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1 Introduction

1.1.1 This Environmental Statement (ES) has been prepared by SSE Renewables Developments (UK) Limited (SSE Renewables) on behalf of SSE Generation Ltd ('the Applicant') in accordance with the requirements of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 ('the EIA Regulations'), in support of an application to the Scottish Ministers for planning permission to construct a wind farm comprising 31 wind turbines and ancillary infrastructure on land 6 km east of Girvan, South Ayrshire, under section 36 of the Electricity Act 1989. The site location is presented in Figure 1.1.

1.1.2 The ES comprises four volumes:
- Volume 1: Non-Technical Summary (NTS);
- Volume 2: Main Report;
- Volume 3: Figures; and
- Volume 4: Technical Appendices.

1.2 Purpose of the ES

1.2.1 This ES reports on the Environmental Impact Assessment (EIA) process undertaken for the proposed Hadyard Hill Extension wind farm ('the proposed development'). The ES provides a description of the proposed development, the key design iterations and alternatives considered and its likely significant environmental effects on the natural, built and human environments.

1.3 Other Planning Documents

1.3.1 Additional documentation that will be submitted with this application includes:
- Planning Statement; and
- A cover letter, confirming deposit locations where the ES may be viewed by the public.

1.4 EIA Process

1.4.1 This section provides an overview of the EIA process followed.

Screening

1.4.2 Screening is the term in the EIA regulations used to describe the statutory process through which the need for EIA is considered by the competent authority (in this case the Scottish Ministers).

1.4.3 EIA is required under regulation 2(1) of the EIA regulations for wind farms with a generation capacity greater than 50 MW, where there are likely significant environmental effects. On this basis, the Applicant has voluntarily prepared this ES and opted not to seek a formal screening opinion.

Scoping

1.4.4 In accordance with Regulation 7 of the EIA Regulations, the Applicant sought a scoping opinion from the Scottish Ministers on the environmental information to be
provided in the ES. This request was accompanied by a Scoping Report (ENVIRON, 2014), which set out a summary description of the proposed development, identified the issues proposed to be included, and proposed an approach to the assessment of effects in each case. The Scoping Report was simultaneously issued to a list of statutory and non-statutory consultees. A scoping opinion was received from the Scottish Ministers on 16th April 2014; its content is summarised in Technical Appendix 1.1: Consultation Register, along with a list of all the organisations consulted.

**Design Evolution and Alternatives**

1.4.5 The Applicant has adopted an EIA process which has sought to avoid likely significant adverse effects through the design of the proposed development. Key issues identified from planning policy (see Chapter 4: Planning Policy), the scoping and consultation process and baseline environmental studies were collated in order to establish constraints and parameters to inform the design strategy. The design process used an iterative approach, amending the turbine and infrastructure layout to find an optimal solution to address environmental and technical constraints, whilst maximising the potential energy generation from the site. The final proposed development is described in Chapter 2: Proposed Development. Further details on alternatives considered and the mitigation achieved through the design evolution are provided in Chapter 3: Design Evolution and Alternatives.

1.4.6 The technical chapters of the ES (Chapter 5 – 13) are focussed on describing and assessing the likely significant effects remaining following the design process.

**Impact Assessment**

1.4.7 Each technical chapter describes the impact assessment methodology used, with reference to both the data sources and survey methods used in establishing the sensitivity of the baseline environment and the criteria used to assess the magnitude of change as a result of the proposed development. Each chapter describes how the magnitude of change interacts with the sensitivity of the baseline environment to determine significant effects and non-significant effects.

1.4.8 A section that identifies the likely significant effects on the environment that may arise as a result of the construction, operation or decommissioning of the proposed development is provided in each technical chapter. Effects may be direct, indirect or cumulative. Within these categories, they may also be short, medium or long-term, permanent or temporary, adverse (negative) or beneficial (positive).

1.4.9 Direct effects are changes to the baseline arising directly from activities that form part of the development, for example a physical change to patterns of surface water runoff as result of track construction would be considered a direct effect. Indirect (or Secondary) effects are those that arise as a result of a direct impact, for example the direct effect on patterns of surface water runoff could have secondary impacts on aquatic biodiversity or flood risk.

1.4.10 Cumulative effects are the additional changes that result from the proposed development in conjunction with other similar development, or the combined effect of the proposed development with other developments taken together. The potential for

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1 The baseline environmental conditions are typically established through a combination of desk based research, site survey, and empirical studies and projections. The baseline environment can be taken as the current site conditions, or as a future baseline making assumptions about anticipated environmental trends assuming no development at the site. Each chapter will describe the baseline used for the purposes of the impact assessment.
significant cumulative effects is addressed in each technical chapter. The list of all cumulative wind farms considered and their planning status (fixed at the 15th December 2014) is set out in Chapter 5: Landscape and Visual Impact Assessment and Figure 5.13a – c. The list of cumulative wind farms was agreed through consultation with South Ayrshire Council and Scottish Natural Heritage.

1.4.11 Where likely significant effects are predicted, mitigation measures to reduce or offset the effects are proposed where possible. Standard measures proposed to avoid likely significant environmental effects during construction are described in outline in Technical Appendix 2.4: Construction Environmental Management Plan (CEMP). These standard mitigation measures are assumed to be in place for all assessments. Where additional mitigation is proposed over and above the measures set out in the CEMP to address likely significant environmental effects, it is detailed in the relevant technical chapter. The effects with this additional mitigation in place are assessed in the section on Assessment of Residual Effects.

Assessment of Residual Effects

1.4.12 Residual effects, i.e. those that remain following the implementation of additional mitigation, are assessed to demonstrate how the additional mitigation has been effective at avoiding, reducing or offsetting likely significant environmental effects. Each assessment chapter of the ES distinguishes between significant and not significant residual effects for the purposes of the EIA Regulations.

1.5 Commenting on the ES

1.5.1 An electronic version of the reports supporting the application, including the ES, will be available to download from:


1.5.2 This document is available at a cost of £1,000 in hard copy format (including postage and packaging) or on CD-ROM (£10). Copies of the ES can be obtained from:

Pauline Allison
SSE
1 Waterloo Street
Glasgow
G2 6AY

Telephone 0141 224 7192 or
Email pauline.allison@sse.com

1.5.3 A Non-Technical Summary of the ES is available free of charge on request.

1.5.4 The ES will also available for viewing by the public during normal opening hours at the following locations:

- South Ayrshire Council, Burns House, Burns Statue Square, Ayr, KA7 1UT.
- Girvan Library, Montgomerie Street, Girvan, KA26 9HE.
- Dailly Library, Community Centre, 67 Main Street, Dailly KA26 9SB.
- Barr Community Hall, Stinchar Road, Barr, KA26 9TW.
1.6 References

ENVIRON (2014) Hadyard Hill Extension Wind Farm, Environmental Impact Assessment (EIA) Scoping Report, Prepared for SSE Renewables Developments (UK) Ltd, February 2014 (UK1219606);

Chapter 2: Proposed Development

2.1 INTRODUCTION

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Technical Appendix 2.4: Construction Environmental Management Plan (CEMP)
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Figure 2.8: Indicative Cable Trench Detail
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2 Proposed Development

2.1 Introduction

2.1.1 This chapter provides a description of the proposed development for the purposes of identifying and assessing the main environmental impacts of the proposals. Information is provided on:

- the physical characteristics of the operational proposed development;
- typical activities associated with the construction and commissioning of the proposed development;
- typical activities associated with the operation of the proposed development; and
- typical activities associated with the decommissioning of the proposed development.

2.2 Project Description

2.2.1 The proposed development would include the following key components:

- 31 turbines, of a maximum tip height of 126.5 m, with external transformers;
- a hardstanding area at each turbine base with a maximum area of 1,600 m²;
- a total of 26 km of onsite access tracks with associated watercourse crossings (of which approximately 18.5 km are new access tracks and 7.5 km are existing tracks which may require some minor upgrades);
- three permanent meteorological masts and associated hardstand areas;
- up to three temporary meteorological masts for the purposes of power performance testing;
- a substation;
- an operations control building with parking and welfare facilities;
- underground cabling linking the turbines with the substation;
- construction of a temporary construction compound and laydown areas;
- construction of a temporary concrete batching plant; and
- up to six borrow pits.

2.2.2 The layout of the proposed development is shown on Figure 2.1. Technical Appendix 2.1: Project Description Details provides the proposed turbine coordinates (British National Grid) and both temporary and permanent land use change areas. The locations of the proposed turbines and other infrastructure would be subject to ‘micrositing’ during the construction phase, as described at paragraph 2.3.22.

Wind Turbines

2.2.3 The proposed development comprises 31 three-bladed horizontal axis wind turbines. The turbines would operate in the upwind direction (facing directly into the wind) and would generate electricity in wind speeds between approximately 4 m/s and 25 m/s (9 to 56 mph). At wind speeds greater than this the turbines would shut down for self-protection.
2.2.4 The final choice of turbine would be dependent on commercial options available at the time of construction, but would be within the maximum dimensional envelope of 126.5 m blade tip height, 104 m rotor diameter and 74.5 m hub height specified for the purposes of this assessment. Based on currently available turbines within this envelope, the maximum rated output of the proposed development would be 105.4 MW (3.4 MW per turbine). The overall rating could change should new turbines be available on the market at the time of construction procurement. Where it has been necessary to select a specific representative turbine model or component size for the purposes of undertaking the environmental assessment, this has been highlighted in the individual assessment chapter. Figure 2.2 shows indicative turbine dimensions and elevations.

2.2.5 The turbine towers would be of tapering tubular steel construction. The blades would be made from fibre-reinforced epoxy. The finish of the turbines is expected to be semi-matt pale grey colour, to be agreed in consultation with South Ayrshire Council, within the required technical parameters.

2.2.6 A transformer would be required for each turbine. For the purposes of this assessment it has been assumed that the transformers would be located adjacent to each turbine. These are typically 4 m x 3 m area and 2 m in height, and would be sited within the standard hardstanding area as shown on Figure 2.3. Depending on the turbine selected for the site, the transformer may be contained within the turbine towers.

