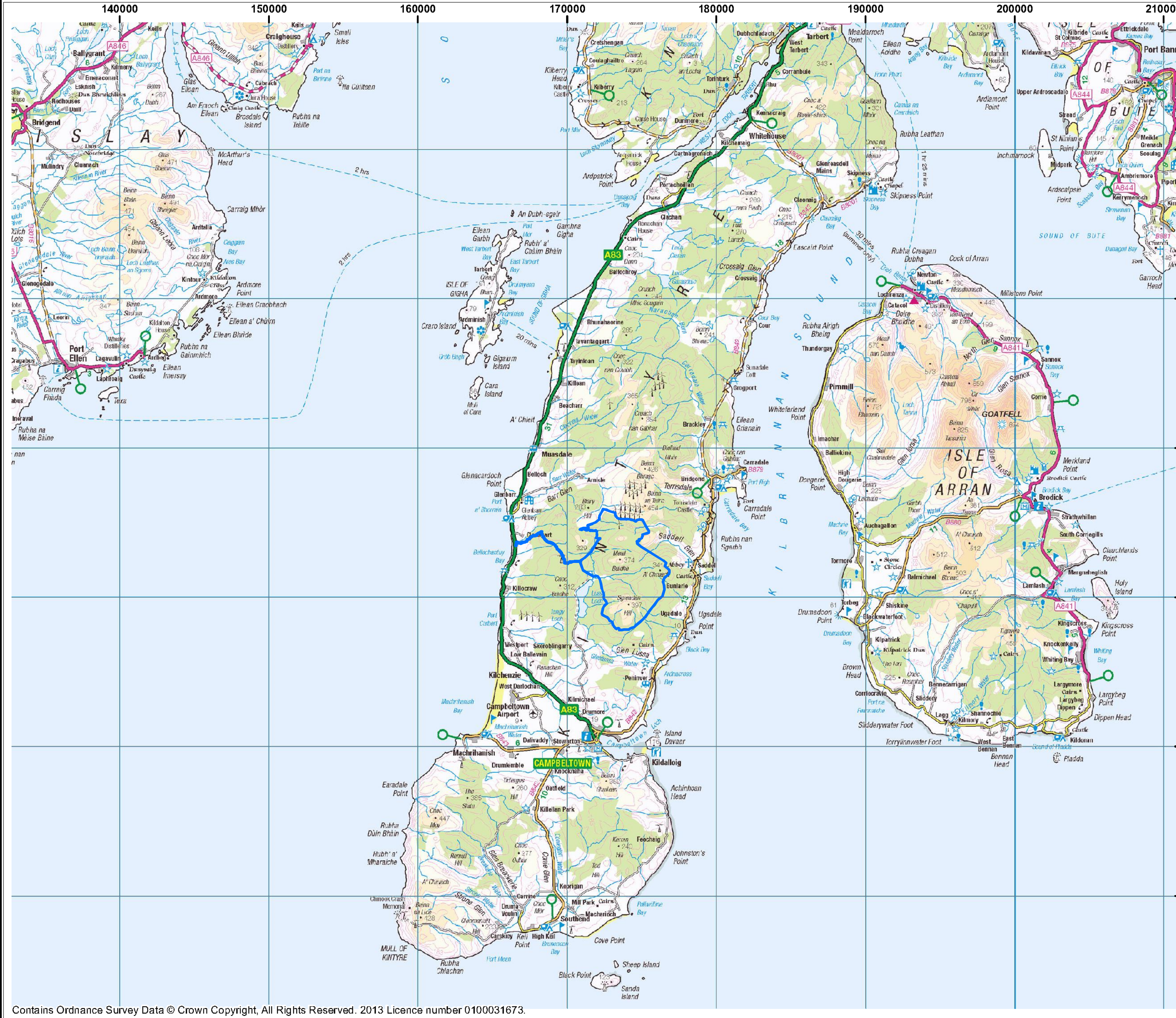
Figure 1 Site Location



Key:

Beinn an Tuirc Phase 3 Site Boundary

N

0 2.5 5 7.5 10 12.5 15

Kilometres

REVISION: B MXD: 004/g001

SCOTTISHPOWER RENEWABLES

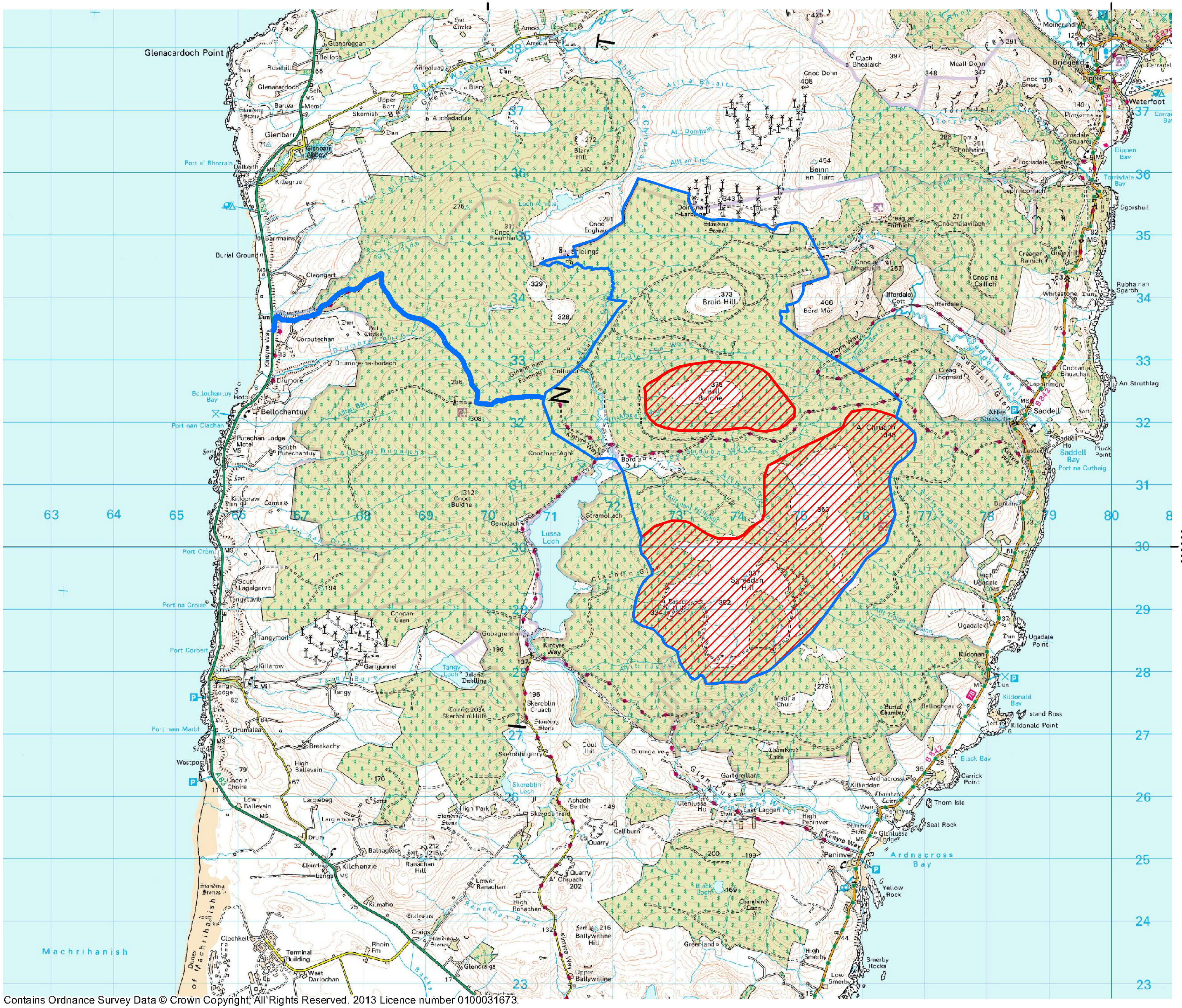
Beinn an Tuirc Phase 3

FIGURE 1
Site Location

SCALE 1:250,000 @ A3	PROJECT CODE JE30749
CONTENT JM	DRAWN JA
CHECKED JM	DATE 29/05/2013

SINCLAIR KNIGHT MERZ SKM ENVIROS

Figure 2 Indicative Turbine Development Area



Key:

- Beinn an Tuirc Phase 3 Site Boundary
- Indicative Turbine Development Area

N

0 1 2 3 4
Kilometres

REVISION: A   MXD: 004/g002

SCOTTISHPOWER RENEWABLES

Beinn an Tuirc Phase 3

FIGURE 2
Indicative Turbine Development Area

SCALE 1:60,000 @ A3	PROJECT CODE JE30749
CONTENT JM	DRAWN JA
CHECKED JM	DATE 29/05/2013

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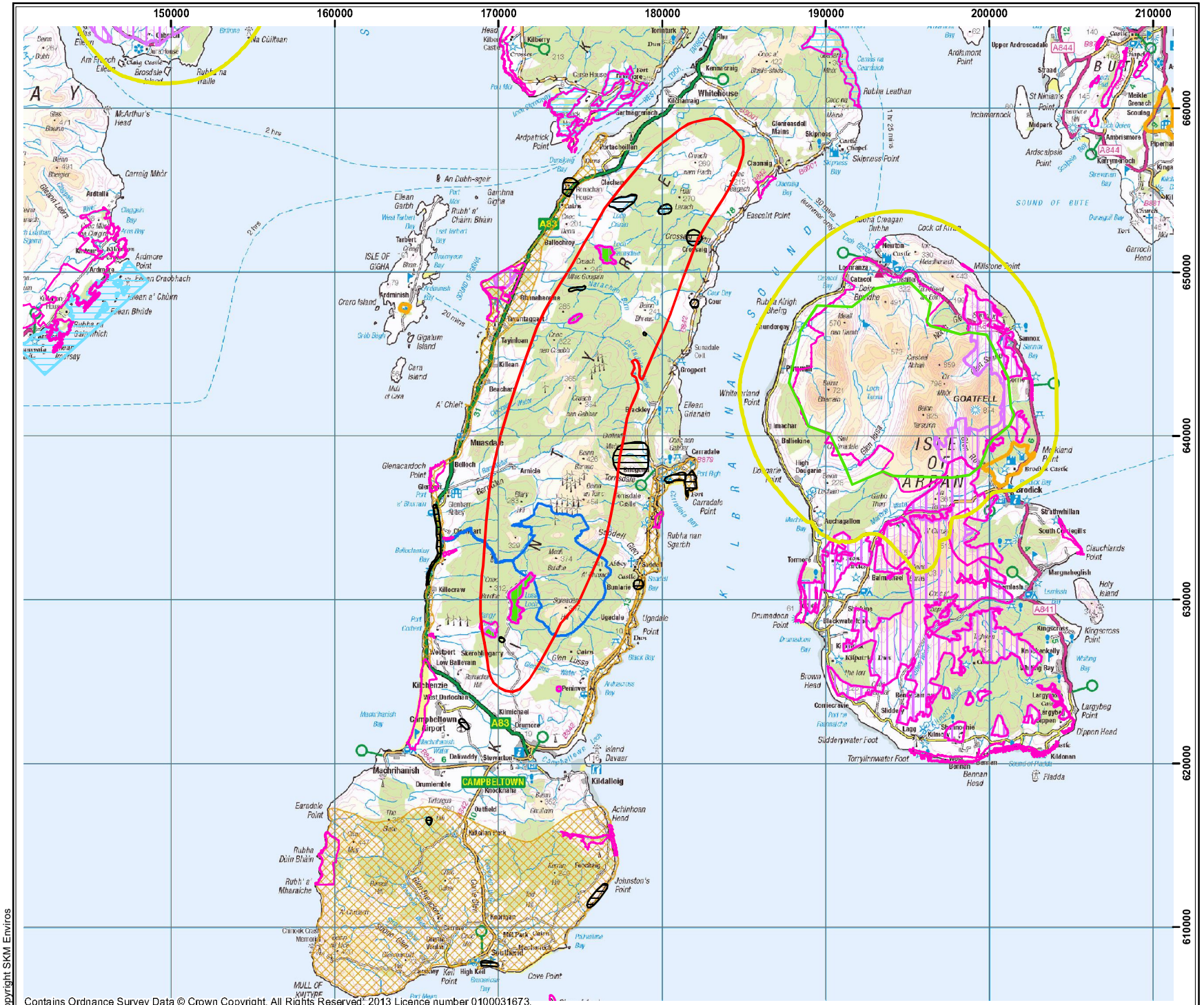
Figure 3 Statutory and Non Statutory Designations



