Hadyard Hill Extension Wind Farm

Environmental Impact Assessment (EIA) Scoping Report

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1 Introduction

SSE Generation Limited proposes to submit an application for consent to construct and operate a wind farm with a nominal generating capacity of 153 MW, referred to as the proposed Hadyard Hill Extension wind farm. The application for this proposal is being prepared by SSE Renewables Developments (UK) Limited (SSE Renewables) on behalf of SSE Generation Ltd. The proposed Hadyard Hill Extension wind farm is located approximately 7 km east of Girvan in South Ayrshire. The site location and wider context is shown on Figure 1 and the site boundary is shown on Figure 2.

The application will be made to the Scottish Ministers under section 36 of the Electricity Act 1989, and will be accompanied by an Environmental Statement (ES) prepared to meet the requirements of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 ('the EIA regulations'). This scoping report is provided to support a request under regulation 7 of the EIA regulations for a scoping opinion from the Scottish Ministers.

1.1 Background

1.1.1 Existing Hadyard Hill Wind Farm

The existing Hadyard Hill wind farm consists of 52 three bladed, horizontal axis, upwind turbines. The existing wind farm contains a mix of 100 m and 110 m (to tip) turbines, with a rotor diameter of 80 m. Associated infrastructure comprises on-site roads, wind monitoring masts, electrical works, control building and substation, and a 132 kV overhead grid connection line to the north east. The existing wind farm has been operational since 2006.

1.2 Purpose of this Report

The specific objectives of this report are to:

- seek agreement on the likely significant effects associated with the proposed Hadyard Hill Extension, and confirm that all likely significant effects have been correctly included in the proposed scope of the EIA ('scoped in');
- seek agreement where non-significant effects have been excluded ('scoped out'); and
- invite comment on the proposed approach to baseline data collection, prediction of environmental effects and the assessment of significance.

Unless consultees specifically request otherwise, all responses will be collated and presented as a Technical Appendix to the ES, as a record of the results of the scoping exercise.

1.2.1 Consultees

The scoping report will be provided to the consultees set out in Appendix A.

1.3 Structure of this Report

The remainder of this report is structured as follows:

- section 2 provides a brief description of the nature and purpose of the development, typical construction activities and decommissioning proposals;

- section 3 describes the baseline environment conditions, the likely significant environmental effects identified and proposed method for further data collection and evaluation of effects;
- section 4 describes the effects that are considered not to be significant, and proposes that these be excluded from the EIA, providing a rationale in each case; and
- section 5 provides information on the process for making representations on the scoping report.

2 Description of the Development

2.1 Site Description

The site lies along an undulating ridge adjacent to the existing Hadyard Hill wind farm to the east and the south. The highest point on the site is Doughty Hill, at 380 m Above Ordnance Datum (AOD) towards the west, descending to approximately 130 m at a point to the east of Milton in the south.

The current land use is a mix of upland grazing of sheep and cattle, with commercial forestry plantation.

The site is drained by a number of small burns, which mainly form tributaries to the Water of Girvan to the north and the River Stinchar to the south. Penwhapple Reservoir lies adjacent to the site to the west, and sits within the existing Hadyard Hill wind farm.

An overhead transmission line (the existing Hadyard Hill wind farm grid connection) leaves the Hadyard Hill wind farm on-site substation, routing to the north east and passing through the site.

The local area is relatively sparsely populated, with a number of small settlements, hamlets and dispersed individual dwellings located within the Water of Girvan and River Stinchar valleys and along the local road network. The nearest settlements[1] include Dailly (3 km north), Crosshill (4.5 km north), Straiton (6 km north east) and Barr (2 km south). The nearest town is Girvan, located 7 km to the west.

The surrounding road network includes a number of unclassified roads, traversing the site to connect the Water of Girvan and River Stinchar valleys. The B734 is located on the western boundary of the site and connects Girvan and the A77 (T) in west and the A714 in the south, via Barr. Figure 3 shows the surrounding road network and proposed site access route. The Girvan to Ayr railway line runs to the north of the site, located at approximately 3 km from the site boundary.

According to the South Ayrshire Council[2], two Core Paths run through the site. The path to the west follows the access track of the existing Hadyard Hill wind farm, and the path in the east of the site follows the unclassified road/ track between Crosshill in north and the Stinchar valley in the south. The Core Paths are shown on Figure 4.

2.2 Proposed Wind Farm Extension

The main elements of the proposed Hadyard Hill Extension wind farm would be as follows:

- up to 51 wind turbines, with a blade tip height of up to 126.5 m;
- associated external transformers and underground cabling;
- new access tracks and hardstanding areas adjacent to each turbine;
- borrow pits;
- meteorological masts; and

[1] Settlements as set out in South Ayrshire Local Plan (URL: http://www.south-ayrshire.gov.uk/planning/planlpdocuments.aspx [accessed 16/01/2014])

[2] South Ayrshire Council, Final Consultation on the South Ayrshire Draft Core Paths Plan (February 2009)

- an on-site electricity substation and control room.

It is expected that the wind turbines would have a generating capacity of up to 3 MW each, with a potential total generating capacity of 153 MW.

An on-site substation and control room to house switchgear and metering would be constructed. Transformers would be located at the base of each turbine, either internal to the turbine or externally adjacent to the turbine tower, and would be linked by underground cables to the on-site substation.

Access to the proposed turbine locations would be taken via the B734 Old Dailly to Barr road, using the existing wind farm track network, subject to any necessary minor upgrades and deviations.

The design for the proposed Hadyard Hill Extension wind farm is currently at an early stage and will be subject to an iterative design process as further environmental information becomes available.

2.3 Construction

It is anticipated that the principal construction access route would be via the B734. Abnormal Indivisible Loads (AILs) required for the delivery of the main turbine components would use the Port of Ayr, following an established route south on the A77(T) and then the B734 towards Barr (see Figure 3). While some minor road improvements to the existing road network may be required to facilitate the passage of the turbines, depending on which turbines are selected for the extension, this route has been proven, having been used during the construction of the existing Hadyard Hill wind farm.

Typical construction activities and work methods will be set out in the ES. Information will also be provided on an indicative construction programme construction traffic generation and construction phasing. The ES will also contain details of appropriate environmental management measures, including pollution prevention measures (in line with SEPA's Pollution Prevention Guidelines (PPGs)), and waste minimisation and management measures.

2.4 Decommissioning

The wind farm would be operational for 25 years, following which, if there has been no approval to extend the life, the turbines would be dismantled and removed from the site. This operation would be similar to their erection and would be carried out according to relevant decommissioning guidelines prevailing at the time.

3 Scope of the EIA

The ES will be prepared to meet the Institute of Environmental Management and Assessment Quality Mark commitments. The EIA will cover all phases of the proposed wind farm including construction, operation and decommissioning.

3.1 Likely Significant Environmental Effects

The Applicant has identified the potential for likely significant effects on:

- Landscape and visual amenity;
- Ecology;
- Ornithology;
- Historic environment;
- Hydrogeology and hydrology;
- Aviation; and
- Noise.

The ES will report on the likely significant direct effects, along with any direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects, as required by the EIA regulations.

The following sections provide a review of baseline conditions, proposed method for further data collection and evaluation of effects.

3.2 Landscape and Visual

For the purposes of assessment a 35 km study area will be used as the basis for the landscape and visual assessment, in line with SNH Guidance[3].

An initial search for landscape planning designations has been undertaken within a 15 km radius as shown on Figure 4.

3.2.1 Baseline

Landscape Character

The site lies mostly within the Foothills or Foothills with Forest landscape character areas (LCAs)[4]. These landscape character areas are generally defined by undulating rounded hills and ridges, with a mix of upland grazing, improved pasture, forestry and varying degrees of remoteness from settlement and ruggedness. The dominant feature in the character of the area immediately surrounding the site is the existing wind turbines, such that the landscape character is a 'wind farm landscape'. The majority of the site for the proposed Hadyard Hill Extension can be considered to be either within the wind farm landscape (immediately adjacent to the operational turbines), or part of the Foothills with Wind Farm character subtype out to a distance of approximately 3 to 4 km from the existing turbines.

[3] Horner + MacLennan and Envision (March 2006). Visual Representation of Wind farms: Good Practice Guidance. Scottish Natural Heritage (SNH) (F03 AA 308/2).

[4] Ayrshire Landscape Character Assessment, SNH report number 116, 1999

The Foothills LCAs provide enclosure to the contrasting character of the lower lying Water of Girvan valley to the north (Middle Dale LCA) and the River Stinchar valley to the south (Intimate Pastoral Valley LCA).

Designations

There are no National Scenic Areas within 35 km of the site, indicating that there are no landscapes considered of national value within the study area. However the site is within the regional Carrick Hills Scenic Area, which extends over much of South Ayrshire.

There are six nationally designated sites on the Inventory of Historic Gardens and Designed Landscapes within a 15 km radius of the site boundary, with Bargany, Kilkerran and Blairquhan located with the Middle Dale LCA (Water of Girvan valley).

Some of the forest areas adjacent to the site to the east and south are part of the Galloway Forest Park, although potential visibility is restricted by the forestry. The Galloway Hills Search Area for Wild Land (SAWL) is located approximately 5.5 km to the south west of the site, centred around the summit of Merrick. The SAWL is not a recognised designation either within local or national policy; however the SNH guidance[5] sets out where the SAWL can be used as a strategic tool for identifying potential wild land. SNH have recently updated their policy with a view to adopting Core Areas of Wild Land (CAWL). The CAWL is under review as part of the draft Scottish Planning Policy[6].

Visual Amenity

Potential visibility of the proposed Hadyard Hill Extension may be experienced by residents of settlements within 5 km at Barr (2 km south), Dailly (3 km north) and Crosshill (4.5 km north). Visibility may also be experienced further afield in settlements between 5 and 10 km from the site at Straiton (6 km north east), Girvan (7 km west), Maybole (7.5 km north) and Pinmore (7.5 km west).

In addition there may be visibility from other dispersed individual dwellings and farms within the surrounding landscape.

There is also potential visibility from specific sections of the local road network, railway and core path network.

3.2.2 Potential Significant Effects

The proposed Hadyard Hill Extension would be likely to be visible from a wide area within the surroundings, with consequent potential likely significant effects on the visual amenity and character of the adjoining landscape.

The Landscape and Visual Impact Assessment (LVIA) will consider effects on:

- landscape fabric, caused by changes to the physical form of the landscape and its elements;
- landscape character, caused by changes in the key characteristics and qualities of the landscape as a result of the proposed wind farm, including consideration of effects on designated areas; and

[5] Wildness in Scotland's Countryside, SNH Policy Statement No. 02/03.

[6] Scottish Planning Policy, Consultation Draft April 2013

- visual amenity, caused by changes in the appearance of the landscape as a result of the proposed wind farm, considering receptors in settlements and residential property, motorists and other road users, rail passengers, core paths and other recreational receptors.

The layout will be tested to ensure that it reflects current SNH guidance on Siting & Designing Wind farms in the Landscape[7].

3.2.3 Additional Baseline Information Collection

Landscape character throughout the study area will be mapped, with reference to SNH's Landscape Character Assessment series. The South Ayrshire Landscape Wind Capacity Study [8] will also be used to inform the landscape character assessment work.

Baseline photography, to be used to support the assessment of effects on visual amenity, will be collected for agreed viewpoints. The locations of the viewpoints will be agreed with South Ayrshire Council and SNH through separate correspondence.

It is proposed that photomontages will be prepared from viewpoints within a 15 km radius of the site, with wirelines provided for viewpoints between 15 km and 35 km radius from the site.

3.2.4 Effects Evaluation

The landscape assessment will be carried out in accordance with the Guidelines for the Assessment of Landscape and Visual Effects: Third Edition, 2013[9]. It will be based on the landscape character information contained within the published Landscape Character Assessment information supplemented with information gained through fieldwork.