Turbine Foundations and Crane Hardstandings

2.2.7 The wind turbines would be erected on steel re-enforced concrete foundations. Detailed foundation design would be completed following detailed geotechnical evaluation at each turbine location at the post-consent/pre-construction stage. For the purposes of the EIA it is assumed that these would be of mass gravity base design. Figure 2.3 provides an illustration of a typical wind turbine foundation construction.

2.2.8 During the erection of the turbines, crane hardstanding areas would be required at each turbine base. Different turbine manufactures require varying sizes of hardstanding. Typically, these consist of one main permanent area of up to 1,600 m² (Figure 2.3) adjacent to the turbine position where the main turbine erection crane would be located. There would be a requirement to use cranes on occasion during the operational phase of the proposed development, so the main crane hardstanding (1,600 m²) would be retained. In addition to the permanent hardstanding areas, other temporary areas, totalling up to 585 m² per turbine would be formed and used during the assembly of the main crane boom and assembly of the rotor. After construction operations are complete, the temporary areas would be reinstated. This approach complies with current good practice guidance (Scottish Renewables et al. 2013) which recommends crane hardstandings are left uncovered for the lifetime of the proposed development.

Access Tracks

2.2.9 The proposed access tracks are a total of 26 km in length with a minimum 4.5 m wide running surface with 0.5 m wide shoulders on both sides (5.5 m total width). A total working area of up to 9 m is assumed to allow for slopes and drainage (surface water management) adjacent to the tracks. The access track layout is shown on Figure 2.1. Of this 26 km, approximately 7.5 km are existing tracks constructed for the existing Hadyard Hill Wind Farm. The running width of the existing tracks varies from 4 m to 5 m. Minor track improvements would be carried out to provide a minimum running
width of 4.5 m with 0.5 m shoulders on both sides for all sections of existing access track.

2.2.10 Of the 18.5 km of new tracks to be constructed, it is currently expected that approximately 17.5 km would be a ‘cut’ design and less than 1 km of a ‘floating’ track design. All tracks would be designed to incorporate passing places and turning heads. It is anticipated that for 4x4 traffic, five passing places would be required every kilometre i.e. approximately every 200 m, and they would be approximately 15 m long and 3 m wide with 5 m splays.

2.2.11 As described in Chapter 3: Design Evolution and Alternatives, the access track layout has been designed taking into account a range of environmental and technical constraints. This included a requirement to maintain appropriate gradients for construction and turbine delivery vehicles and avoid watercourses and deeper peat where possible. Where necessary, the access tracks would be constructed incorporating sufficient sub-track cross drainage to ensure that hydraulic continuity in ground water sensitive habitats would be maintained at pre-development levels without concentrating the discharges into a narrow channel. This would be achieved by using a porous granular rock fill blanket and perforated pipes, wrapped in geotextile placed below the road construction.

2.2.12 Figure 2.4 provides the indicative access track specifications. It is anticipated that site access tracks would be constructed with locally (on site) won graded stone and imported geotextiles (where necessary) with the surface course comprising durable graded crushed rock, also sourced from on-site borrow pits. The use of on-site borrow pits is subject to post-consent ground investigations proving the presence of suitable stone, therefore the assessment of construction traffic allows for all of the stone required to be imported to the site from local quarries, however the preference would be to use on-site borrow pits if suitable.

**Substation**

2.2.13 The proposed development includes a substation building containing the isolators, circuit breakers and transformers and the Supervisory Control and Data Acquisition (SCADA) system, and would form the interface point between the proposed development and the external electricity grid. An indicative substation compound plan is shown on Figure 2.5, with typical elevations shown on Figure 2.5a. The detailed design of the external equipment in the compound would not be confirmed until the final turbine is selected and detailed design undertaken post consent. It is however envisaged that the equipment (shown as STATCOM space on Figure 2.5a) would consist of a number of containerised modules. Based on previous projects, these modules would be of an approximate size 8 m long by 3 m wide and would have a maximum height at, or just below the palisade fence which would surround the equipment. It is likely that some modules would incorporate an outdoor transformer at one end within their footprint.

**Operations Building**

2.2.14 An operations building that would provide workshop and welfare facilities for maintenance staff would be located close to the site entrance from the B734, as shown in Figure 2.1. A typical layout is shown on Figure 2.6, with typical elevations shown on Figure 2.6a. It would also be used for the existing Hadyard site as the current facilities are insufficient for the size of site or the maintenance operations currently required. The existing Hadyard Hill welfare facilities are within the substation building for the Hadyard Hill site and the use as a substation would continue.
Meteorological Masts

2.2.15 Three hub height (up to 74.5 m) permanent meteorological masts would be erected to collect meteorological data for the operational life of the proposed development. A typical elevation of a permanent meteorological met mast is shown on Figure 2.7 and the proposed locations are included on Figure 2.1. Each mast would have a concrete base of 7 m x 7 m, in addition to a 600 m$^2$ crane hardstanding for mast erection.

2.2.16 Up to three temporary meteorological masts for the purposes of power performance testing are proposed. The exact locations of these masts are determined in agreement with the turbine supplier during construction therefore the exact locations cannot be identified at this stage.

On-site Cabling

2.2.17 Turbines are likely to be connected by multiple electrical circuit ‘arrays’, with the output connecting to the substation. The cabling for this would be laid in trenches of varying width (depending on the number of cables) and approximately 1 m in depth alongside the site tracks. Details of the trenches are shown on Figure 2.8. These trenches would also carry earthing and communications cables.

Temporary Construction Compound and Concrete Batching Plant

2.2.18 A temporary construction compound would be required to provide site accommodation with car parking and welfare facilities. This would include a lay down area for materials and small component storage. A typical construction compound layout and elevations are shown on Figure 2.9. The proposed compound and laydown area would each be no more than 100 m x 100 m, and would be located in the area shown on Figure 2.1.

Borrow Pits

2.2.19 Borrow pits would be quarried in order to provide a source of stone necessary for the construction of access tracks and crane hardstanding areas. Proposed search areas for the borrow pits are shown on Figure 2.1.

2.2.20 It is estimated that approximately 325,000 m$^3$ of stone (excluding aggregate for concrete) would be required to be excavated from the borrow pits for construction of the access tracks and surface course, structural fill beneath turbine foundations, and hardstandings at turbine bases and compounds. Further detail on the proposed borrow pits is provided in Technical Appendix 2.2: Borrow Pit Assessment.

2.3 Typical Construction Activities

2.3.1 Typical activities during the construction phase would include the following:

- forestry enabling works (tree felling, timber extraction and removal from site);
- construction of a temporary construction compound and laydown area;
- borrow pit workings;
- construction of the new site access tracks and upgrade of the existing tracks, currently used for maintenance of the existing Hadyard Hill wind farm, through to the base of each wind turbine, the electrical substation and the permanent meteorological masts;
- construction of crane hardstanding areas;
• construction of the wind turbine foundations;
• erection of wind turbines;
• erection of three meteorological masts;
• excavation of trenches to allow the power and instrumentation cables to be laid;
• construction of the substation;
• construction of the operations building; and
• land reinstatement, including removal of the temporary construction compounds.

**Forestry Enabling Works**

2.3.2 The proposed development includes the clear felling of the 915.2 ha of forestry.

2.3.3 Forestry felling would be undertaken using a conventional harvester/forwarder short wood system. The harvesting operation would rely on the formation and maintenance of brash mats to enable repeated forest machine journeys in order to protect the soft underlying ground. Further detail on the management of forestry removal is provided in Technical Appendix 2.3: Forestry.

**Temporary Construction Compound and Concrete Batching Plant**

2.3.4 The temporary construction compound would be created using tracked excavation plant to strip and level the topsoil and subsoil (if necessary) to a suitable formation horizon. Topsoil and subsoil would be placed into separate storage bunds adjacent to the compound area (with a height no greater than 1.5 m) for use in reinstatement following the completion of construction work. Suitably graded crushed rock would be spread and compacted using tracked excavators and vibratory compacting rollers in order to create a suitable platform upon which to site the temporary site accommodation, welfare facilities, car parking and material storage.

2.3.5 It is anticipated that concrete for construction will be provided from an onsite concrete batching plant. The location of the concrete batching plant is shown on Figure 2.1. A temporary concrete batching plant would comprise aggregate and cement hoppers, water bowsers/tanks, a mixer and a control cubicle. Aggregates and sand would be stockpiled and contained adjacent to the plant. The temporary batching plant would also require a water abstraction point from one or more of the watercourses on site. Water abstraction would be subject to either registration or a licencing application to SEPA under the Water Environment (Controlled Activities) (Scotland) Regulations 2011. However, for the purposes of the transport assessment, vehicle movements associated with importing concrete during construction have been taken into account in Technical Appendix 11.1: Traffic Assessment to reflect the potential that concrete is imported.

**Borrow Pits**

2.3.6 The borrow pits would require the use of plant to both win and crush the resulting rock to the required grading. It is anticipated that rock would be extracted by breaking, ripping and some blasting may be required. Following construction, the borrow pits would be reinstated (part filled and contoured, as indicated on the borrow pit drawings provided in Technical Appendix 2.2: Borrow Pit Assessment.
Access Tracks and Hardstanding Areas

2.3.7 The access tracks would be constructed mainly using a ‘cut track’ design, with a ‘floating track’ design used where required by local ground conditions.

- In areas of shallow or no peat (0 m - 1 m), a ‘cut track’ design would be utilised (anticipated to be approximately 17.5 km of track) for which the topsoil and peat would be stripped to expose a suitable foundation horizon on which to build the track. The excavated peat and topsoil, together with any vegetation, would be placed into temporary storage bunds (no greater than 1.5 m in height), in accordance with a site specific soil and peat management plan. The management plan would be designed to ensure the suitability of the peat and soil for use in later landscaping work around the site, for example to provide dressing and visual screening to edges of tracks and hardstanding areas. The track would then be constructed by laying and compacting crushed rock (obtained from suitable on-site borrow pits) to the required level using a combination of tracked excavators and vibratory compacting rollers. Given the variable and undulating topography across the site, it is likely that earthworks (cuttings and embankments) would be required to achieve the required gradients for tracks and crane hardstandings. Cutting slopes would be designed to reflect the existing landscape and topography.