Key:

- Broad Area Search Turbine Tip > 80m (Proposed Argyll and Bute Local Development Plan 2013)
- Wildland
- National Scenic Areas
- SSSI
- Special Protection Areas
- Special Areas of conservation
- RAMSAR
- (Argyll & Bute Local Plan 2009) Local Nature Conservation Site
- (Argyll & Bute Local Plan 2009) Area of Panoramic Quality
- Gardens and Designed Landscapes
- Beinn an Tuirc Phase 3 Site Boundary

N

0 5 10 15

Kilometres

REVISION: C MXD: 004/g003

SCOTTISHPOWER RENEWABLES

Beinn an Tuirc Phase 3

FIGURE 3
Statutory & Non Statutory Designations

SCALE	PROJECT CODE
1:225,000 @ A3	JE30749
CONTENT	DRAWN
JM	JA
CHECKED	DATE
JM	29/05/2013

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Figure 4 Cumulative Sites and Viewpoint Locations

Key:

- Viewpoint Locations
- Beinn an Tuirc Phase 3 - Site Boundary

Cumulative Windfarm Sites

- 1 - Beinn an Tuirc (Operational)
- 2 - Beinn an Tuirc Phase 2 (Approved & under Construction)
- 3 - Tangy (Operational)
- 4 - Tangy Ext.(Operational)
- 5 - Deucheran Hill (Operational)
- 6 - Gigha Community Windfarm (Operational)
- 7 - Allt Dearg (Operational)
- 8 - Cour (Approved and awaiting Construction)
- 9 - Blary Hill (In Scoping)
- 10 - Meall Mhor (Planning application submitted)
- 11 - Freasdale (Planning application submitted)
- 12 - Cnoc an Fleidh (In Scoping)
- 13 - Glen Barr (Planning application submitted)
- 14 - Creggan (In Scoping)

N

0 5 10 15

Kilometres

REVISION: D *MXD:* 004/g004

SCOTTISHPOWER RENEWABLES

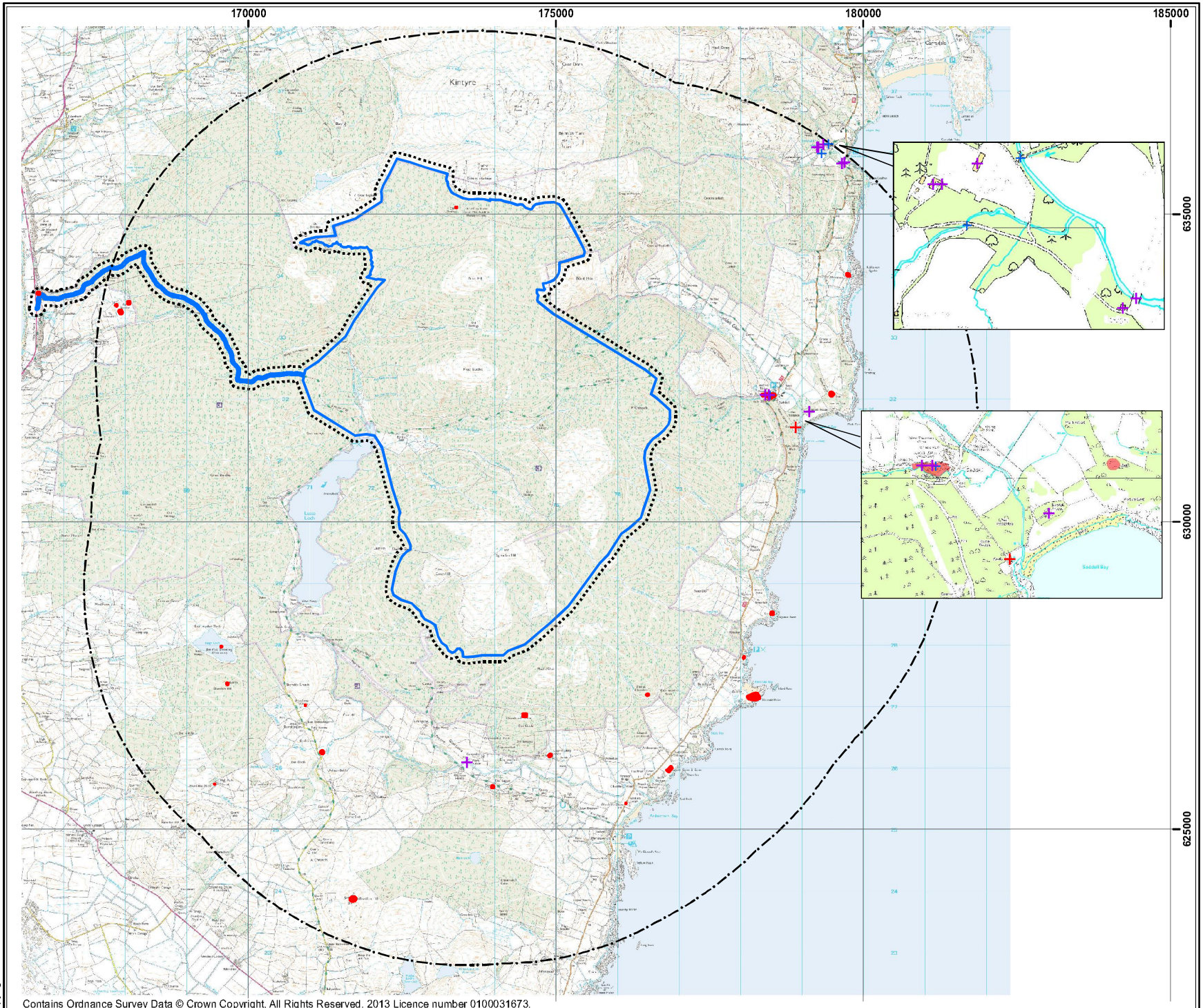
Beinn an Tuirc Phase 3

FIGURE 4
Cumulative sites & Viewpoint Locations

SCALE 1:250,000 @ A3	*PROJECT CODE* JE30749
CONTENT JM	*DRAWN* JA
CHECKED JM	*DATE* 29/05/2013

SINCLAIR KNIGHT MERZ SKM ENVIROS

Figure 5 Designated Cultural Heritage Assets



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Legend

Listed Building

- Category C(S) listed building
- Category B listed building
- Category A listed building
- Inner Study Area*
- Middle Study Area **
- Scheduled Monuments
- Beinn an Tuirc Phase 3 Site Boundary

* Extents 100m From the Site Boundary and Access

** Extents 5km From the Proposed Turbine Development Areas

N

0 1 2 3 4

Kilometres

REVISION: C *MXD:* 004/g006

SCOTTISHPOWER RENEWABLES

Beinn an Tuirc Phase 3

FIGURE 5
Designated Cultural Heritage Assets

SCALE 1:60,000 @ A3	*PROJECT CODE* JE30749
CONTENT JM	*DRAWN* JA
CHECKED JM	*DATE* 29/05/2013

SINCLAIR KNIGHT MERZ SKM ENVIROS

Annex 1 Year 1 Ornithology Report

2012

Beinn an Tuirc 3 Windfarm

Report on Ornithological Surveys 2011-2012

Natural Research Projects
Brathens Business Park,
Hill of Brathens, Glassel,
Banchory

AB31 4BY

08449060200

12/11/2012

Natural Research (Projects) Ltd. Company registered in Scotland: SC213640
Registered Office: 14 Carden Place, Aberdeen, AB10 1UR

Report Quality Assurance Log

Date	Version	Created by	Checked by
09/11/2012	1	Iain Mackenzie	Andrew Thorpe
12/11/2012	2	Iain Mackenzie	

BEINN AN TUIRC 3 WINDFARM – PROGRESS REPORT 2011-2012

Introduction

1. This report details the ornithological survey work undertaken by Natural Research Projects Ltd (NRP) at, and in the vicinity of, the site of the proposed Beinn an Tuirc 3 Windfarm from September 2011 to September 2012.

2. The objectives of study were to:

    - Map the distributions of breeding birds, including scarce species listed in Annex 1 of the EU Birds Directive (79/409/EEC) on the Conservation of Wild Birds 1979 (the Birds Directive) or Schedule 1 of the Wildlife and Countryside Act 1981 (WCA).
    - Quantify the level of bird flight activity by breeding, wintering, foraging and migratory birds of potential conservation importance.
    - Record the presence and abundance of other birds of conservation importance (those listed in Biodiversity Action Plans (BAP) or on the Red List of Birds of Conservation Concern (Eaton et. al 2009)) throughout the year.

Consultations

3. Since the proposals for a windfarm development in this area were not in the public domain during the survey period, no formal consultations were undertaken. However, Forestry Commission Scotland (FCS) staff have provided informal information on the locations of some sensitive bird species.

Field Survey Methods

4. Systematic field surveys reported here commenced on 15 September 2011 and continued until 29 September 2012. Surveys are currently on-going. Some birds range over large areas and are therefore potentially vulnerable to the effects of wind farm developments a considerable distance away. Accordingly, the site boundary, plus buffers of 500m, 1km, 1.5km and 2km around this, was surveyed between these dates, with buffer size dependent on the expected sensitivity of different species (Figure 1).

5. Some surveys overlapped with, and were informed by, survey and monitoring work being undertaken by NRP at the neighbouring Beinn an Tuirc 2 Windfarm (in construction) and the operational Beinn an Tuirc Windfarm. Relevant bird information from surveys undertaken at these sites is included here.

6. The field surveyors were K. Connelly, G. Connelly, P. Daw, C. Robson, B. Stakim and D. Walker. Field surveyors received extensive training prior to, and during, survey work. Training included aspects of navigation, the various survey methods, techniques to minimise fieldworker effects on bird detection, and the classification of bird behaviour. Training was provided irrespective of surveyors' previous experience. Emphasis was placed on the importance of carrying out surveys in a systematic and standardised way to enable direct comparison of data from different sites and survey periods.

Habitat assessment

7. Habitats within approximately 2km of the site boundary were evaluated in respect of their potential to support different bird species. The evaluation was based on the cover-type and structure of the vegetation and has greater relevance to bird distribution than Phase 1 or NVC mapping.