The assessment will include the effects during construction, operation and decommissioning.

The viewpoint photography, wirelines and photomontages will be presented in accordance with current best practice techniques, such as SNH's Good Practice Guidance for the Visual Representation of Wind farms and Landscape Institute guidance[10].

3.2.5 Cumulative Effects

A cumulative search area will be used to establish all wind farm developments within a 60 km radius. The detailed assessment will focus on the potential for cumulative effects with wind farms within a 35 km radius study area, including operational, under construction, consented, and proposed (those for which there is a valid planning application) wind farms. Turbines less than 50 m to tip will not be included.

The planning status of wind farm projects will be confirmed with the local planning authorities (with the 35 km study area) and SNH. The methodology will follow guidance provided by SNH for assessing cumulative effects[11].

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[7] Scottish Natural Heritage (2009) Siting and Designing wind farms in the landscape, Version 1.

[8] South Ayrshire Council, South Ayrshire Landscape Wind Capacity Study - July 19 2013

[9] IEMA and Landscape Institute (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd edition.

[10] Landscape Institute (2011) Photography and photomontage in landscape and visual impact assessment; Advice Note 01/11

[11] SNH (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments, (March 2012)

3.3 Ecology

3.3.1 Baseline

Designated Sites

There are no statutory designated sites for nature conservation located within or adjacent to the site boundary. Sites designed for nature conservation up to 10 km from the Hadyard Hill Extension wind farm site are listed in Table 3.1 and shown in Figure 5. No ancient woodland inventory sites occur within the proposed development area.

No likely significant effects are predicted on designated sites or ancient woodland from this proposal.

Table 3.1 Statutory Designated Sites Within 10 km of the Site

Site Name	Designation(s)	Size (ha)	Distance from the site	Qualifying Features	Likely Significant Effects (yes/no)
Lendalfoot Hills Complex	SAC	1309.07	3.8	Calcareous grassland (Upland); Dwarf shrub heath (Upland) - Dwarf shrub; Dwarf shrub heath (Upland) - Wet heathland; Fen, marsh and swamp (Upland) - Base rich fens; Fen, marsh and swamp (Upland) - Base rich fens - Wet mires; Inland rock	No
Knockdaw Hill	Biological SSSI	387.56	5.9	Calcareous grassland (Upland) - Subalpine calcareous grassland; Dwarf shrub heath (Upland) - Subalpine wet heath; Dwarf shrub heath (Upland) - Subalpine dry heath; Fen, marsh and swamp (Upland) - Alkaline fen; Mosaic - upland assemblage	No
Littleton and Balhamie Hills	Biological SSSI	242.44	1.9	Calcareous grassland (Upland) - Subalpine calcareous grassland; Fen, marsh and swamp (Upland) - Alkaline fen; Fen, marsh and swamp (Wetland) - Basin fen	No
Auchalton	Biological SSSI	5.39	0.9	Neutral grassland - Lowland neutral grassland	No
Aldons Hill	Biological SSSI	234.45	1.9	Calcareous grassland (Upland) - Subalpine calcareous grassland; Dwarf shrub heath (Upland) - Subalpine wet heath; Dwarf shrub heath (Upland) - Subalpine dry heath; Mosaic - Upland assemblage	No
Pinbain Burn to Cairn Hill	Biological & Geological SSSI	521.74	4	Acid grassland (Upland) - Subalpine acid grassland; Igneous petrology - Ordovician	No

Table 3.1 Statutory Designated Sites Within 10 km of the Site					
Site Name	**Designation(s)**	**Size (ha)**	**Distance from the site**	**Qualifying Features**	**Likely Significant Effects (yes/no)**
				Igneous; Inland rock - Calaminarian grassland and serpentine heath; Mosaic - Upland assemblage; Standing open water and canals - Base-rich loch	
Pinbain Burn to Cairn Hill	Biological & Geological SSSI	521.74	4	Acid grassland (Upland) - Subalpine acid grassland; Igneous petrology - Ordovician Igneous; Inland rock - Calaminarian grassland and serpentine heath; Mosaic - Upland assemblage; Standing open water and canals - Base-rich loch	No

In addition to the statutory designated sites, there are a large number of non-statutory local wildlife sites in the area surrounding the site, including 'Provisional Wildlife Sites' and Scottish Wildlife Trust reserves. These sites include the River Stinchar, Water of Girvan and Penwhapple Reservoir (and their catchment tributaries), which are all in close proximity to the site. It is considered there will be no likely significant effects on non-statutory designated sites.

Main Habitats and Species

To date a number of ecological surveys have been completed, including the following:

- Bat activity surveys (May to September 2012).
- Phase 1 habitat survey (September to October 2013); and
- Initial protected species walkover surveys (September to November 2013).

The main habitat types present within and adjacent to the site include a mixture of coniferous plantations, improved and semi-improved grassland, marshy grassland and areas of unenclosed moorland with areas of degraded heath and blanket bog habitats. There are also two waterbodies adjacent to the site, at Penwhapple reservoir and at Tormitchell Quarry. To the north of the site perimeter the land descends towards the Water of Girvan whilst the valley of the River Stinchar is located to the south of the site.

The main findings of baseline field surveys completed to date are summarised below.

- **Phase 1 Habitats:** The survey area comprises approximately 40% grassland (mainly upland acid and improved), 25% conifer plantation, 25% degraded upland heath and modified blanket bog, and 10% broad-leaved woodland. Hydrologically-sensitive habitat types include watercourses, blanket bog, modified bog, marshy grassland, swamp, valley mire and acid / neutral flushes which are considered to be groundwater dependent terrestrial ecosystems (GWDTEs). GWDTEs are more extensive towards the northern parts of the site but also occur within forestry rides across the rest of the

survey area. No notable botanical species records have been identified from surveys (completed to date) or from desk study for the proposed development area.

- **Badger**: Five active badger setts were identified within the site in 2013 - an outlier sett in the east and two setts near Knockrochar to the north.
- **Bats** - Roost Potential: Ayrshire Bat Group provided information regarding three known Soprano pipistrelle *Pipistrellus pygmaeus* roosts within the desk study area and records (not necessarily relating to known roost sites) of Leisler's bat *Nyctalus leisleri*, noctule bat *N. noctula*, Daubenton's bat *Myotis daubentonii*, Natterer's bat *M. nattereri*, soprano pipistrelle, common pipistrelle *P. pipistrellus* and Nathusius pipistrelle *P. nathusii* for the Ordnance Survey hectad NS30. Two disused lime kilns and a mine to the north west of the survey area (outside of the site boundary but within the 500 m margin) were identified as having moderate to high potential for hibernating bats. Although a preliminary study using automated bat detectors did not confirm use of the structures by bats, this cannot be ruled out at this point. A number of trees and disused buildings were also provisionally assessed to have the potential to support roosting bats including the potential nursery roosts. Further survey work is proposed for 2014 to establish if any of these potential structures are being used by bats.
- **Bats** - Activity Survey: Activity surveys undertaken in 2012 confirmed six species of bat using the survey area. These were, in decreasing order of activity levels recorded: soprano pipistrelle, common pipistrelle, noctule, Leisler's bat, Daubenton's bat and Natterer's bat. The highest levels of bat activity within the survey area were recorded near Cairn Hill. The lowest level of bat activity was recorded from the Daljedburgh Plantation, with a single bat pass recorded throughout the whole survey period. All records within forestry plantations were of pipistrelle bats except for 14 Myotis passes recorded at the eastern edge of the Doughty Plantation. The results of the activity surveys broadly reflected anticipated habitat quality for bats, with higher levels of activity near watercourses, even in upland moorland areas, such as Cairn Hill and Dobbingstone Hill. Automated bat detectors with microphones attached to meteorological masts at Daljedburgh Hill and Doughty Hill returned the lowest number of passes; only two bats were recorded at each location across all four summer months. Both these masts are situated on high ground in open moorland and some distance from the nearest water course or woodland edge.
- **Freshwater Pearl Mussel**: Ayrshire River's Trust confirmed that there is a population of freshwater pearl mussel within the Water of Girvan catchment area. However, these populations are classified as functionally extinct due to the fact they are unable to successfully reproduce.
- **Great Crested Newt**: There are no records of great crested newt on the NBN Gateway for the study area and no ponds considered suitable for great crested newt during their breeding season.
- **Otter**: There are several records of otter on the NBN Gateway for the study area, primarily associated with larger watercourses and waterbodies around the periphery of the proposed wind farm extension site. Otter spraint was found along Shiel Burn, Barbae Burn, Lyndsayston Burn and around Penwhapple Reservoir, but there were no confirmed shelters. An otter was seen on the bank of Penwhapple Reservoir, and two otter resting sites were found, one in the northernmost area and one near Penwhapple Reservoir. Potential shelters have been found on a tributary of the Shiel Burn at the far

north east of the study area, along Dobbingstone Burn and on a tributary close to Penwhapple Reservoir.

- **Red Squirrel**: There are no records of red squirrel on the NBN Gateway for the larger woodland areas within the site. No evidence of squirrel was noted during the surveys in 2013, however detailed surveys have not been completed to date (e.g. drey transects, systematic searches for feeding remains, hair-tube surveys). All of the woodland within the survey area was identified as being of relatively low quality for red squirrel.
- **Water Vole**: There are no records of water vole on the NBN Gateway for the study area. No evidence of water vole was identified on site during the surveys completed in 2013. However, there is extensive potentially suitable habitat for water vole within the survey area, particularly in the north where there were multiple slow flowing, relatively deep upland streams around the lower areas of Barony Hill. A reduction/elimination of water vole populations may have occurred due to the presence of mink; mink traps were observed but the presence of mink within the study area was not confirmed.
- **Reptiles**: There are no records of common lizard, slow worm or adder on the NBN Gateway for the study area. Despite several visits by ecologists undertaking other surveys, including areas of potentially suitable reptile habitat and in suitable weather conditions across the survey area in 2012 and 2013, only one common lizard was observed, suggesting a low population density.
- **Salmonid and Lamprey Species:** Ayrshire Rivers Trust confirmed that populations of salmon, sea / brown trout, eel and sea and brook lamprey are present within the Water of Girvan and the River Stinchar catchments

3.3.2 Potential Significant Effects

Particular consideration will be given to potential effects on habitats and species which are of relatively high conservation concern and/or subject to species legal protection these include:

- Habitats of conservation value such as those identified within the local Biodiversity Action Plan, the Scottish Biodiversity Strategy and/or those listed on Annex I of Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora;
- Non-avian fauna subject to special legal protection, for example, through their inclusion on Schedule 2 of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) or Schedule 5 of the Wildlife & Countryside Act 1981 (as amended);
- Non-avian fauna which are identified within the local Biodiversity Action Plan or Scottish Biodiversity Strategy as requiring species conservation measures;
- Plant species of conservation value or special legal protection (e.g. plant species listed on Schedule 4 of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) or Schedule 8 of the Wildlife & Countryside Act 1981, as amended; and
- Consideration of the risk of spread from the construction of the proposed wind farm of any non-native invasive plant and animal species which may be present in the area.

Potentially significant effects from the proposed wind farm extension on sensitive protected non-avian fauna and habitats are summarised as follows:

- Direct loss of habitats of nature conservation value during the construction of the turbine foundations and hard standing areas, access tracks, the substation/welfare building, the site compound area and borrow pit(s);

- Indirect loss / degradation of sensitive habitats due to changes in local hydrology as a result of new infrastructure and artificial drainage;
- Potential disturbance to protected species during construction, operation and decommissioning;
- Potential direct impacts on bats during operation, namely collision risk and barometric trauma; and
- Potential direct and indirect impacts on aquatic species during construction, operation and decommissioning, including impacts arising from any watercourse crossings.