- Generally, a ‘floating track’ design would be utilised on the site in areas where peat depth is greater than 1 m (anticipated to be less than 1 km of track). This would incorporate geotextile material laid onto the surface at a width to suit the road width, which would greatly increase the resistance to prevent the tracks settling into the ground. A layer of approximately 800 mm of crushed stone would then be laid on the geotextile to form the track, which produces a steep stone batter with the edges of the site track raised above the surface.

2.3.8 The permanent crane hardstanding areas would be constructed using similar techniques as the ‘cut’ access track.

Turbine Foundations

2.3.9 The construction of the turbine foundations would generally require the excavation of subsoil and potentially rock to a suitable sub-formation. The depth of the excavation would depend on the depth to reach a suitable sub-formation, typically 4 m, with the sides ‘battered’ back to ensure that they remain stable during construction. The formation would be levelled off prior to the in-situ casting of a steel-reinforced concrete foundation.

2.3.10 The foundations are typically circular. The worked area during the construction of the wind turbine foundations would typically be up to 50 m in diameter, with the foundation 20 m in diameter at the base. Each foundation would require approximately 550 m$^3$ of concrete and 60 tonnes of steel reinforcement. The void remaining following the construction of the foundation would be backfilled and restored after construction so as to leave only a small concrete apron around the base of each tower visible, with an approximate diameter of 6 m.

Turbine Erection

2.3.11 The base section of each tower would be sited on the steel reinforced concrete foundation. Towers are typically installed in three sections, after which the nacelle is
lifted into place. Finally the hub and blades are assembled and erected. Each phase of the turbine erection would involve the use of cranes which would be placed at the crane hardstanding areas next to each of the turbines.

**Construction Programme**

2.3.12 It is expected that many of the above operations would be carried out concurrently. This would minimise the overall length of the construction programme such that it is limited to approximately 22 months. This period is however dependent on timing of the granting of planning permission, availability of grid connection and discharge of relevant planning conditions, should the application be successful; and the weather and ground conditions experienced at the site.

**Hours of Work**

2.3.13 It is proposed that construction activities be limited to the working hours of 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 on Saturdays.

**Construction Traffic and Plant**

2.3.14 In addition to staff transport movements, construction traffic would consist of heavy goods vehicles (HGVs) and abnormal load deliveries.

2.3.15 Turbine components would be delivered using appropriate steerable hydraulic and modular trailer equipment where this is required. Axle loads would be appropriate to the roads and access tracks to be used. The transportation of turbine components would be conducted in agreement with the relevant roads authorities and traffic police. The Applicant would notify the police of the movement of abnormal length (e.g. turbine blade delivery) and abnormal weight (e.g. crane) vehicles and obtain authorisation from the Scottish Government prior to any abnormal vehicle movements.

2.3.16 Police escorts would be used where necessary and the appropriate permits obtained, for the transportation of abnormal loads to ensure that other traffic is aware of the presence of large, slow moving vehicles. Where long vehicles would have to use the wrong side of the carriageway, or need to swing into the path of oncoming vehicles, a lead warning vehicle would be used and escort vehicles would drive ahead and stop oncoming traffic. Vehicles would also be marked as long/abnormal loads. For return journeys, the extendible low loaders used for wind turbine delivery would be retracted to ensure they leave the site with a trailer length of no more than 16 m.

2.3.17 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 main construction access would also be via the B734. This access route was previously used for the existing Hadyard Hill wind farm construction.

2.3.18 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 site would be via the B734 Old Dailly to Barr road, using the existing Hadyard Hill wind farm track infrastructure as far as possible. Further details on the construction traffic volumes are provided in Technical Appendix 11.2: Construction Traffic Trip Generation.

**Construction Environmental Management Plan**

2.3.19 Technical Appendix 2.4: Construction Environmental Management Plan (CEMP) provides outline information on the proposed working methods to be used during construction to avoid, reduce or control the associated adverse environmental effects.
The CEMP would form part of the contract documents between the Applicant and the appointed construction contractor.

2.3.20 A finalised CEMP and would be agreed with the relevant statutory bodies prior to commencement of construction. The finalised CEMP would be updated to include any additional site-specific information obtained during subsequent pre-construction surveys as part of the detailed design stage and would include details on the following:

- project environmental constraints;
- correspondence and general communication;
- site induction and training;
- pollution prevention and mitigation, including the use of silt traps, settlement ponds, and splash protection measures at watercourse crossing points;
- waste management;
- temporary drainage, including the use of Sustainable Drainage Systems (SuDS) to avoid any effects on the volume, rate or quality of surface water run-off;
- water quality monitoring, both pre-construction and during construction;
- watercourse crossings, to be constructed in accordance with the guidance set out in Technical Appendix 2.5: Watercourse Crossing Design;
- ecological protection, including the appointment of a suitably qualified and experienced Ecological Clerk of Works (ECoW);
- archaeological Protection;
- forestry works;
- land use and public access;
- excavated materials, soil and peat management;
- reinstatement;
- environmental incident and emergency response; and
- construction methods.

2.3.21 While all turbines are located in areas classed as low or negligible risk from peat instability, limited areas of medium risk were identified, which would require further investigation and mitigation during the construction phase. The CEMP would include relevant details on peat instability. Further details on the assessment completed for the site are provided in Technical Appendix 2.6: Peat Landslide Hazard and Risk Assessment.

*Micrositing*

2.3.22 The CEMP would include detailed guidance on the application of the proposed micrositing tolerance. This tolerance allows for minor changes in turbine or infrastructure location to respond to possible variations in ground conditions across the site, which would only be confirmed following detailed site investigation work carried out immediately prior to construction. This process also provides scope for further mitigation of localised potential environmental effects through the avoidance of features such as sensitive habitats, and localised areas of deeper peat. Any repositioning would be carried out under the supervision of an ECoW.
2.4 Operation and Management

Life of the Project

2.4.1 The expected operational life of the proposed development is 25 years from the date of commissioning. At the end of this period, a decision would be made whether to refurbish, remove or replace the turbines. If refurbishment or replacement were to be chosen, relevant planning applications would be made.

Maintenance Programme

2.4.2 It is anticipated that six full-time staff would be employed to manage and operate the proposed development. This would be in addition to the 10 staff that already maintain the existing Hadyard Hill wind farm. Additional staff would be utilised on site on an adhoc basis. This would include:

- Routine maintenance and servicing would be carried out on each turbine approximately twice a year, in addition to the initial service three months after commissioning. On average two people will take five days to service each turbine.

- At regular periods oil and components would require changing, increasing the service time per machine. Gearbox oil changes are required approximately every 20 months. Blade inspections are carried out as required (normally somewhere between every two and five years). Appropriate maintenance works would be carried out immediately following any unexpected events on site, such as failure of a generator or gearbox.

- There would also be regular safety inspections, maintenance of the tracks, fencing, and other infrastructure.

Operational Residues and Emissions

2.4.3 Table 2.1 summarises the potential residues and emissions associated with the operational proposed development.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Potential residue/ emission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>All surface water runoff from the proposed development would be captured by a SuDS to control the rate, volume and quality of discharge in to the water environment. No significant residues or emissions have been identified.</td>
</tr>
<tr>
<td>Air</td>
<td>Due to the nature of the proposed development no significant point source or diffuse air emissions would be produced during its operation. The proposed development would generate renewable electricity and would therefore displace CO₂ emissions associated with electricity generation which would otherwise be supplied via other forms of power generation requiring the combustion of fossil fuels. The Scottish Government Carbon Calculator for Wind Farm on Peatlands was used to calculate a payback period for the proposed development based on the full development lifecycle. The results of this assessment are contained in Technical Appendix 2.8 and indicate that the proposed development would have an expected payback period of 3.2 years compared to grid mix of electricity generation.</td>
</tr>
<tr>
<td>Noise and Vibration</td>
<td>The wind turbines would generate noise during operation, and the noise levels would vary according to the wind speed, within an agreed noise level.</td>
</tr>
</tbody>
</table>
Table 2.1: Residues and Emissions

<table>
<thead>
<tr>
<th>Topic</th>
<th>Potential residue/ emission</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>limit designed to protect residential amenity at nearby dwellings. Further details are presented in Chapter 6: Noise. There would be no vibration emissions associated with the proposed development.</td>
</tr>
<tr>
<td>Light</td>
<td>As reported in Chapter 13: Aviation, infrared lighting proposed at the hub on each turbine for aviation visibility purposes would not be visible to the naked eye. The substation buildings are likely to be equipped with passive infra-red sensor controlled security lighting. These would illuminate the sub-station compound area when activated. Any effect would be temporary and not expected to be significant during normal operation of the proposed development.</td>
</tr>
<tr>
<td>Soil pollution/Waste</td>
<td>The power generation aspect of the proposed development would not produce any waste emissions or pollutants. However the general operation and maintenance has the potential to produce a small amount of waste. This is likely to be restricted to waste associated with the control building from employees and visiting contractors and the storage of oils and lubricants.</td>
</tr>
</tbody>
</table>

2.4.4 On the basis of the information presented in Table 2.1, no significant residues or emissions have been identified.

2.5 Decommissioning

2.5.1 If a decision was taken to decommission the proposed development, this would entail the removal of all the turbine components, transformers, the substation and associated buildings. Detailed decommissioning proposals would be established and agreed with relevant authorities prior to commencement of decommissioning activities. This would take cognisance of guidance available at the time.

2.5.2 Following the 25 year period of operation, decommissioning of the development would be undertaken or an additional consent sought for extended operation. When decommissioning is required this is anticipated to involve the activities listed below:

- dismantling and removal of the turbines, and met masts;
- removal to 1 m below ground level of the turbine and met mast foundations;
- removal of substation and operations buildings (foundations generally left in situ below ground); and
- reinstatement of all land affected, in accordance with good practice at the time.

2.5.3 The turbines would be dismantled and removed from the site in a manner similar to that of their erection. Cranes would be used to split the turbines into sections, which would then be removed from the site.

2.5.4 It is not currently good practice to remove the concrete foundations from the site as this would result in more land damage than leaving them in situ. The exposed concrete plinth would be removed and the entire foundation would be graded over with topsoil and replanted appropriately to minimise ground disturbance. This follows advice in the Scottish Government’s web-based renewables advice (Scottish Government, 2013).
2.5.5 All buildings and equipment would be removed including removal of fencing and of building foundations. All material arising would be disposed of responsibly as described above.