- Heath/Bog. Wet and dry dwarf shrub heathland with >25% ericoids (characterised by species such as *Calluna vulgaris*, *Vaccinium myrtillus*, and *Molinia caerulea*). Typically grazed by deer and low densities of sheep. Sub-class-
- Heath/bog with stands of tall heather (>0.4m) (HBT)
- Grass moor. (GM) Typically, unenclosed grass-dominated moor with <25% ericoids grazed by sheep. Characterised by species such as *Deschampsia flexuosa*, *Nardus stricta* and *Juncus squarrosus*, plus some fine grasses such as *Agrostis tenuis* and *Festuca ovina*. Stands of *Juncus* spp. and *Pteridium aquilinum* may occur.
- Grass pasture Typically, enclosed pastures that are more intensively managed than grass moors. Generally grazed by sheep or cattle for at least part of the year. Characterised by species such as *Deschampsia cespitosa*, *Festuca* spp., *Lolium perenne*. Sub-class –
- Recently improved pastures (IP) Grasslands that have been apparently drained, fertilised or re-seeded in recent times. Characterised by lush uniform green swards. Includes hay meadows.
- Plantation forest. Sub-classes –
    - Thicket, pole or high forest. (PO) Closed-canopy forest plantations. Characterised by absence of herb or shrub layer, except in rides between stands of trees and in small patches of unplanted ground or failed crop.

- Clear-fell (CF) Harvested plantation not yet restocked with trees. Characterised by limited development of herb and shrub layer, and brash and tree root-plates from the previous crop.
- Restocked pre-thicket forest (RS) Second rotation forest plantations before canopy closure. Characterised by varying herb and shrub layer development, and brash and tree root-plates from the previous crop. Much open space between lines of planting. Note that newly established second-rotation trees are not always obvious.

Flight activity

8. Information on bird flight activity was collected during timed watches from strategic generic vantage points (GVPs) using the methods described by Band et al. (2007). Eight GVPs were selected through a mix of GIS analysis and field trials, with the aim of maximising ground visibility within the flight activity survey area using the minimum number of points (Figure 2). During the baseline survey period, the flight activity survey area was defined by a 500m buffer around the site boundary enclosing an area of 2,360ha. Spatial coverage of this area from GVPs was 80% (Figure 2).

9. Observers at GVPs positioned themselves to minimise their effects on bird behaviour. A viewing arc not exceeding 180 degrees was scanned. Watches were undertaken during daylight hours by a single observer in a wide range of weather conditions, mainly in conditions of good ground visibility (> 2km) and when the cloud base was higher than the most elevated parts of the survey area.

10. GVP observations were stratified across three daylight periods (termed 'early', 'middle' and 'late') to allow for diurnal variation in activity rates. The timing of watches within each period was adjusted each month in accordance with sunrise and sunset times (Appendix 1). In total, at least 30 hours of observation was undertaken from GVPs relevant to the reporting area during the breeding period (April to August 2012), and at least 27 hours from each GVP during the non-breeding period (September 2011 to March 2012 and September 2012) (Table 1). A wide range of meteorological conditions were sampled, including rain and snow showers, cloud cover from 0-100% and wind speeds up to Beaufort F6. Data on weather conditions recorded during GVP observations are available upon request.

11. During each watch, three hierarchical recording methods were used, as follows:

- Focal bird sampling - timed. The viewing arc was scanned constantly until a *Target A Species*[1] was detected in flight. Once detected, the bird was followed until it ceased flying or was lost to view. The time the bird was initially detected and the time it spent within the flight activity survey area (to the nearest second) were recorded. The route followed by the bird was plotted in the field onto a 1:25,000 scale map, with the direction of flight indicated. Routes were plotted regardless of whether or not the bird was within the survey area. The bird's flying elevation above the ground was estimated at the point of detection and at 15 second intervals thereafter, using a countdown timer with an audible alarm. Flying elevation was classified as <10m, 10-30m, 30-50m, 50-100m, 100-150m, or >150m. Where simultaneous flight activity by a number of birds was observed and it was not possible to plot individual flight lines, areas of flight activity were plotted on the field maps.
- Focal bird sampling – untimed. The same scanning procedure as described above was used, but when a *Target B Species*[2] was detected, the flight was not timed. Instead, the flight path was mapped and flying elevation for segments of the flight was recorded, i.e. at the start and end of the flying bout and where changes in height occurred during the flying bout. Flying elevation was classified as above.
- Activity summaries. At the end of each 5-minute period, flight activity within the flight activity survey area by species of lesser conservation importance (*Secondary Species* – see Appendix 2*)* was summarised. The number of birds recorded in any one period was the minimum number of individuals that could account for the activity observed. The height, direction and number of individuals involved in notable bird movements (e.g. gull flights) were recorded.

12. Data were entered in the field onto recording sheets and later transferred to Excel spreadsheets. Maps of flight activity by *Target Species* were compiled for each watch. Each flying bout was numbered consecutively and cross-referenced to the relevant flight-path on the map. Summary maps were compiled for each species at the end of the season.

Migratory movements

13. Watches were undertaken from a single Migration Watch Point (MWP) which was located at GVP3, with the aim of recording movements by *Target B Species*, i.e. geese, swans and

[1] Target A species were drawn from those listed in Annex 1 of the Birds Directive and Schedule 1 of the WCA. See Appendix 2 for a full list.
[2] Target B species were migratory birds of conservation importance, in this instance swans, geese and certain waders. See Appendix 2 for a full list.

waders, over the Site and in the wider landscape (Figure 2). The MWP gave good broad spatial coverage in respect of birds moving on a predominantly north-south axis over the site plus the wider countryside. Observers also recorded *Target A Species* if seen, but would show preference to geese, swans and waders using the recording procedure for *Target B Species* described above.

14. During the autumn period, observations totalling 23 hours were undertaken in October and to November 2011 (Table 2). Some observations were conducted during conditions of low cloud or mist, as birds will continue to fly in these conditions. Such observations will primarily involve auditory records. A wide range of meteorological conditions were sampled, including rain and snow showers, cloud cover from 0 to 100% and wind speeds up to Beaufort F6. Data on weather conditions recorded during MWP observations are available on request.

Scarce breeding raptors and owls

15. Priority was given to detecting the species considered most likely to occur: hen harrier (*Circus cyaneus*), merlin (*Falco columbarius*), peregrine (*Falco peregrinus*), short-eared owl (*Asio flammeus*) and barn owl (*Tyto alba*). Site reconnaissance and habitat mapping along with NRP's own knowledge of the bird communities present in this area, identified areas suitable for breeding by some of these species and this information was used to prioritise effort within the relevant survey areas. The methods used are given below. These surveys complemented search effort accrued during the course of GVP watches of flight activity (see section on Flight Activity, above).

16. Systematic searches for golden eagles were not undertaken as knowledge of this species local status is known to NRP. All records of golden eagle were nonetheless compiled. Searches for hen harrier, merlin, peregrine and short-eared owl were undertaken within the 2km boundary; for barn owl, searches of suitable sites were focussed within the 1km survey boundary (Figure 1).

17. In addition to the generic vantage point watches, 74 hours were spent searching for evidence of scarce breeding raptors in 2012 (Table 3). Searches for merlin signs were also conducted along suitable forest edges during moorland bird surveys.

18. Hen harrier. Survey methods given in Hardey et al. (2009) were followed. Emphasis was given to searching habitats considered potentially suitable for nesting, in this case including areas of heath/bog with stands > 0.4m tall and suitable habitats within plantation forest.

19. Merlin. Survey methods in Hardey et al. (2009) were followed. Emphasis was given to the edges of closed canopy forestry plantations, old crow nests (which could be re-used by merlin), fence-posts, hummocks, grouse butts, boulders, stone dykes, bushes and trees, which were checked for signs of occupation (e.g. plucked prey, moulted feathers, pellets and faeces) and areas of heath/bog with stands > 0.4m tall.

20. Peregrine. Survey methods given in Hardey et al. (2009) were followed. Potential nest sites were searched in spring to look for the evidence of occupancy (presence of birds, faeces, fresh prey remains).

21. Short-eared owl. Survey methods given in Hardey et al. (2009) were followed. Suitable habitat was checked during April and May for evidence of hunting males, territorial activity and other signs of presence.

22. Barn Owl. Surveys methods given in Hardey et al. (2009) were followed. Systematic searches for potential nest and roost sites were undertaken in winter 2011/12 and summer 2012. Emphasis was placed on searching for birds, nests, pellets, feathers and faecal splash in potentially suitable buildings.

Moorland breeding birds

23. Breeding bird territories were surveyed in 2012 on the relatively small areas of open ground habitats within the 500m site boundary (Figure 1). The Brown and Shepherd (1993) method for surveying upland waders was modified to also provide reliable estimates for some breeding moorland passerines by undertaking some surveys during the first few hours of daylight (see below). All bird species listed in Appendix 2 were recorded with the addition of skylark (*Alauda arvensis*) (but see recording method for skylark below).

24. Most areas were visited at least four times between early April and mid June to allow for differences in detection rates between early and late breeding species. One small area of approximately 40ha in the northern part of the site was only visited twice. In 2012, surveys took place on 12, 14 and 21 April (visit 1); 20 April, 06 and 09 May (visit 2); 25, 27 and 28 May (visit 3) and; 18 and 19 June (visit 4). Fieldwork was not undertaken in conditions considered likely to affect bird detection, for example strong winds (greater than Beaufort Scale Force 4), persistent precipitation, poor visibility (less than 300 m), or in unusually hot or cold temperatures. Data on weather conditions recorded during moorland breeding bird surveys are available upon request.

25. The survey aimed to cover the ground systematically with a constant search effort. All suitable ground within the 500m survey boundary was approached closely, typically to within 100m. Isolated trees were examined carefully and ditches and streams were followed. Surveyors paused at regular intervals to scan and listen for calling and singing birds.

26. Careful attention was given to recording behaviour indicative of breeding and care was taken to avoid counting the same individual more than once. Where necessary, surveyors retraced their steps in order to check the continued presence of previously recorded birds.

27. The location of singing skylarks in a particular area was recorded during visit three only. Recording this highly visible species on only one visit (which presented the best timing and survey conditions to enable an accurate count) was considered to be sufficient to gain a reasonable estimate of the breeding territories of this species without impacting on recording other less visible or vocal species.

28. The location and activity of birds were mapped onto enlarged 1:25,000 scale OS maps using standard BTO codes (Marchant 1983). The position of each bird was mapped at the point it was first detected. The flight lines of birds seen flying over were recorded.

29. At the end of each visit, a summary map was compiled showing the location of each identified territory or breeding pair. The following evidence was considered diagnostic of breeding:

    - Song, courtship or territorial display.
    - Territorial dispute.
    - Nest building and hole excavation.
    - Agitated behaviour by adult bird(s) indicating the presence of a nearby nest or young (e.g. repetitive alarm calling, distraction display).
    - Adult(s) carrying food.
    - Presence of newly fledged young.
    - Adult(s) removing faecal sac.

30. Where a number of breeding individuals was present and it was not possible to determine the exact number of breeding pairs, registrations of individual birds were deemed to represent discrete breeding territories/pairs if the distance between them was more than 250m (200m in the case of small passerines). Whilst it is recognised that these distances are

arbitrary and the territory size varies both inter- and intra-specifically, this approach produces a standardised index of abundance based on the distance that members of a breeding pair are likely to move during the survey period. In cases where two individuals were considered to constitute a pair of birds, the location of the pair was placed centrally by convention.

31. Population estimates were derived by comparing the summary maps for the four survey visits. Territories plotted during each period were considered to be separate from one another if they were located more than 1000m apart (500m in the case of snipe (*Gallinago gallinago*), gamebirds, and ducks; 300m in the case of passerines). These distances were chosen arbitrarily to reflect the distances birds could plausibly move between survey dates. The locations of territories mapped in more than one survey period were plotted centrally.

Black grouse surveys

32. Suitable habitat within the 1.5km survey boundary was surveyed for displaying (lekking) male black grouse in April and May 2012 (Figure 1). Survey methods were based on those in Gilbert et al. (1998) and care was taken to avoid disturbing birds.