3.3.3 Additional Baseline Information Collection

Further baseline surveys are planned for spring - summer 2014 including:

- NVC surveys of applicable phase 1 habitats in order to identify any GWDTEs which occur within 250 m of the proposed locations of turbine bases and borrow pits or 100 m from access tracks, will be undertaken during the summer months (preferably late May-July). These would follow the standard method as described in Rodwell (ed. 1991 - 2000).
- An otter survey of suitable habitat up to 200 m from any proposed infrastructure location (in case of holts used for breeding), ensuring that the surveys are undertaken during and following dry weather.
- A water vole survey of all suitable habitats up to 50 m from any proposed infrastructure location, ensuring that they are undertaken during and following dry weather.
- Potential bat roost surveys of all features identified during the 2013 surveys within 50 m of proposed infrastructure location, which should be undertaken during May to September and follow current best practice guidance (Hundt 2012).
- Potential bat transitional roosts / hibernacula structures (two disused lime kilns and a mine in the north east of the site) would require further surveys to establish if they are in use by bats and to determine which species and approximate numbers.
- Badger surveys to be undertaken up to 50 m from any proposed infrastructure locations and 150 m from any proposed borrow pit / turbine base.
- Red squirrel surveys to be undertaken specifically within woodland to be felled, up to 50 m from any disturbance, where the habitat is suitable. Transects established in plantation woodlands to record dreys and feeding signs (e.g. squirrelled cones), following the method outlined in Gurnell et al. (2009).
- Should development be proposed within 500 m of ponds likely to contain great crested newt, presence / absence surveys would be undertaken during March-June, following the method outlined in Langton et al. (2001)[12].
- Downstream of all proposed infrastructure, fish habitat suitability surveys would be undertaken to assess suitability for salmonids, lamprey and European eel as well as accessibility for fish migration.

[12] Langton, T. E. S., Beckett, C. L. and Foster, J.P. (2001). Great Crested Newt Conservation Handbook. Froglife, Suffolk.

3.3.4 Effects Evaluation

The EIA process involves the application of specific criteria to systematically evaluate the impacts on ecological receptors resulting from a proposed development. The methods adopted for this assessment are based on best practice guidance and the application of professional judgement by experienced ecologists with specific experience of wind farm EIAs and construction projects.

Receptor Value and Sensitivity

Determining the receptor value and sensitivity of ecological receptors to development is an established concept for which there is standard guidance such as CIEEM's Guidelines for Ecological Impact Assessment in the UK (2006) and SNH's A Handbook on Environmental Impact Assessment (2005).

For the purpose of this assessment, the definitions and conventions given in Table 1 and Table 2, Appendix B will generally be adopted for assigning receptor value, and effect magnitude.

Cumulative Effects

It is unlikely that effects upon any particular habitat type or protected non-avian species from a similar development within the area would have any influence upon the habitats and species at this site, except for aquatic species. Therefore, for aquatic species, any common watercourses between any other development sites, including consideration of conifer plantation felling plans, and the proposed Hadyard Hill Extension wind farm would be considered.

For each terrestrial habitat type and each protected species (non avian / non aquatic) may have multiple potential effects resulting from this development. Therefore, effects on each habitat type and each protected species would be undertaken by considering the various potential effects, both individually and cumulatively upon each receptor.

3.4 Ornithology

Baseline surveys commenced in May 2011 and were completed in March 2013; a total of 22 months of continuous survey effort. Survey methods followed contemporaneous best practice guidance (further details of survey methods and survey effort are provided in Appendix C). Baseline ornithological surveys included winter, spring, summer and autumn flight activity surveys from strategically located vantage points and breeding bird surveys. Vantage points and viewsheds are illustrated in Figure 6.

3.4.1 Baseline

Designated Sites

The site is not located within or adjacent to any statutory sites designated for ornithological interest and there are no such sites within 10 km of the proposed wind farm.

The only statutory designated site for ornithological interest within c. 20 km of the site is the Glen App and Galloway Moors Special Protection Area (SPA) which is situated c. 12 km to the south-west and supports a breeding population of hen harrier.

Following current SNH guidance[13] on the connectivity of SPA populations with supporting habitats in the wider environment, the distances to all SPAs in the surrounding area are all greater than the largest reported range / connectivity distance for the qualifying species listed for the individual SPAs. As such, there are considered to be no SPAs which are close enough to the site to warrant further consideration within the EIA.

Summary of Baseline Surveys

- **Geese and Swans** –no regular local or passage movements of geese or swans over the site;
- **Raptors** - two separate peregrine breeding territories were recorded as occupied in 2011, 2012 and 2013; there was no evidence during breeding raptor surveys in 2011 or 2012 of breeding hen harrier, osprey, merlin or goshawk;
- **Black Grouse** - there was no evidence of lekking black grouse within the site or core survey area;
- **Waders** – the survey area supports breeding curlew, with a peak number of 19 breeding territories recorded in 2012. Other breeding wader species, typical of the habitats present in the area, are present in very low numbers. Concentrations of golden plover, particularly during the autumn passage period, were noted;
- **Barn Owl** - one barn owl breeding site was confirmed with the wider survey area during 2012;
- **Other Species** - there was no evidence of the presence of breeding short-eared owl during surveys completed in 2011 or 2012. During all surveys, there was one record of short-eared owl hunting beside the road near Balcletchie in May 2012, possibly a bird breeding in the wider surrounding area. The survey area also supports a suite of breeding songbirds typically associated with upland moorland habitats and commercial conifer plantation in south-west Scotland.

Further detail on baseline survey results is provided in Appendix C.

3.4.2 Potential Significant Effects

Particular consideration will be given in the assessment to potential effects on species which are of relatively high conservation concern and/or subject to species legal protection these include:

- Species of conservation concern listed on Annex I of European Council Directive 2009/147/EC on the Conservation of Wild Birds, in particular those that may be associated with populations of species that are qualifying interests of Special Protection Areas in the wider area;
- Species listed in Schedule 1 to the Wildlife and Countryside Act 1981 (as amended);
- Species of national conservation concern, not included within the above categories, but that are present within the study area in nationally or regionally important numbers.

The key potentially significant effects on ornithological receptors arising from wind farm development can be broadly summarised as follows:

[13] SNH (2012) Assessing Connectivity with Special Protection Areas (SPAs). March 2012.

- Direct loss of habitat to wind turbine bases, access tracks, site substation, converter station and ancillary infrastructure;
- Indirect loss / degradation of habitat quality due to the disturbance and / or displacement of birds by construction works and operation of the wind farm;
- Mortality due to collision with wind turbine blades; and
- The potential for cumulative effects arising from the combined effects of other existing and proposed developments within the wider area affecting the same bird populations.

Taking into consideration the current proposed layout, and the findings of the desk study and baseline surveys completed to date, potentially significant effects on the following ornithological receptors have been a focus for design mitigation that will also be the primary focus of the impact assessment:

- Hen harrier (collision risk and potential displacement from wintering habitat);
- Peregrine (collision risk, potential disturbance / displacement from breeding and wintering habitats resulting in a potential reduction in productivity and potential territory loss);
- Black grouse (potential for long-term displacement from habitats that may be realistically re-occupied in the near future subject to land-use, management, habitat enhancement);
- Golden plover (collision risk and potential displacement from wintering habitat); and
- Curlew (collision risk, and potential displacement from breeding habitat resulting in a significant reduction in the local population).

3.4.3 Additional Baseline Information Collection

3.4.4 Effects Evaluation

The nature conservation value / sensitivity of the receptors would be assessed using current best practice EIA methodology (e.g. in agreement with relevant and current SNH and CIEEM guidance). The evaluations and effect assessments would be undertaken on the basis of the field survey information collated augmented with information available from the desk study.

Bird flight activity data would be collated and analysed to assess the potential risk of individual species of conservation concern from collision mortality, following the method described by Band et al. (2007). Appendices will be provided in the ES giving further detail on the source data and the collision risk calculations. Current SNH guidance on collision avoidance rates would be used in the analysis.

The EIA would be carried out using a set of standardised ‘impact categories’ that describe the scales at which an impact can occur and its subsequent effect(s) and significance. These impact categories have been developed following best practice guidance and professional experience and knowledge of EIA. The likely effects that the development (construction and operation) would have on the ecological interests would be assessed for their potential to be significant. Any mitigation measures required to offset or reduce identified effects would be described and assessed.

Cumulative Effects

An assessment of the potential for significant cumulative residual effects, as a result of other projects with potential additive effects the same bird pollutions / receptors affected by the Hadyard Hill extension, will be completed following current best practice guidance (SNH 2012[14]).

3.5 Historic Environment

3.5.1 Baseline

A search of the Sites and Monuments Record (SMR)[15] shows that there are no Scheduled Ancient Monuments (SAM) located within the site boundary. There are no Listed Buildings on-site but there are a number (>50) of Sites and Monument Records (SMR/RCAHMS database) on site.

Sites of archaeological and cultural heritage interest, identified through an initial desk-based survey, are shown on Figure 7.

The following SAMs are located within approximately 5 km of the site boundary:

- Mote Knowe, motte (SAM 2863, designated 2010);
- Drummochreen, house (SAM 5387);
- Cairnhill, palisaded enclosure and timber house (SAM 5479);
- Camregan Castle (SAM 5403);
- Knockinculloch, enclosures (SAM 3357);
- The Lady Chapel (SAM 3358);
- Bencallen Hill, chambered cairn (SAM 3890);
- Old Dailly Church (SAM 8138);
- Dalquharran Castle (Old Castle) (SAM 316); and
- Maxwellston Hill, fort (SAM 2201).

In addition within approximately 5 km of the site there are in excess of 90 Listed Buildings (of all categories, of which 9 are category A listed). Most of these are scattered on the north of the site and to the south of it, within and around Barr. Within this same 5 km area, there are in excess of 200 SMR and RCAHMS database records.

There are six Inventory Gardens and Designed Landscapes (GDLs) located within 15 km from the site boundary. The closest GDL (Kilkerran) is located approximately at 450 m to the north of the site, with the rest comprising: Bargany (approximately 2.2 km to the west); Blairquhan (approximately 3.7 km to the north east); Culzean Castle (approximately 9.7 km to the north west); Craigengillan (approximately 11 km to the east) and Skeldon House (approximately 11.4 km to the north). Additionally, Rozelle GDL is located approximately 16 km to the north of the site and Glenapp, approximately 22 km to the south west.

Six conservation areas are also located within 15 km of the proposed Hadyard Hill Extension: Barr (approximately 2 km to the south); Crosshill (approximately 4.5 km to the

[14] Scottish Natural Heritage. 2012. Assessing the cumulative impact of onshore wind energy developments

[15] Historic Scotland (2011) 'Spatial Data Warehouse' (http://data.historic-scotland.gov.uk/) (accessed 14.01.2014)

north); Straiton (approximately 6 km to the east); Kirkmichael (approximately 6.1 km to the north); Girvan (approximately 7 km to the west); and Kirkoswald (8.3 km to the north west).

3.5.2 Potential Significant Effects

The current layout of the proposed Hadyard Hill Extension has been developed to avoid direct effects on known cultural heritage assets. As such, no direct effects are anticipated on cultural heritage assets of national or regional importance. However an assessment would be undertaken to assess the potential for likely significant direct effects, through destruction or disturbance during construction, on other known or unknown cultural heritage assets within the site.

There is the potential for likely significant indirect effects on the setting of cultural heritage assets both within and outside of the site. An assessment will consider the potential for effects on the experience, understanding and appreciation of heritage assets of national and regional importance within 10 km, and features of local value within 5 km.

3.5.3 Additional Baseline Information Collection

A desk based assessment and site walkover would be undertaken. This would take into account existing archive records, aerial photographic resources and historic maps.

A site walkover would be undertaken to RCAHMS level 1 survey standard. The field survey will:

- assess the present baseline condition of known cultural heritage assets identified through the desk based assessment;
- identify any further features of interest not detected from the desk based assessment; and
- identify areas with the potential to contain currently unrecorded features of interest.