2.5.6 Some of the access tracks could be left on-site to ensure the continued benefit of improved access by the landowner, or they could be reinstated.

2.5.7 It is anticipated that underground cabling would not be removed.

2.5.8 The above has been taken into account when predicting decommissioning effects in each of the technical assessments reported in this ES when considering potential decommissioning effects.

2.6 References


Chapter 3: Design Evolution and Alternatives

3.1 SITE SELECTION CONSIDERATIONS
3.2 CURRENT LAND USE AND SITE CONTEXT
3.3 KEY ISSUES AND CONSTRAINTS
3.4 ALTERNATIVES
3.5 MITIGATION BY DESIGN
3.6 ISSUES REMAINING FOR IMPACT ASSESSMENT
3.7 REFERENCES

Appendices
None

Figures
Figure 3.1: Design Layout Iterations
Figure 3.2: Blade Tip ZTV
Figure 3.3a: Wirelines for Viewpoint 4 – Merkland
Figure 3.3b: Wirelines for Viewpoint 11 – Brunston Castle Golf Course
Figure 3.3c: Wirelines for Viewpoint 13 – B741, south of Crosshill
Figure 3.3d: Wirelines for Viewpoint 23 – Bargany Gardens
3 Design Evolution and Alternatives

3.1 Site Selection Considerations

3.1.1 The site for the proposed development was selected following a broad search of potential wind farm sites throughout Scotland. The proposed development is one proposal within a wider programme of development by the Applicant aimed at significantly increasing the proportion of energy generated from renewable sources. The Applicant is committed to decarbonising its generation by 50% by 2020.

3.1.2 Site selection factors taken into account during identification of sites include a range of criteria; primarily wind resource but also landscape capacity, environmental designations and ecological sensitivity. In this case, a key factor was the presence of the existing Hadyard Hill wind farm, and the agreement with neighbouring landowners to submit proposals for an extension.

3.1.3 Initial feasibility studies identified that the site is a good location for a wind farm, benefiting from both good wind resource and the environmental capacity to accommodate further development. Zone of Theoretical Visibility (ZTV) mapping of the existing Hadyard Hill wind farm demonstrated that existing visibility is concentrated within close proximity to the site, with limited and relatively patchy visibility beyond. In particular, there is little visibility in the neighbouring valley landscapes to the north and south. The existing Hadyard Hill wind farm turbines are located centrally on the ‘foothills’ with sufficient depth either side to preclude extensive visibility in the more sensitive river valleys. As a result the existing Hadyard Hill wind farm is relatively well concealed, and with the exception of views from the more distant and higher elevated viewpoints, it is difficult to ascertain the full extent of the existing development. On this basis, it is considered that there is capacity for further wind farm development at the site.

3.2 Current Land Use and Site Context

3.2.1 The site lies along an undulating ridge adjacent to the existing Hadyard Hill wind farm. The existing Hadyard Hill wind farm is an operational wind farm (commissioned in 2006) comprising 52 turbines. The turbines are located in the Carrick Hills, to the south of Hadyard Hill, 4 km to the west of Girvan and 2.5 km south of Dailly. The existing Hadyard Hill wind farm comprises turbines of two hub heights: 60 m; and 70 m, with overall blade tip height of either 100 m or 110 m.

3.2.2 The site is located in a landscape character type classified as ‘Foothills’, which comprises a mix of improved grassland, unimproved grassland and commercial forestry plantations. These hills form an important backdrop to the Water of Girvan valley to the north and the Stinchar valley to the south. The highest point on the site is Craiginmoddie Hill, at 382 m Above Ordnance Datum (AOD) at the centre of the site, descending to approximately 160 m at a point to the southwest, close to B734.

3.2.3 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.

3.2.4 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 are Barr (2 km south), Dailly (3 km north), Crosshill (4.5 km north), Straiton (6 km north east) and Maybole (7.5 km north). The nearest town is Girvan, located 7 km to the west.

3.2.5 The current use of the land for sheep and cattle grazing does not pose any constraint to the proposed development; however the commercial forestry plantations are considered to be incompatible. Wind resource modelling has been used to determine the likely effects of retaining forestry land-use on the site. The modelling predicts unacceptable turbulence and shear caused by forestry and unacceptable loss of energy yield as a result. As such, the proposed development includes for the felling of the plantation areas on the site. Further details on the forestry felling proposals are provided in Technical Appendix 2.2: Forestry.

3.3 Key Issues and Constraints

3.3.1 The key issues and constraints for consideration in the design process have been established through both desk based research and extensive field survey covering the following issues:

- landscape character and visual amenity within a 35 km study area;
- noise, including a noise survey and assessment strategy to characterise the existing and predicted noise environment at the nearest residential dwellings surrounding the site;
- hydrology and hydrogeology, including identifying all sensitive surface water features and abstractions;
- cultural heritage, including mapping all known assets within the site, and assets of national importance within a 10 km study to assess the potential for visibility and setting effects;
- sensitive habitats, particularly peat forming habitats (supported by an extensive peat probing survey) and habitats dependent on groundwater;
- sensitive fauna, with the mapping of the presence of European protected species; and
- ornithology, including surveys for breeding bird activity and bird flight activity in the site.

Key Policy Considerations

3.3.2 The site does not lie within or adjacent to any areas where wind farms are either not acceptable (National Parks and National Scenic Areas), or to any areas afforded significant protection from wind farm development (national and international ecological designations, wild land, priority peatland habitat or areas within 2 km of settlements identified in the local development plan) under the Scottish Planning Policy (Scottish Government, 2014). On this basis, the site falls into the category of (group 3) ‘areas with potential for wind farm development’ (Scottish Government, 2014; p39).

3.3.3 At a local level, the key policy is provided by The South Ayrshire Local Development Plan (LDP) (South Ayrshire Council, 2014). The LDP policy on wind energy highlights a number of key aspects considered important in the design process, including:
• minimising effects on the landscape through a careful choice of site, layout and overall design, taking account of the key features identified in the South Ayrshire Landscape Wind Capacity Study (South Ayrshire Council, 2013);
• avoiding significant detrimental visual impacts, protecting amenity from residential property, settlements, public roads, footpaths, important public viewpoints including those from recreational and tourism assets;
• avoiding effects on residential amenity from noise and shadow flicker;
• avoiding significant detrimental effects on natural and cultural heritage features;
• avoiding effects on aviation, defence interests and broadcasting installations; and
• avoiding unacceptable cumulative effects in combination with other existing and approved wind energy developments.

3.3.4 A review of the South Ayrshire Landscape Wind Capacity Study (LWCS) identified the key consideration for the overall design as the avoidance of effects on ‘landmark’ hills and maintaining the containment provided to the surrounding pastoral valleys.

3.3.5 Chapter 4: Planning Policy provides a more in-depth description of the policy context within which the design of the proposed development has been considered. It also identifies material considerations relevant to the consideration of the application for consent. A Planning Statement is provided separately, which assesses the compliance of the proposed development with planning policy.

3.4 Alternatives

Do-Nothing Alternative

3.4.1 The “do nothing” scenario is a hypothetical alternative conventionally considered, albeit briefly, in EIA as a basis for comparing the development proposal under consideration. This scenario is considered to represent the current baseline situation as described in the individual chapters of this ES.

3.4.2 It is assumed that in the absence of the proposed development, the future baseline would include the eventual decommissioning of the existing Hadyard Hill Wind Farm at the point at which the associated planning consent expires. It is also anticipated that the part of the site that is covered by the existing Hadyard Hill Wind Farm would ultimately be reinstated following decommissioning, and that the part of the proposed development that is covered by commercial forestry plantation would continue in that land use cycle.

3.4.3 Irrespective of the changes in the future baseline as a result of the decommissioning of the existing Hadyard Hill Wind Farm described above, it is recognised that the baseline would not remain static for the lifetime of the proposed development. In particular, and apart from any changes arising from economic and agricultural policies and economic market considerations, it is predicted that biodiversity and landscape would undergo some level of change as a result of climate change. Two publications from the Landscape Institute (2008) and Scottish Natural Heritage (SNH, 2012) consider potential climate change effects on the landscape character. Due to the complexities and uncertainties inherent in attempting to predict the nature and extent of such changes to landscape and biodiversity during the lifetime of the proposed development, it has been assumed that the current baseline would subsist. It is
considered that this represents a precautionary and appropriate approach for EIA purposes.

Alternative Designs

3.4.4 A number of alternative turbines tip heights and rotor diameters have been examined through the design process. The principal design consideration was to consider the compatibility with the existing Hadyard Hill wind farm turbines, avoiding pronounced differences in scale between the existing turbines and the proposed development. Turbines with a tip height ranging from 110 m to 149 m were considered. Following careful consideration the maximum tip height for the proposed development was set at 126.5 m, on the basis that this provides an optimum balance of potential energy yield, whilst still avoiding any appreciable difference between the existing turbines and the proposed development in close range views.

Design Evolution and Alternative Layouts

3.4.5 Figure 3.1 summarises the wind farm design evolution from pre-scoping to final design layout, and the following paragraphs explain the key design iterations.

Scoping Layout (January 2014)

3.4.6 The scoping layout (Figure 3.1a) was based on a standard turbine spacing within the land available, arranged to take account of basic desk based hydrological, topographical and wind data constraints. The scoping layout identified the potential for 51 turbines.

3.4.7 Additional environmental baseline information gathered during the scoping stage included hydrological, geological, ornithological, cultural heritage and ecological constraints, which contributed to the development of the design layout.

Iteration 1: Baseline constraints Design (September 2014)

3.4.8 The first design iteration (Figure 3.1b) was made in September 2014. Iteration 1 increased the number of turbines to a total of 52. It was made following the receipt of the scoping opinion from the Scottish Ministers in April 2014 (incorporating input from a range of statutory and non-statutory consultees). Changes were made in light of the comments received through the scoping process, and baseline environmental studies carried out up to September 2014 with the exception of detailed habitat data and peat depth information. Iteration 1 included changes to the locations of the turbines, predominately based on refined wind resource modelling, detailed technical appraisal of the site and environmental constraint mapping. This primarily relocated turbines to the central part of the site to focus on the locations with better wind resource around Daljedburgh Hill, Craigimoddie and Peat Rigg. Turbines around Dobbingstone farm were moved to the south to be more than 250 m away from the Dobbingstone Private Water Supply.