33. In areas which were identified as being potentially suitable for display by black grouse, two visits were undertaken within two hours of dawn to locate leks. In 2012, visits were conducted in calm dry weather with good visibility on 20, 28 and 29 April and on 06, 09 and 15 May (Table 4). Observers watched and listened for lekking birds from a number of suitable vantage points. Data on weather conditions recorded during black grouse surveys are available upon request.

34. During the autumn and winter, evidence of occupation by black grouse (e.g. feathers and faecal droppings) was noted during the walked transects (see below).

Autumn/winter walked transects

35. Walk-over surveys were undertaken between September 2011 and March 2012 and in September 2012. These were designed to complement surveys of breeding birds undertaken during the spring and summer (see above), and occurred mainly within the 500m survey boundary (Figure 1).

36. Walk routes meandered to closely examine as much ground as practical, in particular features of potential ornithological importance such as woodland edges, rocky outcrops and

streams. Where practicable, observers used a different route on each visit to maximise the eventual spatial coverage. Observers frequently paused to scan for birds.

37. Forty-seven walked transects, totalling 94 hours, were undertaken (Table 5). A range of meteorological conditions were sampled, although wind speeds above Beaufort F5 were avoided to improve aural detection of species. Data on weather conditions recorded during autumn/winter walked transects are available upon request.

38. The walked transects were effectively mobile VP watches. The procedure employed was as follows:

    - For *Target A* and *B Species* the time each individual was first detected was recorded along with details of age, sex and behaviour. These details were cross-referenced to a 1:25,000 scale map where the location and/or flight route were plotted.
    - For all other recordable species (see Appendix 2), the number of individuals was recorded and locations they were first detected were plotted on the map.

Field Survey Results

Habitat assessment

39. The majority of the habitat within the 2km buffer of the site is plantation woodland, mainly pole-stage but with some areas of recent planting and clear-fell. There are several discrete areas of heather and bog habitat surrounded by forestry and some of the southern, eastern and south-eastern margins of the area support areas of grass moor and rough pasture. There is one freshwater loch and numerous water courses.

Wildfowl

Occurrence and status

40. Whooper swan (*Cygnus cygnus*) (Annex 1 and Schedule 1 species) was recorded over the 2011/12 winter. Greenland white-fronted goose (*Anser albifrons flavirostris*) (Annex 1) was recorded during the autumn migration period and over the winter of 2011/12. Greylag goose (*Anser anser*) was present during the non-breeding season of 2011/12. A single barnacle goose (*Branta leucopsis*) (Annex 1) was recorded during the spring migration period in 2012, but this was considered to be a feral bird. Red-throated diver (*Gavia stellata*) (Annex 1 and Schedule 1) was recorded in the breeding season of 2012.

Abundance and distribution

41. During all surveys combined, three flights by whooper swan were recorded, numbering a total of 23 birds.

42. During all surveys combined, 41 Greenland white-fronted goose flights were recorded totalling 1,888 birds. All but one of these records came from the vicinity of Lussa Loch to the west of the site. Five greylag goose flights totalling 37 birds were recorded, over Lussa Loch and in the north of the site. The flight by the barnacle goose was over Lussa Loch.

43. A single red-throated diver was recorded flying over and then landing on Lussa Loch.

Flight Activity – Generic Vantage Point Watches during the non-breeding season

44. Two whooper swan flights, of two and sixteen birds, were recorded at heights ranging from 50 to >150m (Figure 3; Tables 6 & 7).

45. Thirty-two Greenland white-fronted goose flights numbering 1,085 birds were recorded flying at between 0 and >150m (Figure 3; Tables 6 & 7).

46. Five greylag goose flights numbering 37 birds were recorded at between 10 and 100m elevation above the ground (Figure 3; Tables 6 & 7).

47. A single flight by one unidentified grey goose was recorded at >150m (Tables 6 & 7).

Flight activity – Generic Vantage Points during the breeding season.

48. A single flight by a barnacle goose was recorded at 30 – 50m in spring 2012 (Figure 4; Tables 6 & 7).

49. A single flight by a red-throated diver was recorded in July 2012, lasting a total of 92 seconds (s) at between 10 and 100m (Figure 4; Tables 6 & 7).

Additional flight records – non-breeding season

50. Eight flights by a total of 748 Greenland white-fronted geese were recorded incidentally in the non breeding season. All but one of these flights was recorded over Lussa Loch, and the remaining flight was an auditory record from the middle of the site.

51. A flight by five whooper swans was recorded incidentally to the north-west of the site.

52. No wildfowl flights were recorded during migration watches.

Scarce raptors and owls

Occurrence and Status

53. Four species of scarce raptor were recorded: white-tailed eagle, hen harrier, golden eagle and osprey. Two scarce owl species were recorded: short-eared owl and barn owl.

54. White-tailed eagle (Annex 1 and Schedule 1) was recorded once in the non-breeding season (winter 2012). No evidence of breeding by white-tailed eagle was recorded during baseline surveys.

55. Hen harrier (Annex 1 and Schedule 1) was recorded in the breeding and non-breeding seasons. Hen harriers bred within 2km of the site. A nest was not located; however, evidence of a successful nesting attempt came from sightings of recently fledged young and adults in suitable nesting habitat (Confidential Figure).

56. Golden eagle (Annex 1 and Schedule 1) was recorded in the breeding and non-breeding seasons. There is a known golden eagle breeding location approximately 6km from the site and an adult pair nested successfully there in 2012, rearing a single chick. Golden eagles from this breeding location are not known to regularly forage within the BAT3 site (NRP, unpublished data) and none of the golden eagle records from baseline surveys were identified as individuals from this pair.

57. Osprey (Annex 1 and Schedule 1) was recorded once in the breeding and once in the non-breeding season (spring 2012). No evidence of breeding by osprey was obtained during baseline surveys.

58. Short-eared owl (Annex 1 and Schedule 1) was recorded during the breeding and non-breeding seasons. There was no evidence of breeding obtained during baseline surveys.

59. Barn owl (Schedule 1) was recorded in the breeding season, with evidence of a probable nesting attempt. However, this was more than 1km from the site (Confidential Figure).

Abundance and Distribution

60. In January 2012, a single flight by a sub-adult white-tailed eagle was recorded incidentally to the west of the site.

61. In all surveys combined during the non-breeding season of 2011/12 and in September 2012, single hen harriers were recorded on 38 occasions. Records came from throughout the site extending to around 1km from the site boundary. In all surveys combined during the 2012

breeding season, 48 records of single hen harriers were obtained from throughout the site, extending to 2km from the site boundary and a family group were recorded together once.

62. In all surveys combined, there were eight golden eagle records, all of single birds, in the non-breeding season. These were recorded from all across the site but mainly in the north. In the breeding season, there were three records from the middle of the site.

63. In the non-breeding season (March 2012) and breeding season (June 2012), single ospreys were recorded fishing over Lussa Loch to the west of the site.

64. Single short-eared owls were recorded on four occasions in the non-breeding season in the southern and eastern parts of the site. In the breeding season, short-eared owls were recorded twice in the northern and southern parts of the site.

65. A single pair of barn owls was recorded on one occasion, approximately 1.5km to the west of the site.

Flight Activity from GVPs – non-breeding season (September2011 to March 2012 and September 2012)

66. Thirty-one hen harrier flights, all by single birds, were recorded lasting a total of 6,223s. Of this time, 3228s was at <10m, 1,088s was at 10 – 30m, 572s was at 30 – 50m, 360s was at 50 – 100s, 230s was at 100 – 150m and 744s was at >150m (Figure 5; Tables 6 & 7).

67. Six golden eagle flights, all by single birds, were recorded, lasting a total of 2,264s. Of this, 258s was at 10 – 30m, 167s was at 30 – 50m, 369s was at 50 – 100m, 155s was at 100 – 150m and the remaining 1,315s was at >150m (Figure 5; Tables 6 & 7).

68. Two flights by single short-eared owls were recorded, lasting a total of 223s. All this time was at below 10m (Figure 5; Tables 6 & 7).

Flight Activity from GVPs – breeding season (April - August)

69. Forty-eight flights by single hen harriers were recorded lasting a total of 7,377s. Of this time, 3754s was at <10m, 1548s was at 10 – 30m, 1105s was at 30 – 50m, 816s was at 50 – 100m, 77s was at 100 – 150m and 77s was at >150m (Figure 4; Tables 6 & 7).

70. Two golden eagle flights by single birds were recorded, lasting a total of 373s. Of this time, 17s was at <10m, 67s was at 10 – 30m, 61s was at 100 – 150m and the remaining 228s was at >150m (Figure 4; Tables 6 & 7).

71. One osprey flight was recorded lasting 141s, with all this time spent at 30 – 50m (Figure 4; Tables 6 & 7).

72. Two short-eared owl flights by single birds were recorded, lasting a total of 162s. All this time was at below 10m (Figure 4; Tables 6 & 7).

Additional flight records – non-breeding season (September 2011 to March 2012 and September 2012)

73. A single flight by a white-tailed eagle was recorded incidentally.

74. Eight hen harrier flights were recorded incidentally during winter transects in the non-breeding season (Table 5).

75. A single golden eagle flight was recorded during a migration watch (Table 8).

76. Two short-eared owl flights were recorded during winter transects (Table 5).

Additional flight records – breeding season (April to August)

77. Six hen harrier flights were recorded incidentally or during scarce breeding bird surveys.

Waders

Occurrence and Status

78. One species of wader of conservation concern was recorded during surveys: golden plover. Two other species, woodcock and snipe were also recorded.

Abundance and Distribution

79. Golden plover was present during the non-breeding season of 2011/12 and in September 2012 and was also recorded on migration during the breeding season of 2012. There were no breeding records.

80. Woodcock was present in the non-breeding season of 2011/12 only.

81. Snipe were present in the non-breeding season of 2011/12 only.

Flight Activity from GVPs – non-breeding season (September 2011 to March 2012 and September 2012)

82. A single golden plover was recorded flying at less than 10m (Tables 6 & 7).

Flight Activity from GVPs –breeding season (April to August)

83. Two golden plover flights, totalling 29 birds were recorded at 0 – 30m elevation above the ground (Figure 4; Tables 6 & 7).

Black grouse

Occurrence and Status

84. Black grouse were recorded in the breeding and non-breeding seasons.

Abundance and Distribution

85. During dedicated surveys for lekking black grouse, a maximum of eleven males were recorded displaying at six locations; four leks of one bird, one lek of two birds and one lek of five birds. All of these leks were within the 1500m buffer of the site (Figure 6; Table 4).

86. Signs or additional incidental sightings of black grouse were also recorded at some of these locations and at several other locations. Two records were of single males and there was one female recorded.

Flight Activity from GVPs – non-breeding season (September 2011 to March 2012 and September 2012)

87. A single flight by a male black grouse was recorded in November 2011, lasting 14s and all below 10m elevation above the ground (Tables 6 & 7).

Additional breeding and wintering bird records

Occurrence and Status

88. Two species recorded in the 500m buffer of the site during moorland breeding bird surveys in 2012 are considered of conservation concern: red grouse (*Lagopus lagopus scoticus*) and skylark. Of the species recorded during the autumn/winter transects, red grouse, dunnock (*Prunella modularis*), song thrush (*Turdus philomelos*), twite (*Carduelis flavirostris*), lesser redpoll (*Carduelis cabaret*), bullfinch (*Pyrrhula pyrrhula*), crossbill (*Loxia curvirostra*) and reed bunting (*Emberiza schoeniclus*) are considered of conservation concern (Table 5).