The walkover will use a standard monument recording form, digital photography, with locations and extent of features recorded using GPS equipment.

Cultural heritage assets within 10 km of the development site will be identified, where there is the potential indirect setting effects.

3.5.4 Effects Evaluation

Effects on cultural heritage assets will be assessed using two study areas, as follows:

- Direct effects study area – considering all assets within the site boundary; and
- Indirect effects study area – considering all assets within a 10 km study area.

The assessment will take into account the heritage importance of the asset and the magnitude of impact. The assessment of heritage importance of cultural heritage assets reflects the relative weight which statute and policy attach to them, principally as published in Scottish Planning Policy and SHEP[16]. The heritage importance of each asset will be assessed as National, Regional, Local or Lesser. Where there are no detectable surface remains and/or where the location and boundaries of a site are uncertain, the importance of

[16] Scottish Historic Environment Policy (SHEP) – URL: http://www.historic-scotland.gov.uk/index/heritage/policy/shep.htm (accessed 22.11.2012)

the site are assessed as unknown. The sensitivity of the setting of a cultural heritage asset will also take account of the contribution of the baseline setting to the experience, understanding and appreciation of the asset.

The magnitude of the impact on cultural heritage assets will be quantified as High, Medium, Low or Imperceptible, based on the nature and longevity of effect on the asset.

Effect significance will be determined by assessing both the sensitivity, and magnitude of impact. Effects will be defined as Major, Moderate, Minor or Negligible. Major and Moderate impacts will be classed as "significant"; other impacts will be insignificant.

The assessment of indirect effects will be supported by field visit and through the analysis of tools including ZTV maps and wireline models. Further consultation with South Ayrshire Council and Historic Scotland will be required to agree any requirement for visualisations to support the assessment.

Cumulative Effects

Cumulative indirect effects on cultural heritage assets as a result of the addition of the proposed Hadyard Hill Extension will be considered with reference to other proposed wind farm developments.

Operational and consented/in construction wind farms will be considered as part of the baseline.

3.6 Geology, Hydrogeology and Hydrology

3.6.1 Baseline

The site is drained by a number of small burns, which mainly form tributaries to the Water of Girvan to the north and the River Stinchar to the south. Penwhapple Reservoir lies adjacent to the site to the west, and sits within the existing Hadyard Hill wind farm.

The Penwhapple Burn which feeds the Penwhapple Reservoir is classified as having Moderate ecological potential (Heavily modified), with a targeted objective to be classified as Good for 2015. Penwhapple Reservoir is operated by Scottish Water and provides the public water supply for Girvan. It is stocked for recreational fishing.

The Riven Stinchar is classified as a drinking water protection zone, as is the Penwhapple burn, and Penwhapple Reservoir. The latter supplies Girvan and particularly the Ladyburn Distillery. Additionally it is stocked with trout and actively fished from both bank and boat, while River Stinchar is designated under the Freshwater Fish Directive.

In addition, the initial desk-based study identified the presence of one spring: Scarcraig Well spring (as shown on Ordnance Survey maps). A number of private water supplies are anticipated to be located within or in proximity to the site boundary, as the ES for the Hadyard Hill wind farm had identified sixteen Private Water Supplies on Hadyard Hill. Lower lying parts of the site may also be sensitive to an increase in flood risk given the proximity to the River Stinchar.

A review of the SEPA Indicative River & Coastal Flood Map[17] shows that areas at risk of flooding within the proposed wind farm site and its vicinity are confined to the areas alongside the Penwhapple Reservoir.

[17] SEPA Flood Map http://go.mappoint.net/sepa/ (accessed 01.11.2012)

The existing superficial geology mapping indicates peat coverage is limited to one area along the western slopes of Delamford Hill. Groundwater vulnerability in the area is likely to vary from reasonably low to high, depending on the location of rock fractures and subsequent groundwater flow.

3.6.2 Potential Significant Effects

There is the potential for direct significant effects on water quality, local hydrogeology and flood risk. These in turn have an indirect effect upon water use (private water supplies) and aquatic ecology.

The identification of the effects will based on the assessment of a design and construction process incorporating appropriate standard and good practice construction methods including the Water Environment (Controlled Activities) (Scotland) Regulations (General Binding Rules), Pollution Prevention Guidelines, and relevant SEPA policies.

Potential short term construction effects include:

- reductions in water quality through sedimentation and changes to in-stream hydrochemistry, primarily as a result of the necessary ground disturbance;
- pollution of watercourses and groundwaters (and therefore private water supplies proximate to the site) as a consequence of accidental spillage of chemicals, hydrocarbons and other construction materials; and
- localised disturbance of hydrogeology particularly with respect to Ground Water Dependent Terrestrial Ecosystems (GWDTEs) including isolated peat pockets may result in instability, drying and oxidation of the peat and sedimentation and acidification of draining watercourses.

The consideration of operational effects is based on the reasonable assumption that the wind farm would be designed and operated to meeting good practice guidelines. Consideration will be given to the potential for:

- impacts on hydrological pathways of increased impermeable extents and the routing effects of access tracks and cable trenches; and
- long term disruption to hydrogeology of Ground Water Dependent Terrestrial Ecosystems (GWDTEs).

3.6.3 Additional Baseline Information Collection

Consultation will be conducted with SEPA regarding the status of draining catchment waterbodies and locations of any Controlled Activities Regulations (CAR) abstraction licences.

The location of public and private water supplies will be confirmed with Scottish Water and South Ayrshire Council. Depending on the location of private water supplies, a risk assessment will be completed in accordance with SEPA guidelines[18].

A site visit will be conducted to confirm the desk reviews of geology (recording bedrock and drift exposures) and soils types and review if the local mapped features are hydrologically active. The site visit will also be used to understand the location and extent of peat deposits

[18] SEPA (2010) Land Use Planning System, SEPA Guidance Note 4: Planning advice on wind farm developments.

on site, both in relation to the access proposals and in relation to the final layout of the proposed Hadyard Hill Extension infrastructure.

The identification and assessment of potential borrow pit locations (if needed) will initially comprise a review of all relevant historical and geological maps, soil survey maps and aerial photographs together with any available borehole records held by the BGS. This information will be used in combination with the Digital Terrain Model (DTM) to identify preferred borrow pit sites based on topographic gradients and anticipated geology.

Following identification of potential borrow pit locations based on existing available data, a site walkover survey will be carried out to ground truth the information.

3.6.4 Effects Evaluation

The assessment will follow a defined assessment of criteria in which the final significance of an effect is a combination of the receptor sensitivity and magnitude of change. In this context the sensitivity is defined by the presence of a designated status, presence of salmonids or other freshwater ecological interests, the extent of active floodplain and the presence of public/private water supplies etc. The magnitude of change is based upon the level and duration of disturbance.

The assessment will include an assessment of the infrastructure locations with reference to the hydrological constraints. Particular attention will be paid to the potential hydrological and water quality impacts upon any water supplies within the vicinity of the site and any aquatic ecological features, as well as GWDTEs identified within the Ecology Chapter, in consultation with the ecological consultants.

There are no areas mapped as being at risk from flooding within the site on the SEPA Indicative River and Costal Flood Map, except two small areas south of Faikham Rig and the area adjacent to the Penwhapple Reservoir, both located at the western site boundary. Development within these areas will be avoided and hence a Drainage Impact Assessment and Flood Risk Assessment are not considered necessary.

Water Crossing Assessment

Assessment of proposed water crossing sites identified will be conducted. This will include detailed information on the watercourse crossings requiring a CAR authorisation/registration; which will include hydromorphological information at the water crossing location (including photographs upstream and downstream and the width of the watercourse), the type of crossing required and the subsequent level of CAR authorisation required.

Private Water Supply

A Private Water Supply Risk Assessment will be undertaken for any abstractions identified within 250 m of the nearest turbine, or 100 m of the nearest element of infrastructure. This will confirm the status, location, source type and baseline quality of any supplies that may potentially be affected and will facilitate a full assessment of any risk that the proposals may pose, along with suitable mitigation measures.

Peat Assessment

The detailed design of the infrastructure layout will aim to avoid any areas of deep peat.

Based on the findings of the baseline surveys for peat, a peat stability risk assessment and Peat Management Plan may be required, subject to further consultation. Furthermore, the Scottish Government Carbon Calculator tool will be completed.

Cumulative Effects

Cumulative effects on hydrology will be considered with reference to any other proposed wind farms within the Water of Girvan or River Stinchar catchments.

3.7 Access, Traffic and Transport

3.7.1 Baseline

The surrounding road network includes a number of unclassified roads, traversing the site to connect the Water of Girvan and River Stinchar valleys. The B734 is located on the western boundary of the site and connects Girvan and the A77 (T) in west and the A714 in the south, via Barr. Primary access to the wind farm would be via the B734 Old Dailly to Barr road, using the existing Hadyard Hill wind farm track infrastructure as far as possible.

The main components of the turbines would be delivered to site by road from a suitable port facility, most likely to be the Port of Ayr via the A77 and B734. The proposed site access route is shown on Figure 3. The main construction access would also be via the B734.

This access route was previously used for the existing Hadyard Hill wind farm construction.

3.7.2 Potential Significant Effects

The main potential effects considered are:

- Traffic congestion due to an increase in HGV traffic related to material and component delivery, and forestry extraction;
- Traffic congestion due to an increase in non-HGV traffic; and
- Abnormal road wear and tear.

3.7.3 Additional Baseline Information Collection

The key tasks are as follows:

- undertake a site visit to examine site access junction locations for the development site;
- undertake swept path assessments and identify mitigation measures required to achieve access for abnormal loads;
- collection of base line traffic data; and
- develop construction, operational and decommissioning traffic volumes for use in the assessment.

3.7.4 Effects Evaluation

The assessment will cover the construction, operational and decommissioning phases of the project. An assessment of the potential effects on identified receptors will be undertaken in accordance with Institute of Environmental Assessment (IEA) guidelines[19], using traffic count data and an estimate of the number of trips associated with each phase of the development.

Scoping discussions will be held with both South Ayrshire Council (as local roads authority) and Transport Scotland and their agents Amey (as trunk roads agencies). The scoping

[19] IEA (1993) Guidelines for the Environmental Assessment of Road Traffic

discussions will identify the extent of the study area, agree the methodologies and identify data sources for use in the project.

Sensitive receptors, including settlements, residential properties and community facilities will be identified and classified.

The results from the receptor sensitivity and impact magnitude will be correlated to assign a level of significance.

Cumulative Effects

The identification of any cumulative schemes to be considered in the assessment will be discussed and agreed with South Ayrshire Council.

3.8 Aviation

3.8.1 Baseline

Glasgow Airport is situated approximately 65 km to the north of the site and Glasgow Prestwick International Airport lies approximately 25 km to the north. The NATS (En Route) plc Lowther Hill Radar is approximately 57 km to the east of the site.

3.8.2 Potential Significant Effects

Potential significant effects include:

- interference with aviation operations through physical obstruction; and
- interference with radar and air traffic control services through the turbines creating clutter on a radar display.

3.8.3 Effects Evaluation

An assessment will be completed to consider all potential impacts on aviation operations at Glasgow Airport and Glasgow Prestwick Airport, and military and civilian low flying aircraft operations.

A technical and operational assessment will be conducted which will consider all potential effects on NATS (En Route) plc radar and communications installations.

All available mitigation solutions will be identified and considered.

Following the technical assessment, consultation will be undertaken with the relevant aviation stakeholders (notably NATS, Defence Infrastructure Organisation (DIO) on behalf of the MOD, Glasgow Prestwick Airport and Glasgow Airport) to discuss the results with a view to agreeing mitigation strategies where appropriate. There may be a requirement for aviation planning conditions to support a mitigation strategy.

Cumulative Effects

The assessment will include consideration of cumulative impacts of the proposed Hadyard Hill Extension in combination with operational and consented wind farms as agreed with statutory and non-statutory consultees.