Iteration 2: Pre-Design Workshop Layout (September 2014)

3.4.9 The second design iteration was made following a detailed engineering site walkover, receipt of further private water supply information, refinement of the noise model and initial peat probing data.

3.4.10 This layout (Figure 3.1c) reduced the number of turbines proposed from 52 to 38 and revised the previous layout (Iteration 1 – Figure 3.1b) based on a more detailed technical and engineering appraisal of the site (including factors such as access),
landscape and visual advice and incorporating mapping of sensitive habitats and peat depth.

3.4.11 Changes included:

- removal of turbines from Pinverains/ Auchengairn to the east; due to the engineering assessment identifying that this area of the site would pose problems for access because of a combination of slope, ground conditions (including an area of deep peat) and water crossings. Thus reducing the extent of development and avoiding turbines straddling both sides of the minor road / National Cycle Route 7;
- removal of turbines around the northern periphery of the site to increase the distance between turbines and non-financially involved residences;
- removal of turbine 8 due to its proximity to the public road; and
- removal of turbine 9 due to its encroachment into the Stinchar valley.

Iteration 3: Post-Design Workshop Design Freeze (November 2014)

3.4.12 Iteration 3 (Figure 3.1d) was produced following the design workshop in October 2014. The layout was ground-truthed and final surveys completed based on this layout with the turbine layout frozen in November 2014 at 31 turbines after a few minor alterations. The track and infrastructure layout was frozen in January 2015. The design workshop identified various changes which primarily involved removal of turbines in the area to the north of Dobbingstone Burn, around Barony Hill and Cairn Hill ridge. The removal of turbines from this area:

- reduces the potential visibility and the perceived scale of the proposed development overall from the Middle Dale LCT, the Water of Girvan valley, Straiton, Maybole and the A77 to the north and east;
- reduces the magnitude of potential cumulative effects with Dersalloch wind farm;
- avoids the need to cross a number of watercourses; and
- avoids potential effects on ground nesting bird species and other autumn passage visitors such as golden plover which were noted in their highest around Barony Hill and Cairn Hill.

3.4.13 A more detailed design of access track layout was started at this stage, with the aim to utilise the existing track network where possible, reduce effects on sensitive habitat areas by avoiding blanket bog habitat and, as far as possible, avoiding pockets of deeper peat found on site, minimising the number of watercourse crossings, and avoiding tracks within 250 m of private water supply abstractions.

3.4.14 Following ground-truthing, there were also minor alterations to some turbine locations and the track in order to address localised habitat and peat depth related constraints within the site. The locations of the temporary construction compound, substation, operations building, concrete batching plant areas, permanent meteorological masts and borrow pit search areas were added into the layout presented in Figure 3.1d and finalised in January 2015.

Analysis of Layout Changes using Theoretical Visibility Mapping

3.4.15 Figures 3.2 a-d provide blade tip zones of theoretical visibility (ZTV) mapping for each of the iterations. Figure 3.3 a – d provide a selection of wirelines to illustrate the
change in visibility and horizontal extent achieved through the design iterations from viewpoints to the north and east of the proposed development. In particular the wirelines illustrate the following changes:

- In Viewpoint 11 – Brunston Castle Golf Course (Figure 3.3b), the removal of the seven turbines on the left of the group is evident, leading to a notable reduction in the horizontal extent of the proposed development.

- In Viewpoint 13 – Crosshill (Figure 3.3c), the seven turbines which are removed were previously those which were most prominent in the view, being seen with towers and nacelles set well above the ridge. The revised wireline for Iteration 2 shows that there are fewer turbines visible and that those that are visible are set well below the ridge, such that mostly blades and blade tips are visible, with only a few nacelles being noticeable.

- In Viewpoint 23 – Bargany Gardens (Figure 3.3d), the removal of the turbines means that there is no visibility of the proposed development from this viewpoint. This is representative of many of the lower-lying parts of the Water of Girvan Valley, where there would be no visibility of the proposed development.

**Proposed Development**

3.4.16 The proposed development layout (Figure 2.1), presented in Chapter 2: Proposed Development, includes:

- a reduction in the number of turbines from 51 to 31;

- grouping of the turbines to form a visually logical extension to the existing Hadyard Hill wind farm and a coherent visual envelope as viewed from the surrounding area and from key receptors; and

- minimisation of track, utilisation of existing access track and layout of infrastructure to reduce impact as far as practicable site.

**3.5 Mitigation by Design**

3.5.1 The reduction of the number of turbines from 51 at the scoping stage to 31 at the design freeze stage and the careful placement of these within the site boundary allowed effective mitigation of potentially significant effects. A summary of the potential effects addressed through the design process and the issues remaining following the selection of the final design is provided in Table 3.1.
### Table 3.1: Summary of Mitigation by Design

<table>
<thead>
<tr>
<th>Topic/Issue</th>
<th>Environmental Constraint / Potential Effect</th>
<th>Mitigation by Design</th>
<th>Further Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscape and Visual Amenity</td>
<td>• potential to substantially increase the extent of effects on landscape character; and&lt;br&gt;• potential to substantially increase the extent of visibility, with effects on residential amenity, settlements, transport corridors, recreation and tourism assets.</td>
<td>The number of turbines was reduced through the design process from 51 to 31, providing the following mitigation:&lt;br&gt;• the proposed development is contained within the Foothills with Forest and Wind Farms LCT that Hadyard Hill Wind Farm occupies, limiting effects on the Intimate Pastoral Valleys LCT;&lt;br&gt;• the removal of turbines from Pinverains/ Auchengairn to the east reduces the extent of development and avoids turbines straddling both sides of the minor road / National Cycle Route 7;&lt;br&gt;• the turbines are viewed as a coherent group, avoiding substantial increases in the horizontal extent of development, particularly from the Water of Girvan Valley, the Middle Dale LCT, Maybole, Straiton and the A77 to the north and east by removing turbines from the area to the north of Dobbingstone Burn, around Barony Hill and Cairn Hill ridge; and&lt;br&gt;• the design has reduced ‘stacking’ or overlapping of turbine rotors in key views, favouring an irregular cluster, that reflects the layout of the existing Hadyard Hill Wind Farm, reducing the effects on visual amenity.</td>
<td>Chapter 5: Landscape and Visual provides an assessment of the residual effects of the proposed development on landscape character and visual amenity.</td>
</tr>
<tr>
<td>Noise</td>
<td>• potential for effects on residential amenity from noise during construction and/or operation of the proposed development; and&lt;br&gt;• potential for increased noise effects in combination with the neighbouring existing Hadyard Hill wind farm.</td>
<td>Mitigation by design to avoid or reduce potential noise effects includes:&lt;br&gt;• removal of turbines around the northern periphery of the site to increase the distance between turbines and non-financially involved residences;&lt;br&gt;• noise predictions indicate that the proposed development would be within the upper and lower daytime noise limits, and the night time noise limits derived in accordance with ETSU-R-97 to protect residential amenity, both on its own and cumulatively with the existing Hadyard Hill wind farm;</td>
<td>Chapter 6: Noise provides an assessment of likely significant effects associated with noise during construction (including the indirect effects associated with traffic movements). The assessment also demonstrates the derived noise limits based on ETSU-R-97 and the predicted noise level with the proposed development in operation.</td>
</tr>
</tbody>
</table>
### Table 3.1: Summary of Mitigation by Design

<table>
<thead>
<tr>
<th>Topic/Issue</th>
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</tr>
</thead>
</table>
| Hydrology and Hydrogeology      | • potential effects on the Water of Girvan, River Stinchar and Penwhapple Reservoir catchments through increased rate/volume or run-off (potential for increased flood risk) and reduced quality of run-off;  
  • potential effects on ground water dependent terrestrial ecosystems (GWDTE) through changes to site hydrogeology; and  
  • potential effects on private water supply (PWS) abstractions through either contamination or changes in the site hydrogeology; have been identified within the site boundary. | • the proposed development incorporates good practice drainage design during construction and operation, using a multi-tiered sustainable drainage system (SUDS) approach to control the rate, volume and quality of run-off from the proposed development;  
  • with the exception access track watercourse crossings, the design incorporates a minimum 50 m buffer distance around all surface watercourses, avoiding direct effects on watercourses;  
  • the number of watercourse crossings has been reduced through the design process, with the location of crossings selected to avoid damage;  
  • all turbines previously located on identified GWDTEs have been moved to a different location or have been completely removed, avoiding direct effects on these habitat types; and  
  • all turbines and associated infrastructure has been located > 250 m from private water supply abstractions. | Chapter 7: Hydrology and Hydrogeology provides further assessment of the potential for direct (associated with access tracks) and indirect effects on GWDTE. Further information on watercourse crossings is provided in Technical Appendix 2.5: Watercourse Crossing Design. |
| Cultural Heritage                | • potential effects on known or unknown buried archaeological remains; possibility of disturbing, removing or destroying in situ remains and artefacts during groundbreaking works; and  
  • effects upon the setting of assets such as Listed | • the proposed development was designed to avoid all known cultural heritage assets within the site boundary; and  
  • the removal of turbines from Barony Hill and Cairn Hill reduces the potential for indirect (setting) effects on assets located in the Water of Girvan Valley, particularly around Maybole and Straiton. | There is a possibility that hitherto unknown buried archaeological remains survive within the site.  
Chapter 8: Cultural Heritage provides an assessment focussed on identifying the likely significant indirect  
  