Relative Abundance

89. During the 2012 moorland bird survey, 21 red grouse territories were recorded in addition to ten singing skylarks. These species were recorded throughout the open ground within the site (Figure 7; Table 9).

Additional flight records

Occurrence

Kestrels (*Falco tinnunculus*), ravens (*Corvus corax*) and buzzards (*Buteo buteo*) were recorded frequently during GVPs in the breeding and non-breeding seasons and sparrowhawks (*Accipiter nisus*) were recorded occasionally. Grey heron (*Ardea cinerea*), cormorant (*Phalacrocorax carbo*) and cuckoo (*Cuculus canorus*) were recorded occasionally during GVPs (Table 6).

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Appendix 1: Recording periods used in the diurnal stratification of GVP watches

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Early VPs finish/middle VPs begin	09:30	09:00	08:30**	08:30	07:45	07:30	08:00	08:30	09:00	09:30*	09:00	09:30
Middle VPs finish/late VPs begin	15:00	16:00	16:30**	18:00	19:00	19:00	19:00	18:30	17:30	16:30*	15:00	14:30
	GMT	GMT	GMT	BST	BST	BST	BST	BST	BST	BST	GMT	GMT

* This time is BST. When clocks changed time was kept in line with this, within month. ** This time is GMT. When clocks changed time was kept in line with this, within month.

Appendix 2: Bird species recorded during NRP surveys

SPECIES RECORDED FOR ASSESSMENT OF FLIGHT ACTIVITY			Additional species (e.g. breeding and/or wintering
Target A species	**Target B species**	**Secondary species**	
Diver species	Whooper swan	Cormorant	Tree pipit
Common Scoter	Greylag goose	Grey heron	Dunnock
White-tailed eagle	Barnacle goose	Kestrel	Song thrush
Golden eagle	White-fronted goose	Buzzard	Grasshopper warbler
Hen harrier	Pink-footed goose	Sparrowhawk	Wood warbler
Goshawk	Brent goose	Red grouse	Spotted flycatcher
Red kite	Bean goose	Grey partridge	Marsh tit
Osprey	Golden plover	Lapwing	Willow tit
Merlin	Dunlin	Redshank	Crested tit
Peregrine	Greenshank	Common sandpiper	Starling
Hobby	Whimbrel	Oystercatcher	House sparrow
Barn owl	Curlew	Snipe	Tree sparrow
Short-eared owl	Wood sandpiper	Woodcock	Linnet
Black grouse	Tern species	Herring gull	Twite
Capercaillie	Arctic skua	Cuckoo	Lesser redpoll
Nightjar	Great skua	Ring ouzel	Crossbill species
Chough		Raven	Bullfinch
(Other rare raptors)		(Any flocks >30)	Hawfinch
			Yellow hammer
			Reed bunting
			Corn bunting
			Mute swan
			Mallard
			Goosander
			Teal

TABLES

Table 1. Survey hours for generic vantage points

GVP number	Early, middle or late	2011				2012									
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1	E		1.00	1.00	1.00	1.00	1.00		1.50	1.50	1.50	1.50	1.50		**12.50**
	M		3.50	3.00	2.50	3.00	3.50	4.00	4.50	5.00	6.00	5.00	4.50	5.00	**49.50**
	L		1.00	1.00	1.00	1.00	2.50		1.50	1.50	1.50		1.50		**12.50**
Total			**5.50**	**5.00**	**4.50**	**5.00**	**7.00**	**4.00**	**7.50**	**8.00**	**9.00**	**6.50**	**7.50**	**5.00**	**74.50**
2	E		1.00	1.00	1.00	1.00	1.00	1.50	1.50	1.50	1.50	1.50	1.50		**14.00**
	M		3.50	3.00	2.50	3.00	3.50	3.00	4.50	5.00	5.00	5.00	4.50	3.00	**45.50**
	L		1.00	1.00	1.00	1.00	1.00		1.50	1.50	1.50	1.50	1.50		**12.50**
Total			**5.50**	**5.00**	**4.50**	**5.00**	**5.50**	**4.50**	**7.50**	**8.00**	**8.00**	**8.00**	**7.50**	**3.00**	**72.00**
3	E		1.00	1.00	1.00	1.00	1.00		1.50	1.50	1.50	1.50			**11.00**
	M		4.00	3.00	2.50	3.00	3.50	4.00	8.00	5.00	3.50	5.00	2.50	2.50	**46.50**
	L		1.00	1.00	1.00	1.00	1.00		1.50	1.50	1.50	1.50			**11.00**
Total			**6.00**	**5.00**	**4.50**	**5.00**	**5.50**	**4.00**	**11.00**	**8.00**	**6.50**	**8.00**	**2.50**	**2.50**	**68.50**
4	E		1.00	1.00	1.00	1.00			1.50	1.50		1.50	1.50		**10.00**
	M		3.50	3.00	2.50	1.50	5.00	2.83	5.00	5.00	3.00	5.00	3.00	3.00	**42.33**
	L		1.00	1.00	1.00	1.00	1.00			1.50		1.50			**8.00**
Total			**5.50**	**5.00**	**4.50**	**3.50**	**6.00**	**2.83**	**6.50**	**8.00**	**3.00**	**8.00**	**4.50**	**3.00**	**60.33**
5	E		1.00	1.00	1.00	1.00				1.50	1.50	1.50			**8.50**
	M		3.50	3.00	2.50	3.00	3.00	3.00	4.50	5.00	5.00	5.00		3.00	**40.50**
	L		1.00	1.00	1.00	1.00			1.50	1.50	1.50	1.50			**10.00**
Total			**5.50**	**5.00**	**4.50**	**5.00**	**3.00**	**3.00**	**6.00**	**8.00**	**8.00**	**8.00**		**3.00**	**59.00**
6	E		1.00	1.00	1.00	1.00	1.00		1.50	1.50		1.50			**9.50**
	M		3.50	3.00	2.50	3.00	3.50	3.00	7.50	5.00	3.67	5.00		3.00	**42.67**
	L		1.00	1.00	1.00	1.00	1.00			1.50	1.50	1.50			**9.50**

GVP number	Early, middle or late	2011				2012									
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Total			**5.50**	**5.00**	**4.50**	**5.00**	**5.50**	**3.00**	**9.00**	**8.00**	**5.17**	**8.00**		**3.00**	**61.67**
7	E		1.00	1.00	1.00	1.00	1.00	1.50	1.50	1.50	1.50	1.50	1.50		**14.00**
	M	3.00	3.50	3.00	2.50	3.00	3.50	4.00	3.00	5.00	5.00	5.00	4.50	5.00	**50.00**
	L		1.00	1.00	1.00	1.00	1.00	1.50	1.50	1.50	1.50	1.50	1.50		**14.00**
Total		**3.00**	**5.50**	**5.00**	**4.50**	**5.00**	**5.50**	**7.00**	**6.00**	**8.00**	**8.00**	**8.00**	**7.50**	**5.00**	**78.00**
8	E		1.00	1.00	1.00	1.00	1.00		1.50	1.50	1.50	1.50			**11.00**
	M	2.50	3.50	3.00	2.50	4.50	3.50	2.00	4.50	5.00	5.00	5.00	4.50	5.00	**50.50**
	L		1.00	1.00	1.00	1.00	1.00	1.50	1.50	1.50	1.50	1.50	1.50		**14.00**
Total		**2.50**	**5.50**	**5.00**	**4.50**	**6.50**	**5.50**	**3.50**	**7.50**	**8.00**	**8.00**	**8.00**	**6.00**	**5.00**	**75.50**
Grand Total		**5.50**	**44.50**	**40.00**	**36.00**	**40.00**	**43.50**	**31.83**	**61.00**	**64.00**	**55.67**	**62.50**	**35.50**	**29.50**	**549.50**

Table 2. Survey hours for migration watches

	2011 hours		
MWP name	**Oct**	**Nov**	**Grand Total**
MWPA	14.00	9.00	**23.00**

Table 3. Scarce breeding bird survey hours

Date	Observer	Time in field (hrs)
04/04/2012	DGW	2.00
22/04/2012	DGW	3.00
24/04/2012	DGW	3.00
21/04/2012	DGW	1.00
20/04/2012	DGW	3.50
28/04/2012	DGW	1.00
08/05/2012	DGW	2.00
05/05/2012	DGW	1.50
18/05/2012	DGW	4.00
30/05/2012	GC	4.00
29/05/2012	GC	4.50
29/05/2012	KC	4.25
30/05/2012	KC	4.50
20/06/2012	GC	2.75
08/06/2012	DGW	3.00
09/06/2012	DGW	5.00
18/06/2012	DGW	1.00
09/07/2012	CRR	1.25
09/07/2012	CRR	1.25
14/07/2012	CRR	2.00
21/07/2012	CRR	1.16
21/07/2012	CRR	0.75
30/07/2012	DGW	3.00
29/07/2012	DGW	6.00
28/07/2012	DGW	2.00
19/07/2012	DGW	3.00
16/07/2012	DGW	3.50
Total		**73.91**

Table 4. Black grouse survey, field survey hours and observations

Date	Time in field (hrs)	Observer	Results
29/04/2012	2.17	DGW	1 male displaying
28/04/2012	2.00	CRR	2 males displaying; 2 different locations
20/04/2012	2.00	DGW	1 male displaying
28/04/2012	1.50	DGW	7 males displaying; 3 different locations
09/05/2012	1.42	DGW	1 male displaying
06/05/2012	1.75	DGW	1 male displaying
15/05/2012	2.00	DGW	3 males displaying; 2 different locations
Total	**12.83**		

Table 5. Autumn/winter transects - surveys hours and results

Months	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Sep**
Hours in field	**32.50**	**11.92**	**8.00**	**10.00**	**11.00**	**8.00**	**8.75**	**4.50**
Species – number recorded or signs of presence								
Bullfinch		1	2	1		2		
Black grouse	3 & signs	1			1		Signs	
Buzzard			2	1				2
Crossbill		10	18	Signs	13	8		
Dunnock			2					Signs
Golden eagle	Signs	Signs						
Golden plover					Signs			
Grey heron			1					
Hen harrier	1		1	1				
Kestrel				1	1	2		
Lesser redpoll								11
Reed bunting			Signs					
Red grouse	3	18 & signs	18	18	14	12	2	2
Raven		3	3	1		Signs		2
Short-eared owl				1 & signs	1 & signs			
Sparrowhawk						1		
Snipe		1		1				
Song thrush						1		
Tawny owl				1				
Twite					1			
Woodcock				2	7			

Birds listed in Annex 1 of the Birds Directive or Schedule 1 of the WCA are shown in bold. Red-listed birds of Conservation Concern and Biodiversity Action Plan (BAP) species are shown in italics.