3.9 Noise

3.9.1 Baseline

The nearest settlements include Barr (2 km south) and Dailly (3 km north). In addition there are a number of scattered dwellings and farms in the surrounding area (some of which are financially involved in the project) which are considered to be sensitive to an increase in the noise levels.

The baseline noise environment includes the contribution of the existing Hadyard Hill wind farm; however the noise from the operational turbines will not influence the background noise levels used to derive noise limits, in accordance with Institute of Acoustics guidance[20].

With the exception of any noise from the existing wind farm, the baseline noise environment is typical of a rural environment.

3.9.2 Potential Significant Effects

There is the potential for mechanical noise from the operational wind turbines; however the dominant noise source would be associated with aerodynamic noise from the blades moving through the air to be audible at neighbouring dwellings during the operation of the wind farm.

The assessment will also consider potential significant effects associated with construction noise.

3.9.3 Additional Baseline Information Collection

The following actions will be carried out:

- review of current proposals and site context to confirm noise sensitive properties and suitable background noise measurement positions, taking into account the current operating wind farm;
- consultation with South Ayrshire Environmental Health Officer (EHO) on baseline noise monitoring proposals and assessment methodology; and
- installation of noise measurement equipment at agreed baseline measurement locations and collection after sufficient data has been collected.

3.9.4 Effects Evaluation

Noise effects will be assessed in accordance with the recommendations of ETSU-R-97[21] and the IOA Good Practice Guide[22]. The predicted noise levels produced by the operation of the wind turbines will be compared with appropriate noise limits at nearby residential properties. Noise limits will be derived based on the results of the baseline monitoring and correlation with on-site wind speed measurements.

The ETSU-R-97 noise limits are as follows:

[20] Institute of Acoustics, A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise (May 2013).

[21] Department of Trade and Industry 'The Assessment and Rating of Noise from Wind Farms' (ETSU, 1996)

[22] Institute of Acoustics, A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise (May 2013).

- Night-time periods: 5dB(A) above prevailing night-time background, subject to a minimum of 43dB(A); and
- Day-time periods: 5dB(A) above prevailing day-time background, subject to a minimum of 35dB(A) to 40dB(A) (lower and upper limits respectively).

Construction noise will be predicted and assessed in accordance with the methods defined in BS5228-1[23], which states that construction noise in rural locations away from noise sources is significant where it exceeds 70dB LAeq,T.

Noise impacts from construction HGVs will be assessed by comparing existing and proposed HGV movements. For all traffic, only where a proposed development results in a doubling of traffic flow, are impacts usually considered significant. In this situation, it is possible that traffic levels may double on the access tracks. It is also possible that HGV numbers might double on the access tracks. In this case, a significant noise impact will be defined where the proposed development gives rise to an increase in HGV and other traffic flow which is >100% of baseline flow.

The potential for cumulative impacts of operational noise with other wind farms identified will be considered including an assessment of effects for worst case wind direction to evaluate possible cumulative exceedances of derived noise limits.

3.10 Cumulative Effects

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

Cumulative effects will be considered for each of the technical assessments with reference to operational and consented wind farms, proposed wind farms which are the subject of undetermined applications and scoping stage projects.

Additional consultation will be carried with South Ayrshire Council, Dumfries and Galloway Council and SNH to agree a list of wind farms (and their planning status) to be included within the scope of the assessment of cumulative effects at a suitable cut-off date.

3.11 Socioeconomics

The proposed wind farm would bring the potential for beneficial economic effects in relation to the temporary and long term increase in employment opportunities during construction and operation. While the economic effects are not considered to give rise to significant effects, it is proposed that effects on socioeconomics will be considered in the ES.

Potential effects on visual amenity for tourists and recreational locations will be fully assessed in the landscape and visual assessment. However, it should be noted that while the proposed Hadyard Hill extension is located in an area where tourism makes a considerable contribution to the local economy and there are numerous recreational resources present in the area, there is no evidence to support the suggestion that the

[23] BS5228-1:2009, Code of practice for noise and vibration control on construction and open sites.

presence of a wind farm would result in a significant adverse effect on tourism or recreation resources[24].

The construction of the proposed wind farm would not entail significant road works, closures or diversions which would have potential to adversely affect access to tourism assets and no potential for significant effects is identified.

[24] Renewables UK (2010) Wind Farms and Tourism Fact Sheet 03, accessed at http://www.helensburghrenewables.co.uk/wp-uploads/2013/02/ReUK-Tourism.pdf

[24] Visit Scotland, Wind Farm Consumer Research, 2012

[24] David Stewart Associates (2002) Lambrigg Wind Farm Impact on Tourism Research

[24] Biggar Economics (2006) Impact of Wind Farms on Tourism – A Report to Airtricity

[24] Research for Scottish and Southern Energy (2007) 'Tourism Impact of the Artfield Fell Wind Farm'

[24] Riddington et al, Glasgow Caledonian University et al. (2008) The economic impact of wind farms on Scottish tourism

4 Issues scoped out of the EIA

4.1 Air Quality

The proposed development is not considered likely to give rise to significant impacts on air quality. The main activities would 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 would be localised, short term, intermittent and controllable through the application of good construction practice. Fixed and mobile plant would be limited in size and number, and operate for short periods.

The contributions of exhaust emissions (NO_2 and PM_{10}) from construction vehicles are likely to be low, and orders of magnitude below current Air Quality Objectives. Therefore, it is proposed that the EIA will not address air quality impacts.

4.2 Forestry

A large proportion of the site is currently stocked with commercial plantation woodland. The current proposal is that the woodland would be clear felled from the site. A brief description to the proposals would be provided in the main ES, with a Forest Design Plan covering the management of felling, any restocking, conversion proposals (e.g. to native woodland) or compensatory planning or habitat management to satisfy the requirements of the Scottish Government woodland removal policy[25] provided as a technical appendix to the ES. It proposed that an impact assessment on forestry is not required.

Indirect effects on landscape, visual amenity, ecology, ornithology, hydrology and noise associated with tree felling and timber extraction will be considered in the appropriate technical chapters.

4.3 Shadow Flicker

Scottish Government web-based Advice on onshore wind turbines (previously known as PAN45) states that 'where separation is provided between wind turbines and nearby dwellings (as a general rule 10 rotor diameters), "shadow flicker" should not be a problem.' Local policy[26] also looks for a 10 rotor diameter separation to the nearest dwellings. On this basis, no shadow flicker assessment will be provided, unless there are properties within the 10 rotor diameter limit.

4.4 Ice Throw

The maximum potential distance of ice falling from turbines can be approximated using the formula 1.5 x (blade diameter + hub height)[27]. For the proposed wind farm, the maximum distance from a turbine where ice could be expected to fall is therefore in the region of 270 m. As such, the risk to public safety is considered to be very low because the distance

[25] Scottish Government, Control of Woodland Removal, Forestry Commission Scotland, February 2009

[26] Addendum to Ayrshire Joint Structure Plan Technical Report TR03/2006, URL: http://www.ayrshire-jsu.gov.uk/publications.html (accessed 15/01/2014)

[27] BOREAS (2003), Seifert, Westerhellwg and Kroning Risk Analysis of Ice Throw from Wind Turbines, BOREAS 6-11th April 2003

from the turbines to the nearest public road or residential property would be greater than 270 m.

In line with current guidance[28] however, on any occasion when icing may present a risk, temporary warning signs at access points are proposed to alert the public to this issue, with advice not to stand close below towers and when nearby and in-line with turbine blades. No detailed assessment is proposed as part of the ES.

[28] Good Practice During Wind Farm Construction, A joint publication by Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency, Forestry Commission Scotland; Version 1, October 2010 (URL: http://www.snh.org.uk/pdfs/strategy/renewables/Good%20practice%20during%20windfarm%20construction.pdf)

5 Next steps

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

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

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Appendix A: Consultee List

Consultee List
Competent Authority
Scottish Government
Statutory Consultees
Planning Authority
SEPA
SNH
Non Statutory Consultees
Forestry Commission
Historic Scotland
Marine Scotland
Transport Scotland
Association of Salmon Fishery Board
Civil Aviation Authority - Airspace
The Crown Estate
Defence Infrastructure Organisation
NATS Safeguarding
RSPB Scotland
Mountaineering Council of Scotland
Scottish Water
Visit Scotland
John Muir Trust
Scottish Wildlife Trust
BAA (Glasgow Airport)
Glasgow Prestwick Airport
Scottish Rights of Way and Access Society (ScotWays)
Garden History Society in Scotland
Dark Sky Discovery partnership
Turbine Coordinates by email only
OFCOM
Atkins
BT
Joint Radio Company

Consultee List
Arqiva
Local community consultees
Local community consultees to be consulted separately through the SSE Renewables community liaison team.

Appendix B: Ecology

Ecology Methodology

Study Areas

Various survey and desk study areas have been established for this project. The core survey area for the habitat and protected species surveys includes the site boundary and a 500 m wide margin around this boundary. For the desk study, a 2 km wide margin beyond the site boundary was used for requests for most records. For bats this was extended to 10 km.

Desk Study

Designated Sites

Information on sites designated for nature conservation within 10 km of the Hadyard Hill Extension were obtained from Scottish Natural Heritage's (SNH) Sitelink website and South Ayrshire Council's website.

Protected Habitats and Species

Biological records were obtained from the National Biodiversity Network (NBN) Gateway for the 10 km British Ordnance Survey national grid hectads that cover the Hadyard wind farm extension site, i.e. NS20, NS30, NX29 and NX39. A further 10 km wide area was included within the desk study specifically for bat records.

In addition, various organisations were contacted to request relevant biological data, which could assist in focusing particular survey effort as well as helping to inform a comprehensive description of the key ecological interest of the study area. The following organisations were contacted with requests for records of protected species / species of conservation concern for the relevant study area:

- Scottish Wildlife Trust
- Ayrshire Bat Group;
- Scottish Badgers;
- Ayrshire Biodiversity Officer;
- Southwest Red Squirrel Project Officer;
- Ayrshire Rivers Trust;
- Forest Enterprise / Forestry Commission;
- Tilhill Forest Managers; and
- Botanical Society of the British Isles (BSBI) vice county recorder.

Habitat and Flora Surveys

A Phase 1 habitat survey was undertaken in September 2013. The survey included a 500 m wide margin around the proposed development area boundary. This followed the methods described in the Handbook for Phase 1 Habitat Survey (JNCC, 2010)[29]. The Phase 1 habitats within 500 m of the proposed development will be mapped according to the

[29] JNCC (2010). Handbook for Phase 1 habitat survey - a technique for environmental audit. First published 1990; reprinted in 1993; reprinted in 2003 with limited revisions & additions; reprinted in 2004; reprinted in 2007 with minor additions; reprinted in 2010.

methods set in JNCC (2003)[30]. A list of higher plant species will also be produced. Scientific names used for vascular plants recorded during the surveys will follow those given in Stace (2010)[31] and for non-vascular plants (mosses and liverworts) Smith (2004)[32] and Paton (1999)[33].

Target notes made during the Phase 1 habitat survey, which provide further detail on habitat condition, vegetation composition and diversity, management effects, and the location of notable habitats and plant species stands too small to map, will also be provided.

A National Vegetation Classification (NVC) survey will be completed for applicable Phase 1 habitats in summer 2014. Using field notes and quadrat data the closest matching NVC community will be assigned using professional judgement and with reference to the descriptions in Rodwell (ed. 1991-2000)[34] and keys in Averis *et al.* (2004)[35]. This survey will provide more detail on the type and distribution of semi-natural vegetation communities that might be affected by the proposed development and will help to identify sensitive habitats of conservation interest including those considered to be moderately or highly groundwater dependant (i.e. GWDTEs). GWDTEs are habitats that are considered sensitive to changes in groundwater flow and quality, particularly in response to earthworks associated with construction sites. NVC communities considered to be, or potentially to be, GWDTEs are listed in the SEPA document 'Land Use Planning System – SEPA Guidance Note 4: Planning advice on windfarm developments' (March 2012).