### Table 3.1: Summary of Mitigation by Design

<table>
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</thead>
<tbody>
<tr>
<td><strong>Buildings, Scheduled Monuments, Conservation Areas and Inventory Historic Gardens and Designed Landscapes.</strong></td>
<td>- potential effects on cultural heritage assets.</td>
<td>with the exception access track watercourse crossings, the design incorporates a minimum 50 m buffer distance around all surface watercourses, avoiding direct effects on watercourses;</td>
<td>Chapter 9: Ecology assesses the residual effects on aquatic and terrestrial habitats, and protected species.</td>
</tr>
<tr>
<td><strong>Ecology</strong></td>
<td>- potential effects on aquatic ecology, including fish; - potential effects on sensitive habitats through habitat loss, fragmentation and degradation (in particular, through changes in hydrology/hydrogeology); and - potential effects on protected species including mammals, fish and herptiles.</td>
<td>- the proposed development incorporates good practice drainage design during construction and operation, using a multi-tiered sustainable drainage system (SUDS) approach to control the rate, volume and quality of run-off from the proposed development; - turbines and tracks avoid sensitive habitats, including peat forming habitats and GWDTEs, as far as possible based on both habitat mapping and peat probing surveys; and - the proposed development successfully avoids all potential bat roosts by at least 500 m. Disused limekilns located on the north side of Barony Hill with the potential to support roosting bats would be more than 2 km from the proposed development.</td>
<td></td>
</tr>
<tr>
<td><strong>Ornithology</strong></td>
<td>- potential disturbance to breeding birds; passage and wintering birds; - potential mortality from collision with wind turbines and other structures; - behavioural displacement from important supporting habitats;</td>
<td>- turbine and infrastructure avoid all known, suspected and recently occupied schedule 1 raptor nest sites and territories by more than 500 m; - the proposed development avoids concentrations of breeding birds and autumn passage visitors (e.g. Golden Plover) identified in the area to the north-east of the proposed development around Barony Hill and Cairn Hill; and - the site is not located on any significant migratory route between roosting or feeding areas.</td>
<td>Chapter 10: Ornithology assesses the residual effects on birds, including presenting the results of collision risk analysis.</td>
</tr>
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</table>
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</thead>
<tbody>
<tr>
<td>Traffic and Transport</td>
<td>• potential for nuisance effects associated with increased traffic during the construction phase.</td>
<td>• the proposed construction access route for abnormal indivisible loads (AILs) is based on the same route used by the existing Hadyard Hill wind farm, thus minimising the need for offsite road improvement; and</td>
<td>Chapter 11: Traffic and Transport provides an assessment of the potential effects associated with the construction traffic.</td>
</tr>
<tr>
<td>Socioeconomics</td>
<td>• potential for beneficial economic effects in relation to the temporary and long term increase in employment opportunities during construction and operation.</td>
<td>• potential beneficial effects would be available through opportunities for local procurement during the construction phase.</td>
<td>While the economic effects are not considered to give rise to significant effects, socioeconomics are considered in Chapter 12: Socioeconomics and Tourism.</td>
</tr>
<tr>
<td>Aviation</td>
<td>• potential for physical obstructions to low flying aircraft; and</td>
<td>• proposed development extent reduced from 51 to 31 turbines, reducing the potential to restrict low flying; and</td>
<td>Further details on aviation interests are addressed in Chapter 13: Aviation.</td>
</tr>
<tr>
<td></td>
<td>• potential for adverse effects on primary surveillance radar within radar line of sight.</td>
<td>• the applicant would enter into a radar mitigation contract with Glasgow Prestwick Airport to provide a technical solution to potential interference with radar.</td>
<td>--------------------------------------------------------------------------------------</td>
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- Effects on free movement to and from roosting, feeding, nesting habitats; and effects from changes to forest structure and management within the wind farm area.
## Table 3.1: Summary of Mitigation by Design

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</thead>
<tbody>
<tr>
<td>Peat Slide Risk</td>
<td>• potential for peat instability during the construction work.</td>
<td>• peat probing at 100 m centres was completed to inform the design. No turbines or infrastructure are located in areas with peat depth in excess of 1.5 m.</td>
<td>All turbines are located in areas classed as low or negligible risk from peat instability. Limited areas of medium risk were identified, which would require mitigation during construction. Further details are provided in Technical Appendix 2.6: Peat Slide Risk Assessment.</td>
</tr>
<tr>
<td>Shadow Flicker</td>
<td>• potential for effects on residential amenity from shadow flicker.</td>
<td>• turbines are located more than 10 rotor diameters from nearest dwellings; and where shadow flicker is identified to be a potential issue further than 10 rotor diameters from the site, the turbines would be provided with automatic shutdown based on a software module that detects when the conditions are such that shadow flicker could arise.</td>
<td>No issues remaining. No further assessment required.</td>
</tr>
<tr>
<td>Tele-communications</td>
<td>• potential for interference with microwave communications links through physical obstruction.</td>
<td>• consultation with all relevant organisations confirmed that there is no potential for interference with existing microwave communication links (see Technical Appendix 1.1: Consultation Register for further details).</td>
<td>No issues remaining. No further assessment required.</td>
</tr>
<tr>
<td>Air quality</td>
<td>• potential for effects on air quality / climate.</td>
<td>• 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</td>
<td>Therefore, no air quality assessment is provided within this ES. The results of a carbon calculator are provided in Technical Appendix 2.8.: Carbon Calculator</td>
</tr>
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<tbody>
<tr>
<td>practice. Fixed and mobile plant would be limited in size and number, and operate for short periods;</td>
<td></td>
<td>demonstrating that the proposed development will have a net benefit for climate change policy, reducing carbon dioxide emissions to the atmosphere after 3.2 years.</td>
<td></td>
</tr>
<tr>
<td>The contributions of exhaust emissions (NO₂ and PM₁₀) from construction vehicles are likely to be low, and orders of magnitude below current Air Quality Objectives; and</td>
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<tr>
<td>The wind farm design avoids areas of peat in excess of 1.5 m depth. Of the 18.5 km of new track proposed, less than 1 km is located on areas of peat greater than 1 m depth.</td>
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</tbody>
</table>
3.6 Issues Remaining for Impact Assessment

3.6.1 Following consultation and baseline characterisation of the site, the following key environmental issues have been identified and are addressed in the remainder of this ES, as follows:

- Chapter 5: Landscape and Visual;
- Chapter 6: Noise;
- Chapter 7: Hydrology and Hydrogeology;
- Chapter 8: Cultural Heritage;
- Chapter 9: Ecology;
- Chapter 10: Ornithology;
- Chapter 11: Traffic and Transport;
- Chapter 12: Socioeconomics and Tourism; and
- Chapter 13: Aviation.

3.7 References


South Ayrshire Council (2014) South Ayrshire Local Development Plan, Adopted 23 September 2014, URL: www.south-ayrshire.gov.uk/planning

South Ayrshire Council (2013), South Ayrshire Landscape Wind Capacity Study, Main Study Report and Appendix.

Scottish Natural Heritage (2012), An assessment of the impacts of climate change on Scottish landscapes and their contribution to quality of life, SNH Commissioned Report 488.

Chapter 4: Planning Policy

4.1 NATIONAL POLICY

4.2 NPF3

4.3 SCOTTISH PLANNING POLICY

4.4 DEVELOPMENT PLAN

4.5 OTHER MATERIAL CONSIDERATIONS

4.6 REFERENCES

4.7 GLOSSARY

Appendices

None

Figures

None
4 Planning Policy

4.1 National Policy

4.1.1 National policy in Scotland is provided by the National Planning Framework (NPF3) (The Scottish Government, 2014a) which provides a statutory framework for Scotland's long-term spatial development, and Scottish Planning Policy (SPP) (The Scottish Government, 2014b) which sets out national planning policies which reflect Scottish Ministers' priorities for the operation of the planning system and for the development and use of land.

4.2 NPF3

4.2.1 The NPF3 vision is a Scotland which includes:

- A low carbon place - that seizes the opportunities arising from the ambition to be a world leader in low carbon energy generation, both onshore and offshore.
- A natural, resilient place - where the natural and cultural assets are respected, they are improving in condition and represent a sustainable economic, environmental and social resource for the nation. The environment and infrastructure have become more resilient to the impacts of climate change.

4.2.2 The NPF3 ambition is to achieve at least an 80% reduction in greenhouse gas emissions by 2050. Planning is to play a key role in delivering on the commitments set out in Low Carbon Scotland (The Scottish Government, 2011); the Scottish Government's report on proposals and policies.

4.2.3 Under the heading of "Scotland today" it is noted that at present the energy sector accounts for a significant share of Scotland's greenhouse gas emissions. To address this NPF3 states that:

"we need to employ our skills and innovation to help capitalise on our outstanding natural advantages".

4.2.4 NPF3 notes the industry estimates that renewable energy currently supports around 11,000 jobs in Scotland and it is expected employment in this sector will grow significantly over the coming years.

4.2.5 NPF3 states at 3.7 that:

"A planned approach to development has ensured that onshore wind energy development largely avoids our internationally and nationally protected areas. Whilst there is strong public support for wind energy as part of the renewable energy mix, opinions about onshore wind in particular locations can vary. In some areas, concern is expressed about the scale, proximity and impacts of proposed wind energy developments. In others, it is recognised as an opportunity to improve the long term resilience of rural communities".

4.2.6 Under the heading of "Scotland tomorrow", the Scottish Government want to meet at least 30% of overall energy demand from renewables by 2020 - this includes generating the equivalent of at least 100% of gross electricity consumption from renewables, with an interim target of 50% by 2015.
4.2.7 The Scottish Government want to continue to capitalise on the wind resource, and for Scotland to be a world leader in offshore renewable energy.

4.2.8 NPF3 expects, in time, the pace of onshore renewables energy development to be overtaken by a growing focus on the significant marine energy opportunities, including wind, wave and tidal energy.

4.2.9 The NPF3 recognises that both terrestrial and marine planning have a key role to play in reaching the ambitious targets by facilitating development, linking generation with consumers and guiding new infrastructure to appropriate locations. NPF3 is clear that development must work with and sustain our environmental assets, and should provide opportunities for communities.

4.2.10 NPF3 states at 3.23 that:

"Onshore wind will continue to make a significant contribution to diversification of energy supplies. We do not wish to see wind farm development in our National Parks and National Scenic Areas. Scottish Planning Policy (SPP) sets out the required approach to spatial frameworks which will guide new wind energy development to appropriate locations, taking into account important features including wild land".

4.2.11 The low carbon agenda forms a crucial part of the Scottish Government strategy. The Scottish Government expect development plans to promote a positive, planned approach to providing low carbon infrastructure across Scotland.