Table 6. Occurrence of species during generic vantage point surveys

Species	Target species	Total occurrences	% Occurrence*
Buzzard		399	6.05
Raven		337	5.11
Kestrel		161	2.44
Hen harrier	A	111	1.68
Red grouse		38	0.58
Greenland white-fronted goose	B	26	0.39
Heron		23	0.35
Cuckoo		23	0.35
Cormorant		19	0.29
Sparrowhawk		17	0.26
Golden eagle	A	16	0.24
Barnacle goose	B	10	0.15
Golden plover	B	7	0.11
Greylag goose	B	5	0.08
Curlew	B	5	0.08
Short-eared owl	A	4	0.06
Whooper swan	B	3	0.05
Grey goose spp.	B	2	0.03
Herring gull		2	0.03
Oystercatcher		2	0.03
Black grouse	A	1	0.02
Fieldfare		1	0.02
Woodcock		1	0.02
Teal		1	0.02
Finches		1	0.02
Osprey	A	1	0.02
Red throated diver	A	1	0.02
Crossbill		1	0.02
Snipe		1	0.02

* The percentage of 5-min recording periods in which each species was encountered during watches from all VPs (n=6594) is shown. Birds listed in Annex 1 of the Birds Directive or Schedule 1 of the WCA are shown in bold. Red-listed birds of Conservation Concern and Biodiversity Action Plan (BAP) species are shown in italics

Table 7. Flight activity from generic vantage points

Species	Season	GVP number	No. of flights	No. of birds	Duration	Duration (s) or presence (*) in height band					
						<10m	10-30m	30-50m	50-100m	100-150m	>150m
Whooper swan	Sep-Mar	5	1	2		*	*				
		6	1	16				*	*	*	
Whooper swan Total			**2**	**18**							
Greenland white-fronted goose	Sep-Mar	5	1	2							*
		7	27	1057		*	*	*	*	*	*
		8	4	26		*	*	*	*	*	*
Greenland white-fronted goose Total			**32**	**1085**							
Greylag goose	Sep-Mar	2	1	9					*		
		3	1	4		*					
		7	2	15			*	*			
		8	1	9					*		
Greylag goose Total			**5**	**37**							
Barnacle goose	Apr-Aug	8	1	1				*			
Barnacle goose Total			**1**	**1**							
Grey goose	Sep-Mar	3	1	1							*
Grey goose Total			**1**	**1**							
Black grouse	Sep-Mar	5	1	1	14	14					
Black grouse Total			**1**	**1**	**14**	**14**					
Red-throated diver	Apr-Aug	8	1	1	92		15.33	15.33	61.33		
Red-throated diver Total			**1**	**1**	**92**		**15.33**	**15.33**	**61.33**		
Hen harrier	Apr-Aug	1	3	3	311	245.00		66.00			
		2	2	2	225	132.86	92.14				
		3	3	3	514	33.86	328.24	91.14	60.76		
		4	14	14	2512	788.79	385.34	665.57	518.76	76.77	76.77
		5	17	17	2526	1613.97	620.46	155.17	136.40		
		6	2	2	268	268.00					

Species	Season	GVP number	No. of flights	No. of birds	Duration	Duration (s) or presence (*) in height band					
						<10m	10-30m	30-50m	50-100m	100-150m	>150m
		7	3	3	691	469.89	15.16	104.95	101.00		
		8	4	4	330	201.64	106.36	22.00			
	Sep-Mar	1	5	5	948	407.54	156.94	337.59	45.93		
		2	1	1	33	33.00					
		3	10	10	2498	1522.27	334.36	77.81	94.24	30.97	438.36
		4	2	2	111	111.00					
		5	4	4	1173	92.73	312.46	76.48	186.62	199.26	305.45
		6	2	2	73	73.00					
		8	7	7	1387	988.37	284.69	80.61	33.33		
Hen harrier Total			**79**	**79**	**13600**	**6981.91**	**2636.15**	**1677.32**	**1177.04**	**307.00**	**820.59**
Golden eagle	Apr-Aug	5	1	1	289					60.84	228.16
		6	1	1	84	16.80	67.20				
	Sep-Mar	1	2	2	879		227.45	166.80	242.13	45.49	197.13
		2	1	1	55				36.67	18.33	
		3	1	1	317				90.57	60.38	166.05
		6	1	1	675						675.00
		8	1	1	338		30.73			30.73	276.55
Golden eagle Total			**8**	**8**	**2637**	**16.80**	**325.38**	**166.80**	**369.37**	**215.77**	**1542.88**
Osprey	Apr-Aug	8	1	1	141			141.00			
Osprey Total			**1**	**1**	**141**			**141.00**			
Golden plover	Apr-Aug	6	2	29		*	*				
	Sep-Mar	6	1	1		*					
Golden plover Total			**3**	**30**							
Short-eared owl	Apr-Aug	1	1	1	157	157.00					
		5	1	1	5	5.00					
	Sep-Mar	6	2	2	223	223.00					
Short-eared owl Total			**4**	**4**	**385**	**385.00**					

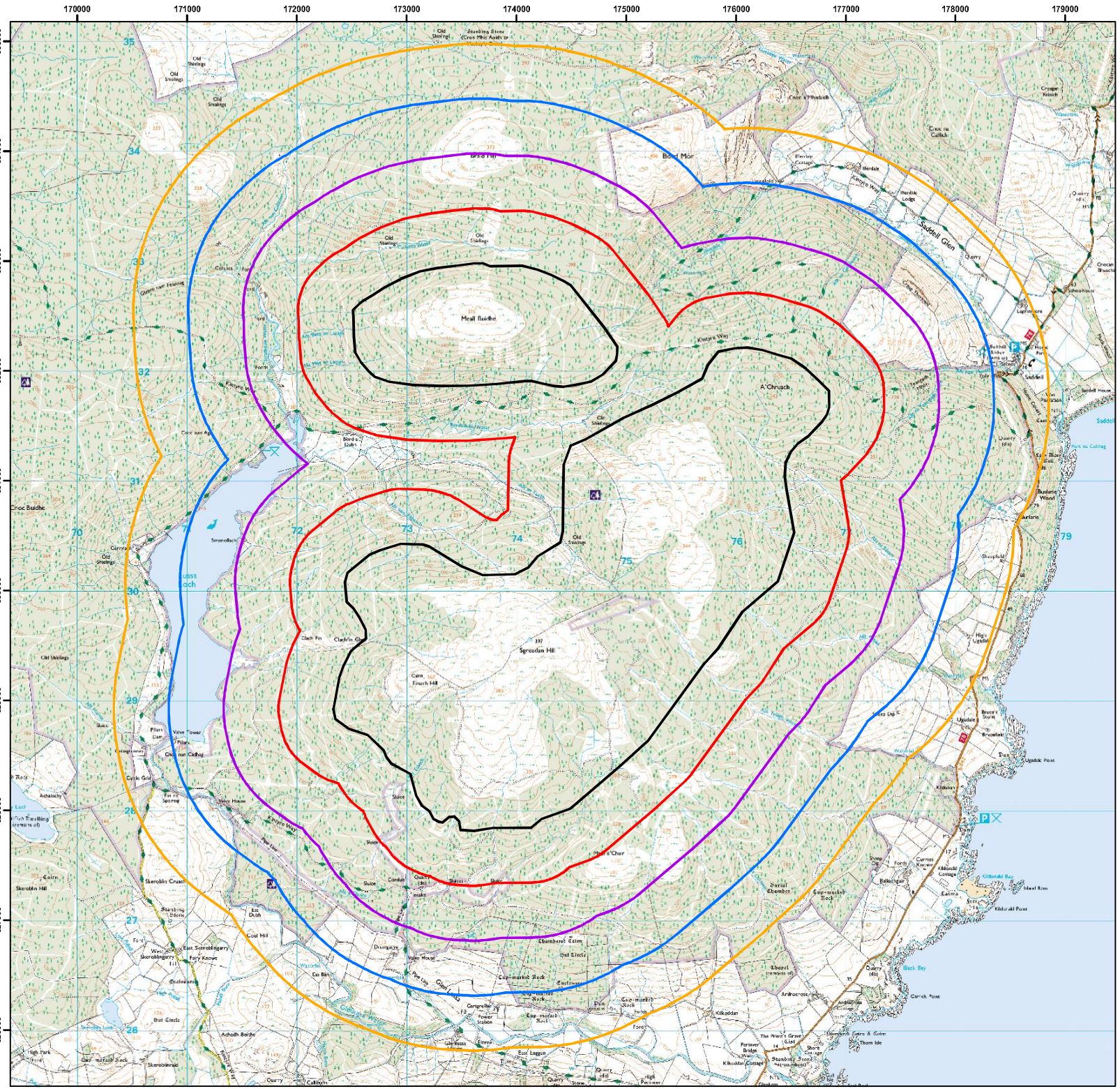
Birds listed in Annex 1 of the Birds Directive or Schedule 1 of the WCA are shown in bold. Red-listed birds of Conservation Concern and Biodiversity Action Plan (BAP) species are shown in italics.

Table 8. Percentage occurrence of species during migration watches

Species	Target species	Total occurrences	% Occurrence*
Golden eagle	A	2	0.72
*The percentage of 5-min recording periods in which each species was encountered during watches from MWP (n=276) is shown. Birds listed in Annex 1 of the Birds Directive or Schedule 1 of the WCA are shown in bold.			

Table 9. Breeding bird territories

Species	Confirmed breeding	Probable breeding
Red grouse	21	-
Skylark	10	-
Red-listed birds of Conservation Concern and Biodiversity Action Plan (BAP) species are shown in italics		