Protected Species Surveys

Protected species surveys were undertaken between September and November 2013. The surveys focused on potentially suitable habitats within the proposed development areas, including a 500 m margin around each area. The surveys focused on assessing habitat suitability and the presence / likely absence of a range of species of conservation concern which have special legal protection in the UK and Europe. Surveys were completed for badger *Meles meles*, bat species, great crested newt *Triturus cristatus* habitat suitability, otter *Lutra lutra*, red squirrel *Sciurus vulgaris* and water vole *Arvicola amphibius* and follow current best practice guidance on relevant survey methods.

No specific surveys were undertaken for reptiles. However, during the various surveys any observations of adder *Vipera berus*, slow worm *Anguis fragilis* and common lizard *Zootoca vivipara* were noted. A search for records of reptiles was completed as part of the desk study.

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[30] JNCC (2010). Handbook for Phase 1 habitat survey - a technique for environmental audit. First published 1990; reprinted in 1993; reprinted in 2003 with limited revisions & additions; reprinted in 2004; reprinted in 2007 with minor additions; reprinted in 2010.

[31] Stace, C.A. (2010). New Flora of the British Isles, 3rd Edition. Cambridge University Press, Cambridge, UK.

[32] Smith, A.J.E. (2004). The Moss Flora of Britain and Ireland, 2nd Edition. Cambridge University Press, Cambridge, UK.

[33] Paton, J.A. (1999). The Liverwort Flora of the British Isles. Harley Books, Colchester, UK.

[34] Rodwell, J. S. (ed.) (1991 -2000). British Plant Communities (Volumes 1-5). Cambridge University Press, Cambridge.

[35] Averis, A., Averis, B., Birks, J., Horsfield, D., Thompson, D., & Yeo, M. (2004). An Illustrated Guide to British Upland Vegetation. Joint Nature Conservation Committee, Peterborough, UK.

No specific fish or fish habitat surveys have been completed to date. Ayrshire Rivers Trust was consulted as part of the desk study and existing general information about fish populations for the larger tributaries / catchments within and surrounding the site was requested.

No aquatic or terrestrial invertebrate surveys have been completed to date. Records / information about known populations of notable species within the study area were searched for as part of the desk study.

Badger

All potentially suitable habitats (including areas of bracken and gorse) were surveyed for evidence of badger, including checking the locations of records obtained during the desk study. Evidence of the presence of badger includes setts, dung pits, latrines, paths, prints, hairs, scratching posts and feeding signs which are described in greater detail in Neal & Cheeseman (1996)[36] and Bang & Dahlstrøm (2001)[37]. Any setts found were carefully assessed for evidence of current use by badger and also provisionally assigned to one of the following standards categories: i.e. main sett, annex, subsidiary or outlier.

Bat species

The baseline survey for bats comprised two main approaches: bat activity surveys and bat habitat / roost potential surveys. All survey methods followed those outlined in current best practice guidance[38].

Between May and October 2012 bat activity surveys were undertaken within the proposed wind farm extension areas in order to determine species presence, bat community composition and the type and relative intensity of bat activity across the survey area. This information will be used to assist with the assessment of the potential implications of the proposed development on bat populations (i.e. primarily in relation to the potential for wind farms to result in bat mortality) and to inform any design mitigation which may be appropriate.

The bat activity survey included two methods: walked or driven transects and automated unattended recorders. Transect routes were selected following a stratified random approach, such that the main habitat types within the survey area were sampled for bat activity in relation to their approximate proportional extent within the survey area. Following the Hundt 2012 guidelines, component parts of the survey area were assessed for their general bat habitat quality. Transects which were located within or adjacent to 'medium' or 'high' habitat quality areas were surveyed each month. Transects in 'low' habitat quality were surveyed on a seasonal basis, i.e. in the spring, summer and autumn.

Automated bat detectors were placed at various sampling locations during the summer of 2012 and outside certain structures considered to have some potential as transitional / winter roost sites during September and October 2013. Automated bat detectors were also connected to microphones attached to meteorological masts at 50 m above ground level on Daljedburgh Hill and Doughty Hill. The automated detectors and recorders were typically left

[36] Neal, E. and Cheeseman, C. (1996) Badgers. T & A D Poyser Ltd, London; Bang, P. and Dahlstrom, P. (2001). Animal Tracks and Signs. Oxford University Press, Oxford.

[37] Bang, P. and Dahlstrom, P. (2001). Animal Tracks and Signs. Oxford University Press, Oxford.

[38] Hundt, L (2012) Bat Surveys: Good Practice Guidelines. 2nd Edition, Bat Conservation Trust.

unattended for 5 consecutive nights on a monthly or seasonal rotation depending on the assessed habitat quality, following the approach specified in Hundt (2012).

The presence of any potential bat roosting and foraging habitats within the development site were recorded and systemically evaluated during the protected species walkover survey in between September and November 2013. Natural and man-made structures with features that may provide opportunities for roosting bats were systematically graded on a qualitative scale following the methods set out in Hunt (2012).

Great crested newt

Standing waterbodies within the survey area were assessed for its potential to support newt populations following the Habitat Suitability Index methodology outlined in the guidelines produced by the Amphibian and Reptile Groups of the United Kingdom (ARG, 2010)[39].

Otter

The banks of all waterbodies and potentially suitable resting sites (e.g. holts, couches, under bridges) were surveyed for evidence of the presence of otter. Signs include holts, couches, feeding remains, spraints, prints and slides. Otter field signs are described in detail in Bang & Dahlstrøm (2001) and Sargent & Morris (2003)[40].

Red squirrel

During 2013 all woodlands within the survey area was qualitatively assessed for their suitability to support red squirrel following guidance outlined by Forestry Commission Practice Notes[41], which are based on the tree species, composition, age class and aspect.

Water vole

All watercourses and any suitable areas of bog and marshy grassland were surveyed for evidence of water vole during September and November 2013. Signs include droppings, latrines, feeding stations, lawns, burrows and runs and are described in Strachan *et al.* (2011)[42]. The survey also included recording evidence of American mink because this is a significant non-native predator of water vole.

[39] Amphibian and Reptile Groups of the United Kingdom Advice Note 5 – Great Crested Newt Habitat Suitability Index (May 2010).

[40] Sargent, G. and Morris, P. (2003). How to Find and Identify Mammals. Mammal society. London.

[41] Gurnell, J., Lurz, P.W.W., McDonald, R., Pepper, H., (2009). Practical techniques for surveying and monitoring squirrels, Forestry Commission Technical Note, FCPN011.

[42] Strachan R., Moorhouse, T. and Gelling, M. (2011). Water Vole Conservation Handbook. Wildlife Conservation Research Unit, Oxford.

Ecology Significance Criteria

This guidance for determining ecological receptors value is summarised in Table 1.

Table 1 Defining Ecological Receptor 'Value'	
Value (where species or habitats occur in more than one level, the highest value is applicable)	**Definition**
Very High (International importance)	Habitats or species that form part of the cited interest within an internationally protected site or candidate site (e.g. SAC, SPA, Ramsar site). A receptor (e.g. a habitat or population) which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in an international/national context that the site is likely to be designated as an SAC / SPA.
High (National importance)	Habitats or species that form part of the cited interest within a nationally designated site (SSSI, NNR). A habitat or population which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in a national/regional context for which the site could potentially be designated as an SSSI.
Medium (Regional importance)	Habitats or species that form part of the cited interest of a LNR, or some local-level designated sites depending on specific site conditions. Viable areas of internationally or nationally important habitats (e.g. Annex 1 habitats, priority BAP habitats) present in quality and extent at a regional level or relevant biogeoclimatic zone (e.g. SNH Natural Heritage Future area). Population of a species which is either unique or sufficiently unusual to be considered as being of nature conservation value at up to a county context (e.g. Nationally Scarce). Sites supporting critical habitats for a regularly occurring, regionally significant number of a nationally important species (e.g. a priority UK BAP species).
Low (Local importance)	<u>High</u>: Sites, features/habitats meeting the criteria for the Local Planning Authority's designation or a Wildlife Site. This may include amenity and educational criteria in urban areas. Sites containing viable areas of any priority habitat identified in the UK BAP or the Local Planning Authority's LBAP. Sites supporting viable breeding populations of species known to be Scottish Local Authority rarities (such as those included in the LBAP) and/or supplying critical elements of their habitat requirements. Any regularly occurring, locally significant population.
	<u>Medium</u>:

Table 1 Defining Ecological Receptor 'Value'	
Value (where species or habitats occur in more than one level, the highest value is applicable)	**Definition**
	Features/habitats or species which are not considered to qualify for non-statutory designation but which provide locally important semi-natural habitats (approximately 10 km radius from the site). Populations of any species conservation importance in the context of the local area (approximately 10 km radius from the site).
	Low: Features/habitats or species which are not considered to qualify for non-statutory designation but which provide locally important semi-natural habitats in the context of the immediate surrounding area (such as species-rich hedgerows or small ponds). Populations of any species of conservation importance in the context of the immediate surrounding area.
Negligible	Commonplace feature of little or no habitat/historical significance. Loss of such a feature would not be seen as detrimental to the ecology of the area.
Duration	Short-term (<5 years) Medium-term (5-15 years) Long-term (15-25 years or longer)

Effects Magnitude

The assessment of an ecological receptor's sensitivity to change, due to an effect from the development, is based on professional experience and information available from scientific literature. This aspect of the assessment requires an understanding of the likely responses of a receptor to a given impact or set of impacts.

The levels of effect are ranked into one of five groups, taking into account scale (total to negligible) and duration of the effects (number of years). These levels are described in Table 2

Table 2 Levels of Effects Arising as a Result of the Development, and Duration of effects	
Magnitude	**Description**
Total / Near Total	A loss of a most of or all of the habitat / feature / population, or cause sufficient damage to a feature to immediately affect its viability.
High	Effects on the habitat / feature / population that would alter the nature of the feature in the short or long-term and affect its long-term viability. For example, more than 20% habitat loss or damage.
Medium	Impacts that are detectable in short and long-term, but which should not alter the long-term viability of the habitat / feature / population. For example, between 10 - 20% habitat loss or damage.

Table 2 Levels of Effects Arising as a Result of the Development, and Duration of effects	
Magnitude	**Description**
Low	Minor impacts, either of sufficiently small-scale or of short duration to cause no long-term harm to the habitat / feature / population. For example, less than 10% habitat loss or damage.
Negligible	Minimal change on a very small scale.
Duration definitions	Long-term (15 - 25 years or longer) Medium-term (5 - 15 years) Short-term (<5 years)

The determination of the significance of effect (i.e. whether major, moderate, minor to negligible) involves primarily the interaction of impact magnitude and the receptor value and sensitivity.

Effects are referred to as being significant if they are assessed as Moderate or Major. The IEEM Guidelines for Ecological Impact Assessment in the United Kingdom (2006) guidance emphasises the importance of professional judgement in arriving at a decision about the significance of such effects, because they will also be influenced by the extent of impact, duration, reversibility and timing / frequency.

Appendix C: Ornithology

Ornithology Methodology

Desk Study

Several desk studies have been completed to date (most recently in Autumn 2013) in order to collate existing available information for key species of interest that may be present in the study area. The initial desk study, completed in spring 2011, included searches of available online sources for data on designated sites such as the SNH Sitelink Website (http://gateway.snh.gov.uk/sitelink/) within 20 km of the proposed wind farm extension site. Also, the desk study focused on establishing the potential suite of species that may be present in the area based on previous surveys undertaken to inform the original Hadyard Hill wind farm assessment and the consultant's general knowledge of the bird fauna of the region. A more extensive desk study was completed in 2013. Requests for records of species of conservation concern for the proposed extension site and a c. 10 km wide margin around the site boundary were placed with a range of organisations, as follows:

- Royal Society for the Protection of Birds;
- British Trust for Ornithology;
- Scottish Ornithologist Club local recorder;
- South Strathclyde Raptor Study Group;
- Forest Enterprise / Forestry Commission; and
- Tilhill Forest Managers.