4.2.12 Addressing the vision for "a natural, resilient place", NPF3 states that the Scottish Government "will respect, enhance and make responsible use of our natural and cultural assets".

4.2.13 Under the heading of "Scotland today", in NPF3 at 4.4, Scotland's landscapes are described as: "spectacular, contributing to our quality of life, our national identity and the visitor economy". Biodiversity in Scotland is considered "rich and varied". The historic environment is "an integral part of our well-being and cultural identity", and our archaeological sites "reflect our long history of human settlement".

4.2.14 Under the heading of "Scotland tomorrow", NPF3 states that: "a planned approach to development helps to strike the right balance between safeguarding assets which are irreplaceable, and facilitating change in a sustainable way".

4.2.15 The Scottish Government's key actions in NPF3 include:

"We will continue to take action to help generate the equivalent of 100% of Scotland's gross annual electricity consumption from renewable sources by 2020, with an interim target of 50% by 2015".

4.3 Scottish Planning Policy

4.3.1 The SPP is a statement of Scottish Government policy on how nationally important land use planning matters should be addressed across the country. As a statement of Ministers priorities the content of the SPP is a material consideration that carries significant weight, though it is for the decision maker to determine the appropriate weight in each case.

4.3.2 The Scottish Government's Purpose of creating a more successful country through increasing sustainable economic growth is set out in the Government Economic
Strategy. The Scottish Government has identified 16 national outcomes that articulate in more detail how the Purpose is to be achieved. Outcomes that are relevant to the proposed development include:

- Outcome 2: A low carbon place - reducing our carbon emissions and adapting to climate change.
- Outcome 3: A natural, resilient place - helping to protect and enhance our natural and cultural assets, and facilitating their sustainable use.

The pursuit of these outcomes are reflected in both the SPP and NPF3.

4.3.3 The SPP introduces a presumption in favour of development that contributes to sustainable development. The aim is to achieve the right development in the right place; it is not to allow development at any cost.

4.3.4 The policy principles for Outcome 2: A low carbon place, include that the planning system should:

- support the transformational change to a low carbon economy, consistent with national objectives and targets, including deriving:
  - 30% of overall energy demand from renewable sources by 2020; and
  - the equivalent of 100% of electricity demand from renewable sources by 2020;
- support the development of a diverse range of electricity generation from renewable energy technologies - including the expansion of renewable generation capacity; and
- guide development to appropriate locations and advise on issues that will be taken into account when specific proposals are being assessed.

4.3.5 Referring specifically to onshore wind the SPP states that planning authorities should set out in development plans a spatial framework identifying those areas that are likely to be most appropriate for onshore wind farms as a guide for developers and communities.

4.3.6 The spatial frameworks identify three groups:-

**Group 1:** Area where wind farms will not be acceptable:

- National Parks
- National scenic areas

**Group 2:** Areas of significant protection:

- National and international designations
- Other nationally important mapped environmental interests
- Community separators for consideration of visual impact, and

**Group 3:** Areas with potential for wind farm development.
4.3.7 The SPP states under Group 3 that, beyond groups 1 and 2, wind farms are likely to be acceptable, subject to detailed considerations against identified policy criteria.

4.3.8 The SPP states that local development plans should set out the criteria that will be considered in deciding all applications for wind farms of different scales - including extensions and re-powering - taking account of the considerations set out at paragraph 169 of SPP. It is noted, at paragraph 169, that considerations will vary relative to the scale of the proposal and area characteristics but are likely to include:

- net economic impact, including local and community socio-economic benefits such as employment, associated business and supply chain opportunities;
- the scale of contribution to renewable energy generation targets;
- effect on greenhouse gas emissions;
- cumulative impacts - planning authorities should be clear about likely cumulative impacts arising from all of the considerations below, recognising that in some areas the cumulative impact of existing and consented energy development may limit the capacity for further development;
- impacts on communities and individual dwellings, including visual impact, residential amenity, noise and shadow flicker;
- landscape and visual impacts, including effects on wind land;
- effects on the natural heritage, including birds;
- impacts on carbon rich soils, using the carbon calculator;
- public access, including impact on long distance walking and cycling routes and scenic routes identified in the NPF;
- impacts on the historic environment, including scheduled monuments, listed buildings and their settings;
- impacts on tourism and recreation;
- opportunities for energy storage; and
- the need for a robust planning obligation to ensure that operators achieve site restoration.

4.3.9 The SPP requires that both strategic and local development planning authorities should identify where there is strategic capacity for wind farms, and areas with the greatest potential for wind development, considering cross-boundary consultation and opportunities. The spatial framework is completed by a more detailed and exacting development management process where the merits of an individual proposal will be carefully considered against the full range of environmental, community and cumulative impact (as set out in 1.3.7 above).

4.3.10 The SPP notes that individual properties and those settlements not identified within the development plan will be protected by the safeguards set out in the local development plan policy criteria for determining wind farms and the development management considerations accounted for when determining individual applications.

4.3.11 Grid capacity is not to be used as a reason to constrain the areas identified for wind farm development or decisions on individual applications for wind farms.
4.3.12 The SPP is clear that proposals for onshore wind turbines should continue to be determined while spatial framework and local policies are being prepared and updated. Moratoria on onshore wind development are not appropriate.

4.3.13 Areas identified for wind farms should be suitable for use in perpetuity. The SPP notes that consents may be time-limited but wind farms should nevertheless be sited and designed to ensure impacts are minimised and to protect an acceptable level of amenity for adjacent communities.

4.3.14 The SPP states that where a proposal is acceptable in land use terms, and consent is being granted, local authorities may wish to engage in negotiations to secure community benefit in line with the Scottish Government Good Practice Principle for Community Benefits for Onshore Renewable Energy Development.

4.4 Development Plan

4.4.1 The South Ayrshire Local Development Plan (LDP) (South Ayrshire Council, 2014) was adopted on 23 September 2014. The LDP is a strategic land use plan that sets out strategic spatial priorities and policies for South Ayrshire and will secure land for specified users to provide certainty for development.

4.4.2 The LDP replaces the South Ayrshire Local Plan and the Ayrshire Joint Structure Plan as the Council's adopted development plan.

4.4.3 The LDP foreword and vision statement lists four aims which include to:

- encourage renewable-energy developments without damaging the landscape and countryside.

4.4.4 The LDP notes, under the heading of wind energy, that:

"South Ayrshire has above-average wind speeds and is an attractive area for generating wind energy and, in particular, as a location for wind farms. The Scottish Government has set a target for the equivalent of 100% of Scotland's electricity to be generated from renewable sources by 2020, and onshore wind power is one of the main sources of renewable energy.

Given the Government's target, we have a responsibility to find wind farm locations that would contribute to the overall national supply, while taking any effects on the environment into account. Local benefits arising from wind farms can be important to the economic future of rural communities."

4.4.5 The LDP policy on wind energy is as follows:

"We will support proposals if:

a. they are capable of being accommodated in the landscape in a manner which respects its main features and character (as identified in the South Ayrshire Landscape Wind Capacity Study or in any subsequent updates to that study), and which keeps their effect on the landscape and the wider area to a minimum (through a careful choice of site, layout and overall design);

b. they do not have a significant detrimental visual impact, taking into account views experienced from surrounding residential properties and settlements, public roads
and paths, significant public viewpoints, and important recreational assets and tourist attractions;

c. they do not have any other significant detrimental effect on the amenity of nearby residents, including from noise and shadow flicker;

d. they do not have a significant detrimental effect on natural heritage features, including protected habitats and species, and taking into account the criteria in LDP policy: natural heritage;

e. they do not have a significant detrimental effect on the historic environment, taking into account the criteria in LDP policy: historic environment and LDP policy: archaeology;

f. they do not adversely affect aviation, defence interests and broadcasting installations; and

g. their cumulative impact in combination with other existing and approved wind energy developments, and those for which applications for approval have already been submitted, is acceptable.

We will provide supplementary guidance on wind farms, which will identify preferred areas of search, areas with potential constraints and areas requiring significant protection; and will provide more detail on how the above-mentioned criteria will be applied in assessing all proposals for wind farms and turbines. We will use the South Ayrshire Landscape Wind Capacity Study (or any subsequent updates to that study) to help us decide the effect of proposals on the landscape.

Development proposals will not be permitted where, either individually or cumulatively, they would adversely affect the integrity of a Natura 2000 site.*

4.4.6 The LDP policy is consistent with SPP in setting out the criteria that will be considered in deciding all applications for wind farms of different scales.

4.4.7 The LDP policy on wind energy includes specific reference to other LDP policies, these are:

- LDP policy: natural heritage;
- LDP policy: historic environment;
- LDP policy: archaeology; and

These policies are set out in full below.

4.4.8 The LDP policy on natural heritage is as follows:

*International Designations

Development, either individually or in combination with other plans and projects, which is likely to have a significant effect on a designated or proposed Natura 2000 site (Special Protection Areas, Special Areas of Conservation) will be subject to an appropriate assessment of the implications for the site in view of the sites conservation objectives. Development proposals will only be supported where the assessment concludes that:

a. it will not adversely affect the integrity of the site; or
b. there are no alternative solutions, and there exist imperative reasons of overriding public interest, including those of a social or economic nature.

Where such site hosts a priority habitat and/or priority species as defined by the Habitats Directive (92/43/EC), the imperative reasons of overriding public interest must relate to human health, public safety or beneficial consequences of primary importance to the environment. Other allowable exceptions are subject to the view of the European Commission (via Scottish Ministers).

**National Designations**

Development, either individually or in conjunction with other proposals, which would affect a designated or proposed Site of Special Scientific Interest will only be permitted where ecological appraisals have demonstrated to the satisfaction of the Council as planning authority that:

a. it will not adversely affect the integrity of the site or the qualities for which it has been designated; or

b. any adverse affects are clearly outweighed by social, environmental or economic benefits of national importance.

**Local Designations**

Development, either individually or with other proposals, which would affect the following local heritage sites and designations, shall only be supported where the developer can show that the integrity of the site will not be put at risk.

a. Local nature reserves;


c. Wildlife sites;

d. Tree Preservation Orders;

e. Forest Parks;

f. Wildlife corridors; and

g. Ornithological sites.