NATURAL RESEARCH PROJECTS LIMITED

Legend

- Site boundary
- 500m buffer
- 1km buffer
- 1.5km buffer
- 2km buffer

Date produced: 08/11/12

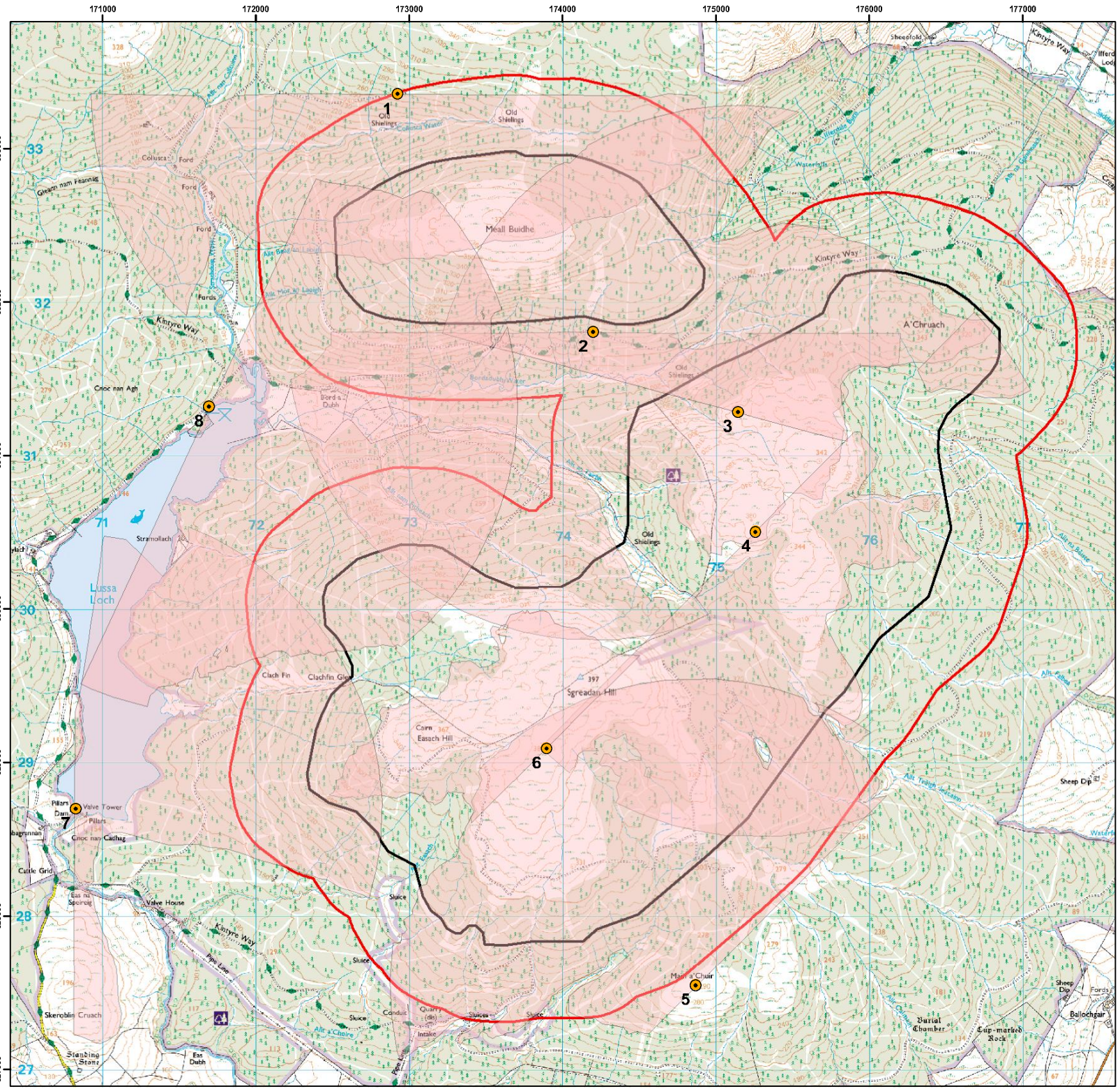
Source: NRP Ltd

0 0.2 0.4 0.8 1.2 1.6 km

N

Figure 1
Site boundary and survey buffers

Beinn an Tuirc 3 Windfarm Report on Ornithological Surveys 2011 - 2012



NATURAL RESEARCH PROJECTS LIMITED

Legend

- GVP locations
- 2km Viewsheds
- **Site boundary**
- **500m buffer**

Date produced: 08/11/12

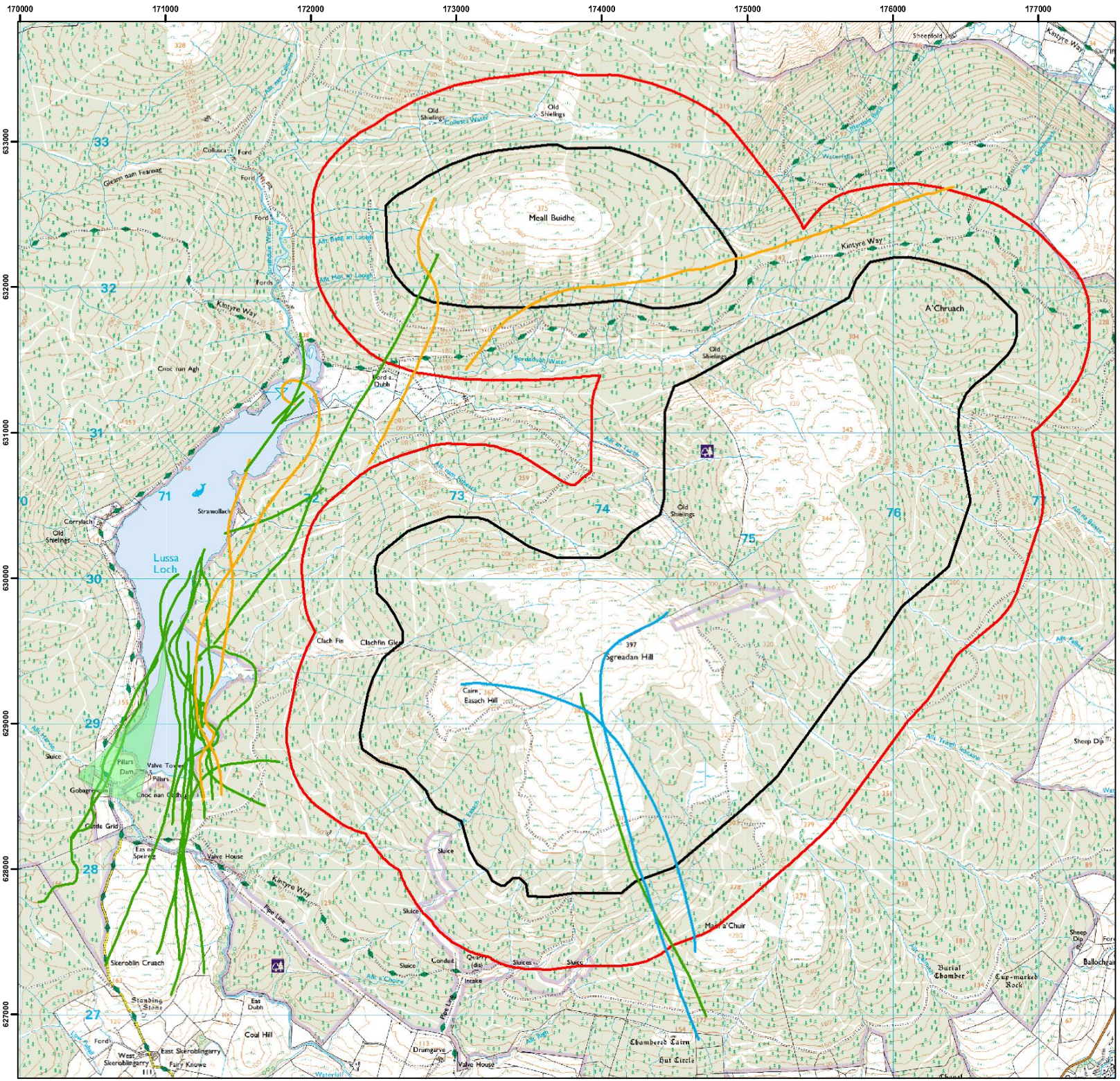
Source: NRP Ltd

0 0.125 0.25 0.5 0.75 1 km

N

Figure 2
GVP locations and viewsheds

Beinn an Tuirc 3 Windfarm Report on Ornithological Surveys 2011 - 2012



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NATURAL RESEARCH PROJECTS LIMITED

Legend

Flight lines

- Greylag goose
- Greenland white-fronted goose
- Whooper swan

Flight areas

- Greenland white-fronted goose
- Site boundary
- 500m buffer

Date produced: 08/11/12

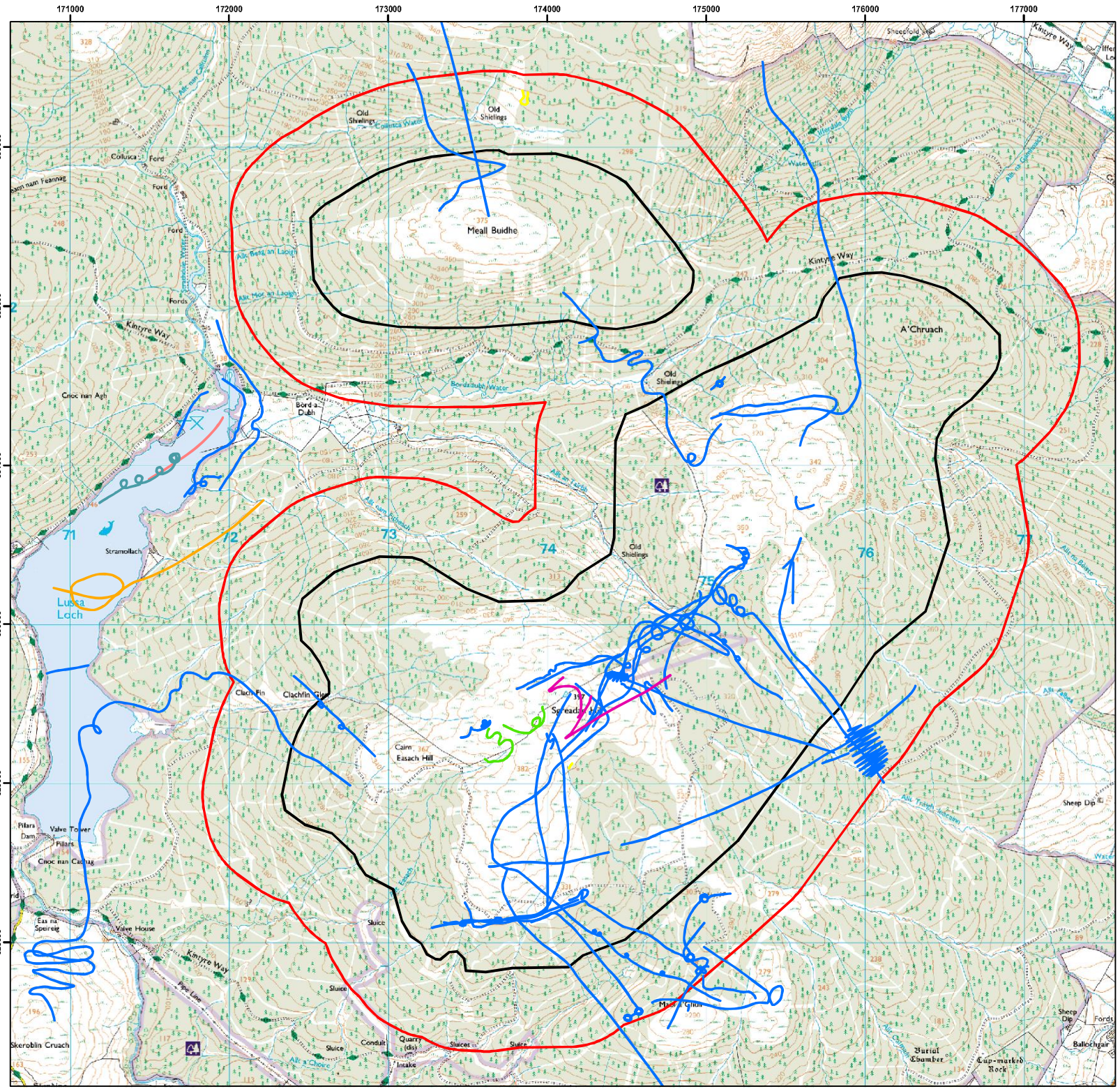
Source: NRP Ltd

0 0.150.3 0.6 0.9 1.2 km

N

Figure 3
Wildfowl flights from GVPs - non-breeding season

Beinn an Tuirc 3 Windfarm Report on Ornithological Surveys 2011 - 2012



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nrp NATURAL RESEARCH PROJECTS LIMITED

Legend

- Barnacle goose
- Red-throated diver
- Golden eagle
- Osprey
- Golden plover
- Short-eared owl
- Hen harrier
- 500m buffer
- Site boundary