The collated information from the desk study was used to help inform, in combination with data from the completed baseline surveys, the wind farm design process and will be used to inform the assessment of the effects of the wind farm extension proposals.

Survey Areas

The survey areas are based on the extension site boundaries. The various survey areas are defined as follows:

- 'site area' refers to the area enclosed by the proposed wind farm extension site boundary;
- 'breeding bird survey area', 'winter walkover survey area' or 'core survey area' refers to the site area plus an additional 500 m wide strip around the site area;
- 'black grouse survey area' refers to the site area plus an additional minimum 1.5 km wide strip; and
- 'raptor survey area' refers to the site plus, up to, an additional 2 km wide strip depending on the focal species and presence of contiguous suitable habitat outside of the core survey area.

Survey Methods

Baseline ornithological surveys were completed between May 2011 and March 2013 to systematically record and assess the use of all habitats within the study area by breeding and non-breeding birds with a particular focus on species that are potentially sensitive to wind farm development and are also of conservation concern (i.e. species listed on Annex 1 of the EC Birds Directive, Schedule 1 of the Wildlife and Countryside Act 1981, species on

the UK Red List of birds of conservation concern). All surveys have been undertaken by suitably experienced ornithological surveyors who have been trained in the detailed field and recording methods of each of the surveys they are completing.

Listed below are some of the key published guidance and scientific papers which have been considered in determining the detailed survey methods for this project:

- SNH (2005) Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities, 2010 version (most recently revised August 2013);
- SNH (2012) Assessing Connectivity with Special Protection Areas (SPAs). March 2012;
- Bibby et al. (2000) Bird Census Techniques;
- Gilbert et al. (1998) Bird Monitoring Methods;
- Brown & Shepherd (1993) A method for censusing upland breeding waders; and
- Hardey et al. (2009) Raptors: a Field Guide to Survey and Monitoring.

The survey area and vantage point (VP) locations for the flight activity surveys are shown on Figure 6. In summary, the following surveys have been completed:

- Winter, Spring, Summer and Autumn Flight Activity Surveys, from strategically located vantage points, to systematically quantify the use of the site by key species (i.e. species of conservation concern and susceptibility to adverse effects from wind farm development);
- Breeding Bird Surveys. A range of surveys completed to determine the presence and approximate location of breeding territories/sites within the core and wider survey areas, including the following:

    - Moorland and woodland breeding bird surveys of the core survey area in 2011 (April to July) and also in 2012 (April to July);
    - Breeding raptor surveys, focusing on species listed on Schedule 1 of the Wildlife & Countryside Act 1981, within suitable habitats in the raptor survey area in the Spring/Summer 2011 and Spring/Summer 2012;
    - Raptor prey transect surveys in June and August 2011 and May and July 2012 in the core survey area;
    - Black grouse *Tetrao tetrix* reconnaissance and lek surveys in Spring 2011 and Spring 2012 within the black grouse survey area;
    - Forest owl, woodcock *Scolopax rusticola* and nightjar *Caprimulgus europaeus* surveys of the core survey area in 2011 and 2012;
    - Hen harrier *Circus cyaneus* winter roost surveys between October 2012 and March 2013 in the raptor survey area; and
    - Focal surveys of peregrine *Falco peregrinus* ranging behaviour at two sites between April and August 2013.

- Winter Bird Surveys involving walkover surveys to assess the use of the site by passage and wintering birds, supplementing observations from the flight activity survey, and regular counts of waterbirds at waterbodies in the wider survey area (i.e. Penwhapple Reservoir). Wintering bird walkover surveys of the core survey area were completed between December 2011 and February 2012 and between October 2012

and February 2013. Waterbody counts were completed between December 2011 and April 2012 and between July 2012 and March 2013.

Bird flight activity was systematically monitored from strategically located vantage points (VPs) in 2011, 2012 and 2013 following the methods described in Band et al. (2007)[43] and SNH (2010)[44]. The purpose of these surveys was to inform estimates of the frequency of flight activity, by certain 'target' species, at the estimated wind turbine height across the survey area. Target species were recorded in preference to secondary species if a target and secondary species were in the observer's view at the same time. The list of target species is given in Table 1 below.

Table 1: List of Target Species for Flight Activity Surveys and their Status (2011-2013)

Common Name	Scientific Name	Schedule 1[i]	Annex I [ii]	UK BoCC Status [iii]
Whooper swan	*Cygnus cygnus*	x	x	Amber
Pink-footed goose	*Anser brachyrhynchus*			Amber
Greylag goose	*Anser anser*			Amber
Hen harrier	*Circus cyaneus*	x	x	Red
Goshawk	*Accipiter gentilis*	x		Green
Osprey	*Pandion haliaetus*	x	x	Amber
Merlin	*Falco columbarius*	x	x	Amber
Peregrine	*Falco peregrinus*	x	x	Green
Black grouse	*Tetrao tetrix*			Red
Golden plover	*Pluvialis apricaria*		x	Amber
Barn owl	*Tyto alba*	x		Amber

i. Species listed on Schedule 1 to the Wildlife and Countryside Act 1981 (as amended).

ii. Species listed on Annex I of the EC Birds Directive (Directive 2009/147/EC on the conservation of wild birds - the codified version).

iii. Birds of Conservation Concern (BoCC) in the UK (Eaton et al. 2009).

From May 2011 and up to and including August 2012 a total of 17 vantage points were used. In August 2012 this was reduced to 14 vantage points reflecting a reduced potential wind farm development area. One of the vantage points was not surveyed between August and October 2011 due to landowner access constraints but was resumed in November 2011. Watches from these vantage points were usually three hours long and were timed to ensure each vantage point had observations spread throughout daylight hours each month.

The height above ground level of target and secondary species flights was assessed by the observer to be within one of several bands so that an estimate could be made of flight

[43] Band, W., Madders, M. and Whitfield, D.P. (2007) Developing field and analytical methods to assess avian collision risk at Wind Farms. In de Lucas, M., Janss, G. & Ferrer, M. (eds.) Birds and Wind Power. Quercus.

[44] Scottish Natural Heritage (2005, revised 2010) Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities.

activity within the zone where turbine blades would be operating. The height bands used in the flight activity surveys were as follows:

- Very Low = <5 m;
- Low = 5-20 m;
- Medium = 20-150 m;
- High = 150-250 m; and
- Very High = >250 m.

Table 2 below details the location of the vantage points selected for the flight activity survey and the number of hours of observation completed at each per year.

Table 2: Vantage Point Locations and Hours of Observation during Flight Activity Surveys from May 2011 to March 2013

VP No.	VP Location	Easting	Northing	2011	2012	2013
1	Kirkland Hill	225072	594162	57.00	141.00	27.00
2	Pinmerry	224397	595337	75.00	132.00	27.50
3	Daldowie Hill	222967	592562	57.00	142.50	27.00
4	Dalfask	222222	593947	87.00	120.00	27.00
5	Green Hill (North)	225742	597257	55.25	95.00	**n/a**[i]
6	Green Hill (South)	225742	597257	68.00	122.75	25.50
7	Mull of Miljoan (West)	227915	597094	81.25	118.50	30.00
8	Craig Hill	232939	600824	62.83	90.00	**n/a**[i]
9	Maxwellston Hill	231298	601437	60.00	90.17	**n/a**[i]
10	Mull of Miljoan (East)	227915	597094	54.58	138.50	27.58
11	Delamford Hill	229302	598577	46.08	144.50	31.00
12	Barony Hill (South)	231066	601276	78.00	127.08	27.00
13	Daljedburgh Hill	231252	597239	87.00	120.00	27.00
14	Pinverains (East)	233421	598288	54.00	145.00	27.00
15	Pinverains (West)	233421	598288	60.00	135.00	27.00
16	The Pilot	232939	600824	36.00 [ii]	135.00	27.00
17	Barony Hill (North)	231298	601437	66.00	126.00	27.00

i. VPs excluded from further surveying from September 2012.
ii. VP not surveyed between August 2011 and October 2011 due to landowner access restrictions.

Summary of Baseline Surveys

Species Records

The following brief summary focuses on records of target species (see Table 1 above).

The initial and subsequent desk studies identified that the study area provide potentially suitable habitat to support breeding goshawk, hen harrier, osprey and merlin although there was no current or recent historical evidence of breeding activity by these species within the survey area. Breeding pairs of peregrine falcon and barn owl were known to be present in the general area. Kestrel *Falco tinnunculus* was also thought to breed in the general area.

The desk study confirmed that flocks of golden plover (peak no. of 85 in April 2002) are present in suitably habitats in the survey area during passage periods and during the winter. However, there was no evidence of breeding activity by this species. The study area is outside of the current breeding range of this species in the UK.

During baseline surveys for the original wind farm development, a total of 17 curlew *Numenius arquata* breeding territories were recorded within the survey area for the existing wind farm.

Records from the RSPB and Dailly Community Council confirmed there were several small black grouse leks (typically comprising peak counts of less than 5 males attending), primarily located towards the centre and north-eastern parts of the survey area for the wind farm extension, present during the mid to late 1990's. However, the most recent record was from c. 2001, suggesting decline and probable local extirpation of black grouse from the area.

There was no evidence from the available desk study information of appreciable numbers of passage or wintering wild geese or swans of conservation concern occurring on Penwhapple Reservoir (the primary potential roost site for wildfowl within the wind farm extension survey area) or habitually feeding in suitable habitat within the study area.

Key Findings of the Baseline Surveys

In general, and in relation to target species, the findings of the baseline breeding and wintering bird surveys were consistent with the information collated during the desk studies.

<u>Geese and Swans</u>

The site was rarely visited by significant numbers of wildfowl and patterns of flight activity showed no regular local or passage movements of geese or swans over the site. The proposed wind farm extension area provides very limited suitable habitat for wintering / passage wildfowl. Penwhapple Reservoir is the only potential roost site of any note within the area.

South west Scotland is an important region for wintering wild geese and swans, including several internationally important sites including the Loch Ken and River Dee Marshes, Solway Estuary, Wigtown Bay, and the River Nith. However, all of these areas are more than 10 km from the site and although there is the potential for geese and swans to occasionally fly over the proposed wind farm extension site, primarily during passage periods, the available evidence indicates that this type of movement is highly sporadic and typically at a height that is much greater than the wind turbines would be operating. More regular movements, and greater risk to local populations from collision mortality, might be expected

if the wind farm was located adjacent to, or in between important roosting and foraging areas, but this is not the case.

Raptors

Within the wider survey area two separate peregrine breeding territories were recorded as occupied in 2011, 2012 and 2013. With the closest eyries located c. 750 m and 3,500 m from the nearest proposed wind turbine. There was no evidence during breeding raptor surveys in 2011 or 2012 of breeding hen harrier, osprey, merlin or goshawk. However, all of these species were observed periodically and to varying frequencies during the flight activity surveys (see Table 3 below). A hen harrier winter roost site was found within the wider survey area during winter 2012/13; however the site was only occasionally used by small numbers of birds (peak of 2).

During 2013 and focal study, observing breeding peregrine ranging behaviour, was completed for the two confirmed sites. Both sites were occupied during the breeding season; however only one pair successfully raised chicks to fledging. This information was used, in combination with flight activity data from 2011 and 2012 to help inform the development of a wind turbine layout with the aim of reducing the potential adverse effects from the proposals on this species.