Date produced: 08/11/12

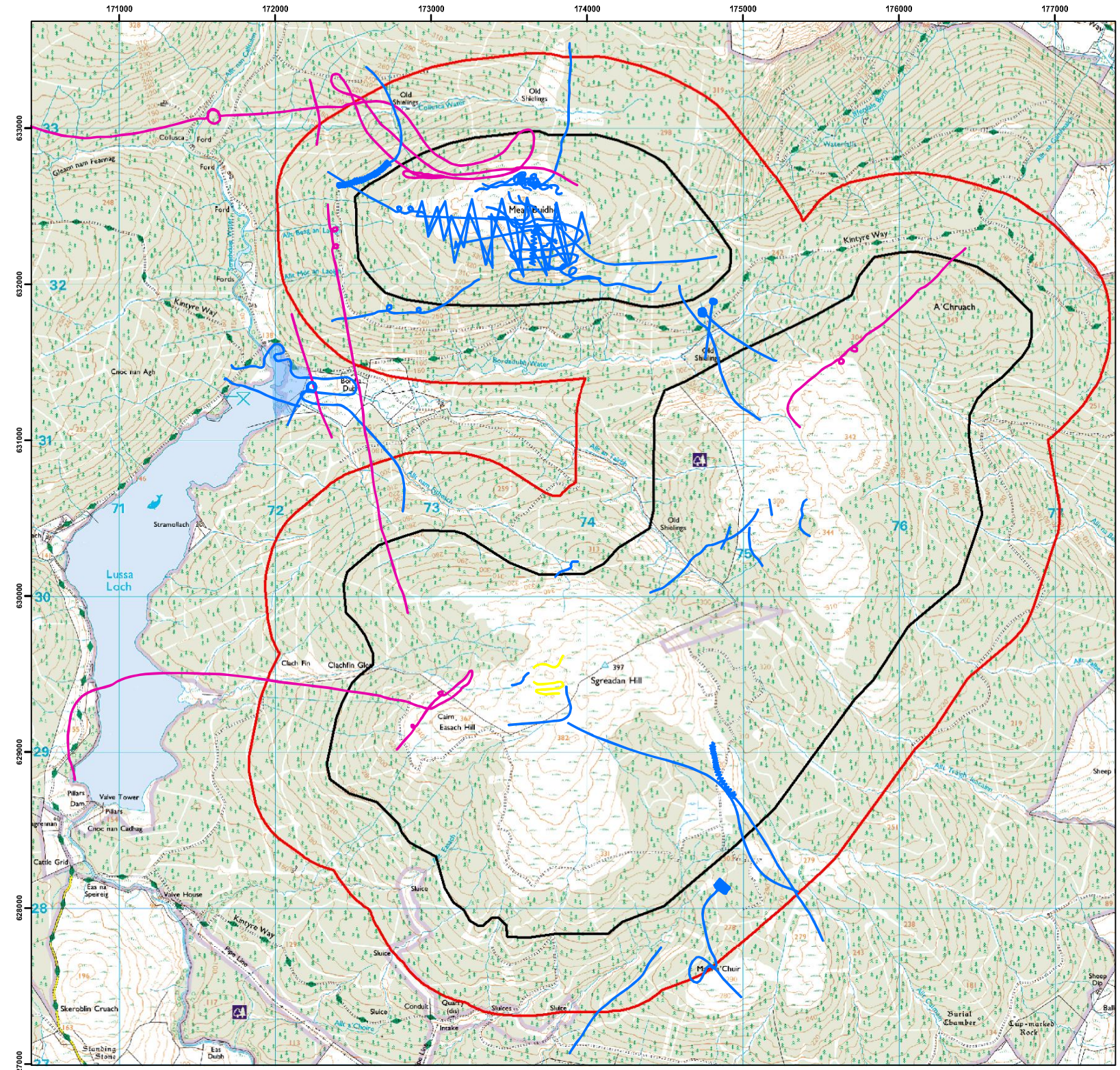
Source: NRP Ltd

0 0.150.3 0.6 0.9 1.2 km

N

Figure 4
Flights by target species from GVPs - breeding season

Beinn an Tuirc 3 Windfarm Report on Ornithological Surveys 2011 - 2012



nrp NATURAL RESEARCH PROJECTS LIMITED

Legend

Flight lines

- Hen harrier
- Golden eagle
- Short-eared owl

Flight areas

- Hen harrier
- 500m buffer
- Site boundary

Date produced: 08/11/12

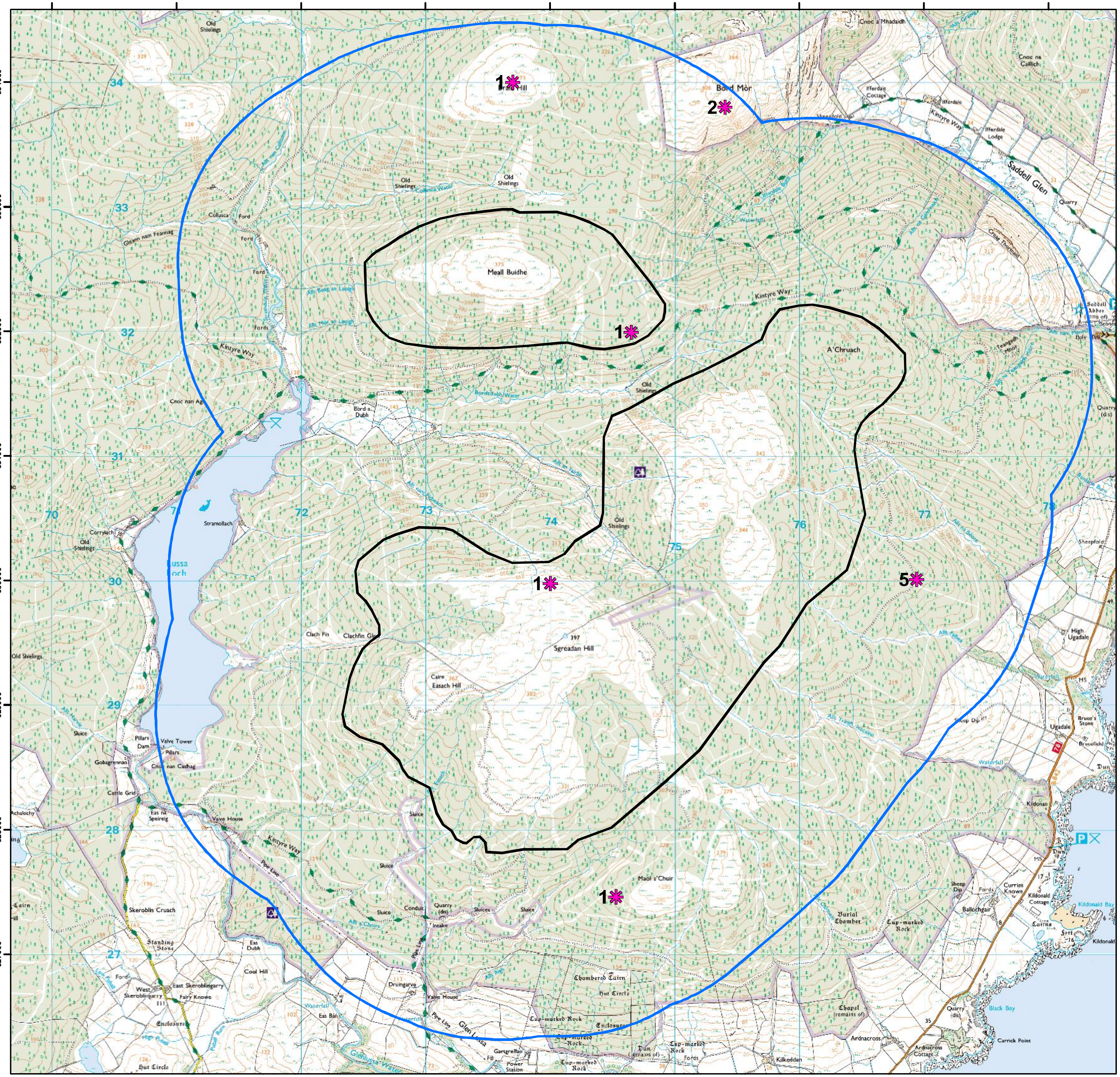
Source: NRP Ltd

0 0.150.3 0.6 0.9 1.2 km

N

Figure 5
Flights by scarce raptors and owls from GVPs - non-breeding season

Beinn an Tuirc 3 Windfarm Report on Ornithological Surveys 2011 - 2012



NATURAL RESEARCH PROJECTS LIMITED

Legend

- Black grouse leks (no. males)
- 1.5km buffer
- Site boundary

Date produced: 08/11/12

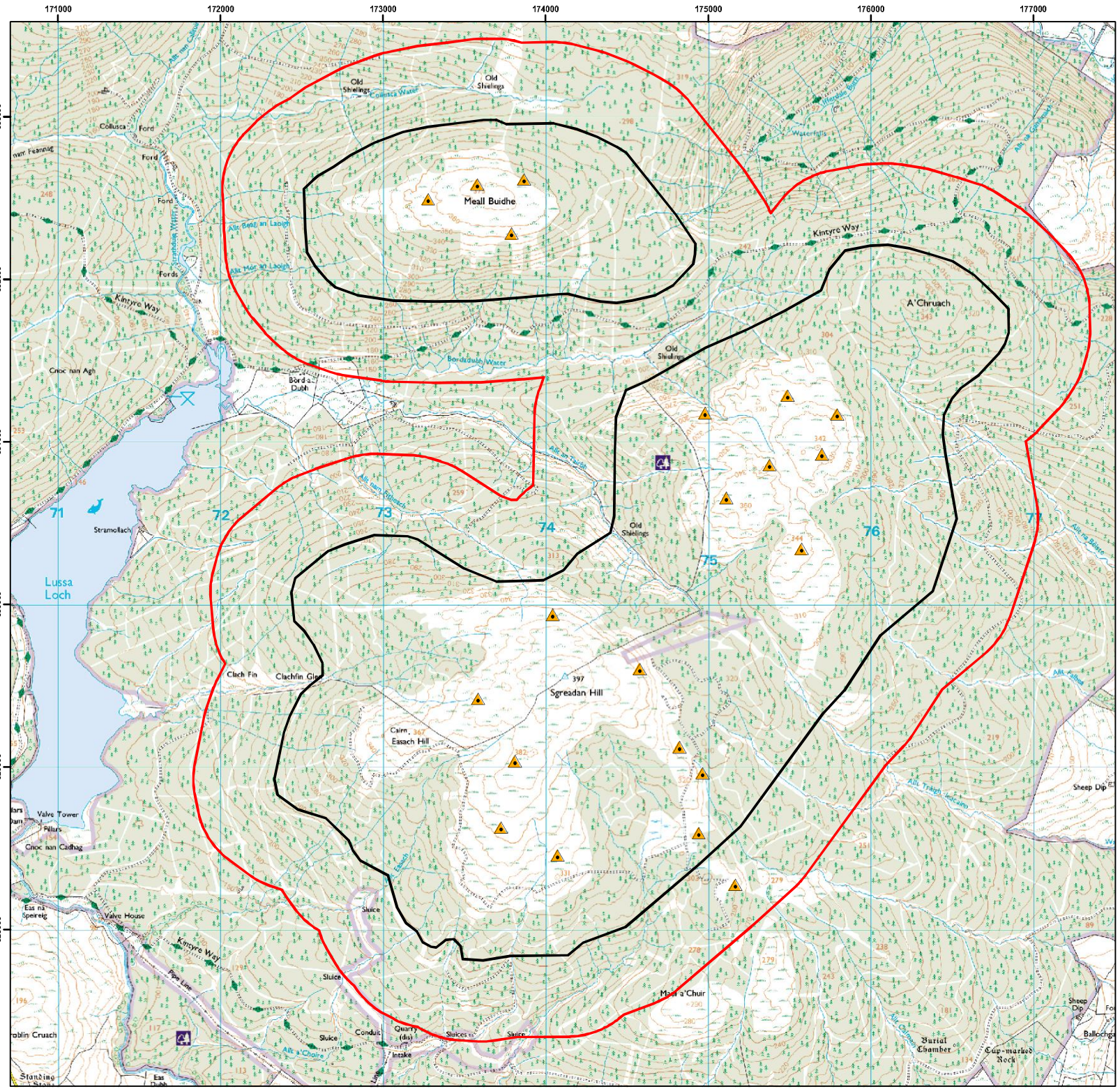
Source: NRP Ltd

0 0.2 0.4 0.8 1.2 1.6 km

N

Figure 6
Black grouse lek locations

Beinn an Tuirc 3 Windfarm Report on Ornithological Surveys 2011 - 2012



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NATURAL RESEARCH PROJECTS LIMITED

Legend

- Red grouse
- 500m buffer
- Site boundary

Date produced: 08/11/12

Source: NRP Ltd

0 0.15 0.3 0.6 0.9 1.2 km

N

Figure 7
Estimated territory centres of moorland breeding birds

Beinn an Tuirc 3 Windfarm Report on Ornithological Surveys 2011 - 2012