Black Grouse

There was no evidence of lekking black grouse within the site or core survey area (i.e. within 500 m of the site boundary) in 2011 or 2012. Two lekking males were observed in 2011 c. 1.25 km to the south of the site near Knockeen Farm. An individual lekking male was noted on several occasions in 2012 towards the eastern edge of the survey area on the western flanks of Knockinculloch Hill (c. 750 m from the site boundary). During the flight activity surveys there was one observation of an adult male black grouse, flying partly at collision risk height, over the woodland to the west of Knockinculloch in February 2012. There was also one observation of an adult female flying at collision risk height near Balcletchie, in February 2013.

Waders

The survey area continued to support breeding curlew, with a peak number of 19 breeding territories recorded in 2012. Other breeding wader species, typical of the habitats present in the area, are present in very low numbers.

Concentrations of golden plover, particularly during the autumn passage period, were noted in the areas of Haryard Hill, Maxwellston Hill, Barony Hill and Cairn Hill. The peak number of golden plover observed was a flock of c. 220 flying to the east of Cairn Hill and Knockinculloch in November 2011.

Barn Owl

One barn owl breeding site was confirmed with the wider survey area during 2012.

Other Species

There was no evidence of the presence of breeding short-eared owl *Asio flammeus* during surveys completed in 2011 or 2012. During all surveys, there was one record of short-eared owl hunting beside the road near Balcletchie in May 2012, possibly a bird breeding in the wider surrounding area.

The survey area supports a suite of breeding songbirds typically associated with upland moorland habitats (comprising a mosaic of acid/marshy grassland, heath and blanket bog vegetation) and commercial conifer plantation in south-west Scotland. The vast majority of the species recorded are relatively widespread and common (that is, their populations are not of conservation concern in Scotland). The moorland breeding bird assemblage is considered to be relatively species-poor with extensive areas supporting low densities of relatively low number of moorland passerine species.

There was no evidence of breeding nightjar in the survey area, despite the presence of some potentially suitable habitat. Currently, the nearest known breeding territories are outside of the study area, to the south within Galloway Forest Park.

Flight Activity Surveys

A summary of the observed flight activity by target species is provided in Tables 3 and 4 below. Table 4 gives a summary of the number of flight lines (and number of birds for flight lines representing more than one bird) recorded between 2011 and 2013 within the survey area. Table 4 provides a summary of the distribution of time recorded at the 5 flight height bands for each species (this includes all flights recorded not just those within the core survey area).

Considering the length of the survey period and the survey effort as a whole, flight activity by target species was relatively infrequently recorded within the core survey area, reflecting the generally poor habitat quality for most of the target species. The most frequently observed target species within the core survey area was golden plover with 35 flights followed by peregrine (25), hen harrier (23), goshawk (15) and merlin (9). By comparison the most frequently recorded species (including secondary species) during the flight activity surveys was kestrel with a total of 450 flights observed (349 flights within or partly within the core survey area).

Table 3: Summary of Recorded Flight Activity by Target Species within the Core Survey Area (2011 - 2013)

Species	No. of flight lines recorded during all surveys	No. of flight lines in core survey area (total no. birds in parentheses)	No. of flight lines at risk height in core survey area (total no. birds in parentheses)
Golden plover	48	35 (891)	26 (610)
Hen harrier	25	23 (23)	6 (6)
Peregrine falcon	25	25 (27)	18 (18)
Goshawk	16	15 (18)	14 (17)
Merlin	13	9 (9)	5 (5)
Barn owl	7	6 (8)	-
Pink-footed goose	5	4 (83)	1 (50)
Osprey	3	2 (2)	1 (1)
Greylag goose	2	2 (10)	-
Black grouse	2	1 (1)	1 (1)

Table 3: Summary of Recorded Flight Activity by Target Species within the Core Survey Area (2011 - 2013)			
Species	**No. of flight lines recorded during all surveys**	**No. of flight lines in core survey area (total no. birds in parentheses)**	**No. of flight lines at risk height in core survey area (total no. birds in parentheses)**
Whooper swan	1	1 (1)	1 (1)

Table 4: Distribution of Time at each Flight Height Band for Target Species During all Surveys (2011 - 2013). NB the number of flight lines within, or partially within, each of the 5 height bands is provided in parentheses.						
Species	**% Very Low**	**% Low**	**% Medium**	**% High**	**% Very High**	**Total time (secs)**
Golden plover	3 (6)	33 (24)	43 (31)	17 (10)	3 (3)	6683
Hen harrier	18 (8)	61 (18)	21 (6)	0 (1)	-	4257
Peregrine falcon	5 (3)	15 (5)	36 (17)	30 (10)	14 (4)	2589
Goshawk	3 (1)	-	75 (15)	19 (4)	2 (1)	2103
Barn owl	18 (3)	82 (7)	-	-	-	817
Pink-footed goose	-	-	4 (1)	18 (1)	78 (3)	767
Merlin	4 (1)	46 (3)	50 (9)	-	-	762
Osprey	-	9 (1)	12 (2)	79 (1)	-	513
Greylag goose	-	-	-	30 (1)	70 (1)	100
Black grouse	-	-	100 (2)	-	-	84
Whooper swan	-	-	100 (1)	-	-	12

SSE Renewables

Key

Proposed Site Boundary

Scale 1:60,000 @ A3

0 0.5 1 2 km

N

Figure 1

Site Location

Hadyard Hill Ext Wind Farm
Scoping Report

E://GIS_Operator/Hadyard_Hill_Ext/Scoping_Figs/Figure1

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SSE Renewables

Key

+ Proposed Turbine Location

Proposed Site Boundary

Scale 1:30,000 @ A3

0 0.225 0.45 0.9 km

N

Figure 2

Proposed Site Layout

Hadyard Hill Ext Wind Farm Scoping Report

E://GIS_Operator/Hadyard_Hill_Ext/Scoping_Figs/Figure2

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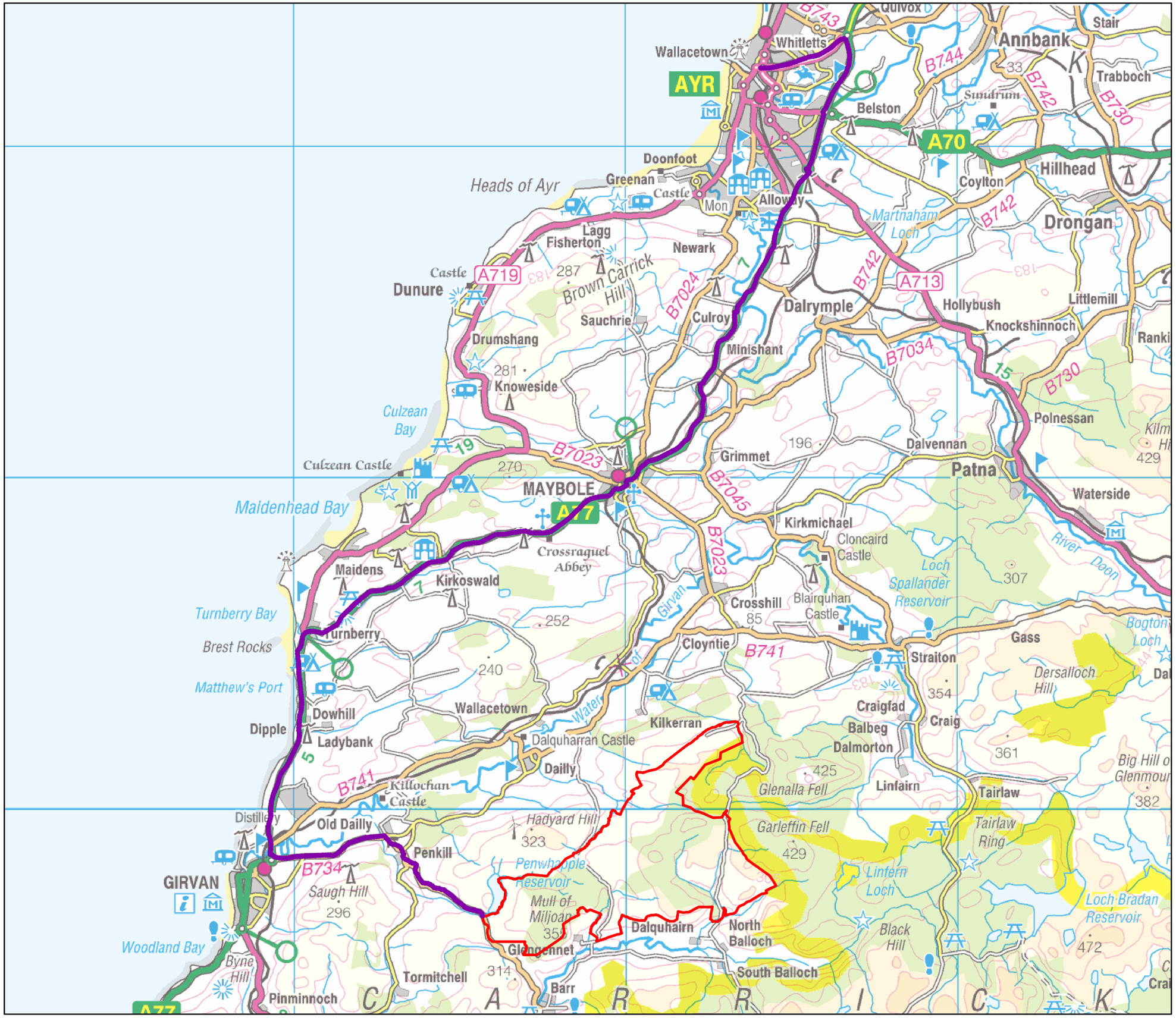

SSE Renewables

Key

- Potential Access Route
- Proposed Site Boundary

Figure 3

Potential Access Route

Hadyard Hill Ext Wind Farm Scoping Report

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SSE Renewables

Key

- Core Paths
- 15km Study Area
- Proposed Boundary
- East Ayrshire Sensitive Landscape Area
- Gardens and Designed Landscapes
- Dumfries and Galloway Regional Scenic Areas
- South Ayrshire Scenic Area
- Conservation Areas

Scale 1:150,000 @ A3

0 1 2 4 km

N

Figure 4

Landscape Designations

Hadyard Hill Ext Wind Farm Scoping Report

E://GIS_Operator/Hadyard_Hill_Ext/Scoping_Figs/Figure4

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SSE Renewables

Key

- Proposed Site Boundary
- 10km Study Area
- SSSI
- Special Protection Areas
- Special Areas of Conservation
- RAMSAR Site

Scale 1:125,000 @ A3

0 1 2 4 km

N

Figure 5

Ecological Designations

Hadyard Hill Ext Wind Farm Scoping Report

E://GIS_Operator/Hadyard_Hill_Ext/Scoping_Figs/Figure5

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SSE Renewables

Key

- Vantage Point
- Proposed Site Boundary
- VP2 Viewshed
- VP3 Viewshed
- VP4 Viewshed
- VP5 Viewshed
- VP6 Viewshed
- VP7 Viewshed
- VP8 Viewshed
- VP9 Viewshed
- VP10 Viewshed
- VP11 Viewshed
- VP12 Viewshed
- VP13 Viewshed
- VP14 Viewshed
- VP15 Viewshed
- VP16 Viewshed
- VP17 Viewshed

Scale 1:75,000 @ A3

0 0.5 1 2 km

N

Figure 6
Ornithology Vantage Points and Viewsheds

Hadyard Hill Ext Wind Farm Scoping Report

E://GIS_Operator/Hadyard_Hill_Ext/Scoping_Figs/Figure6

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SSE Renewables

Key

- A listed building
- B listed building
- C listed building
- Proposed Site Boundary
- Conservation Areas
- Scheduled Ancient Monument

N

Scale 1:50,000 @ A3

0 0.375 0.75 1.5 km

Figure 7

Cultural Heritage and Archaeology

Hadyard Hill Ext Wind Farm
Scoping Report

E://GIS_Operator/Hadyard_Hill_Ext/Scoping_Figs/Figure7

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