In all instances, the Council will require development proposals to have regard to safeguarding features of nature conservation value including woodlands, hedgegrows, lochs, ponds, watercourses, wetlands and wildlife corridors.

**Protected Species**

Planning Permission will not be granted for development that would be likely to have an adverse effect on protected species unless it can be justified in accordance with the relevant protected species legislation.

4.4.9 The LDP policy on historic environment is as follows:

"We will support development proposals, affecting the following heritage resources, if we believe the quality and design of the proposed development will protect, conserve and improve them."
Listed buildings of architectural and historic interest

We are in favour of protecting listed buildings and their settings, especially from inappropriate development, and will actively encourage their sensitive maintenance, restoration and reuse.

Conservation areas

All new development in, or affecting the setting of, a conservation area, has to improve or preserve the area's character or appearance.

We will actively encourage and, where resources permit, implement upgrading and enhancement for conservation areas.

We will use conservation area appraisals and management plans to help make sure development is carried out to a consistent high standard

Scheduled monuments

We will not accept development which would negatively affect the site or setting of a scheduled ancient monument.

Gardens and Designed Landscapes

We will not accept development which would negatively affect gardens and designed landscapes included in the Inventory of Gardens and Designed Landscapes in Scotland.

More Guidance

We will follow the supplementary guidance on historic environment when considering all proposals which would affect our heritage resources. This gives detailed guidance on the following:

a. Principle of development affecting built heritage resources
b. Conservation area appraisals and management plans
c. Policies giving guidance on specific types of development.

4.4.10 The LDP policy on archaeology is as follows:

“We will only allow development which will negatively affect a known archaeological site, or archaeological resources discovered during the period of the local development plan, if developers can show that the benefits of the proposal will clearly outweigh the archaeological value of the site or feature.

To fully assess and understand the implications of development on archaeological sites, we will ask the advice of the West of Scotland Archaeological Service.”

4.4.11 Other LDP policies that may be relevant include:

- LDP policy: Galloway and Southern Ayrshire Biosphere
- LDP policy: landscape quality
- LDP policy: protecting the landscape
- LDP policy: woodland and forestry
• LDP policy: preserving trees
• LDP policy: Central Scotland Green Network
• LDP policy: water environment
• LDP policy: flooding and development
• LDP policy: air, noise and light pollution
• LDP policy: dark skies
• LDP policy: outdoor public access and core paths

4.4.12 These policies are set out in full below:

4.4.13 The LDP policy on Galloway and Southern Ayrshire Biosphere is as follows:

"We will support development that promotes the aims of the biosphere and shows an innovative approach to sustainable living and the economy, and supports improving, understanding and enjoying the area as a world-class environment."

4.4.14 The LDP policy on landscape quality is as follows:

"We will maintain and improve the quality of South Ayrshire's landscape and its distinctive local characteristics. Proposals for development must conserve features that contribute to local distinctiveness, including:

a. community settings, including the approaches to settlements, and buildings within the landscape;

b. patterns of woodland, fields, hedgerow and tree features;

c. special qualities of rivers, estuaries and coasts;

d. historic landscapes; and

e. skylines and hill features, including prominent views."

4.4.15 The LDP policy on protecting the landscape is as follows:

"We will consider proposals within or next to Scenic Areas (as defined on the LDP environment map) against the following conditions.

a. the significance of impacts and cumulative impact on the environment, particularly landscape and visual effects as informed by the Ayrshire Landscape Character Assessment (SNH 1998).

b. How far they would benefit the economy.

c. Whether they can be justified in a rural location."

4.4.16 The LDP policy on woodland and forestry is as follows:

"We will support proposals for woodland and forestry that are:

a. consistent with the objectives and main actions of the Ayrshire and Arran Woodland Strategy; and

b. sympathetic to the environment, nature and wildlife interests of the area, and, wherever appropriate, provide recreational opportunities for the public."
4.4.17 The LDP policy on preserving trees is as follows:

"When assessing proposals for development that might involve loss of, or work to, trees, we will consider how much it would affect the local area and will take measures to protect trees, especially those covered by a provisional or confirmed tree preservation order. Where appropriate we will take into account the criteria in the Scottish Government Policy on the Control of Woodland Removal.

Where the Council is minded to grant planning permission for a development that will necessitate the removal of existing trees, we will require the developer to replace them with new appropriate compensatory planting, taking into account the specific circumstances of the site."

4.4.18 The LDP policy on the Central Scotland Green Network is as follows:

"To contribute to the vision and goals of the network, we will use development opportunities, including through master planning, to make sure that pathways, cycle routes, golf courses, harbours, woodlands, open spaces, river valleys, parklands, wildlife settings, wind farm areas and transport routes, are, as far as possible, connected through a network of green links. Where we allow development within or next to a green link or next to an area of open space as defined on the proposals map, we will, as far as we can:

a. protect and improve natural features of importance and wildlife habitats;
b. carry out new planting using native species;
c. improve public access; and
d. improve and extend the Central Scotland Green Network where appropriate.

All development proposals must keep to the green network supplementary guidance and the Woodlands In and Around Towns Strategy. A working group from the Ayrshire Joint Planning Unit, the other Ayrshire councils and other relevant agencies will prepare this guidance."

4.4.19 The LDP policy on the water environment is as follows:

"We support the objectives of the Water Framework Directive (2000/60/EC). We will only allow development that meets these objectives and shows that:

e. it will not harm the water environment;
f. it will not pose an unacceptable risk to the quality of controlled waters (including groundwater and surface water); and
g. it will not harm the biodiversity of the water environment."
4.4.20 The LDP policy on flooding and development is as follows:

<table>
<thead>
<tr>
<th>Flood Risk Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medium to High Risk Areas:</strong></td>
</tr>
<tr>
<td>Annual probability of watercourse, tidal or coastal flooding is greater than 0.5% (1:200)</td>
</tr>
<tr>
<td>Development proposals located within or bordering a medium to high risk flood area will not be permitted, unless:</td>
</tr>
<tr>
<td>• the development is required at the proposed location to assist in delivering a National Development identified in National Planning Framework 2; or,</td>
</tr>
<tr>
<td>• the development is required at the proposed location to assist in delivering the strategic LDP objectives (as set out in LDP Policy: Spatial Strategy).</td>
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<tr>
<td>Any development proposals permitted in medium/high risk areas will be accompanied by appropriate flood risk assessments and will include appropriate measures to manage flood risk. Any loss of flood storage capacity shall be mitigated to produce a neutral or better outcome. Flood risk assessments should take account of future effects of climate change.</td>
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</table>

| **Low to Medium Risk Areas:** |
| Annual probability of watercourse, tidal or coastal flooding in the range 0.1%- 0.5% (1:1000 –1:200) |
| Development proposals within or bordering a low to medium flood risk areas are likely to be acceptable. However, the submission of a Flood Risk Assessment may be required where: |
| • better local flood risk information is available and suggests a higher risk; |
| • a sensitive land use (as specified in Scottish Planning Policy) is proposed, and/or; |
| • the development borders the coast and is susceptible to the threat of climate change. |

| **Little or No Risk areas:** |
| Annual probability of watercourse, tidal or coastal flooding is less than 0.1% (1:1000) |
| Development proposals located on little or no risk flood areas have an annual probability of watercourse, tidal or coastal flooding of less than 0.1% and will therefore not be constrained by flood risk. |

**“Brownfield land”**

Proposals for developing brownfield land in areas that have a medium or high risk of flooding will not generally be suitable where people will be living below first-floor level. Brownfield sites in medium or high risk areas will not be suitable for essential civil infrastructure, as defined in Scottish Planning Policy. Developers of brownfield land should make sure they use water-resistant materials where appropriate and that the construction of the development is appropriate for the site conditions. (You can find more guidance in Planning Advice Note 69: Planning and Building Standards Advice on Flooding.)

**Land raising**

We will not approve land raising (work that permanently raises a site above the functional flood plain of a watercourse, or elsewhere if flooding is an issue), unless the developer can demonstrate that this would have a neutral or better effect on the probability of flooding elsewhere; be linked to the provision of compensatory storage; and not create islands of development.
SUDS

Areas of impermeable surfaces should be kept to a minimum in all new developments. Development proposals must include Sustainable Urban Drainage Systems (SUDS) which have been designed in line with the SUDS Manual (CIRIA C697). Where possible, SUDS should be designed to maximise the opportunities for habitat restoration and biodiversity.

Local flood plans

We will consider flood risk management plans when deciding on development proposals.

4.4.21 The LDP policy on air, noise and light pollution is as follows:

"We will not allow development which would expose significant numbers of people to unacceptable levels of air, noise or light pollution."

4.4.22 The LDP policy on dark skies is as follows:

"We will support the Galloway Forest Dark Sky Park, and will presume against development proposals within the boundaries of the park that would produce levels of lighting that would adversely affect its ‘dark sky’ status. The boundaries of the Dark Sky Park [and of the buffer zone] are shown on the map on page 40. Development will have to be in line with the supplementary guidance on lighting within the Galloway Forest Dark Sky Park, which we will produce jointly with the adjoining planning authorities and Forestry Commission Scotland. This will also provide guidance for proposed developments within the buffer zone which may have a lighting impact on the Dark Sky Park. [The supplementary guidance will define the geographical extent of the buffer zone.]

4.4.23 The LDP policy on outdoor public access and core paths is as follows:

"We will aim to improve and protect all core paths and other significant access routes - including recognised rights of way, disused railway lines, riverside walkways, wind farm access tracks and cycleways and cycle parking facilities. We will only support proposals which would have a negative effect on a core path or other significant access route if we are satisfied that they provide a suitable alternative route. Development or redevelopment sites should include appropriate facilities for active travel, particularly walking and cycling. Development that is next to or near the core paths network should provide suitable links to the network, where appropriate and practical. Development proposals will not be permitted where they would adversely affect the integrity of the Glen App and Galloway Moors Special Protection Areas."

4.5 Other Material Considerations

4.5.1 There is reference in the LDP policy on wind energy that the Council: "will provide supplementary guidance on wind farms, which will identify preferred areas of search, areas with potential constraints and areas requiring significant protection; and will provide more detail on how the above mentioned criteria (in the LDP policy on wind energy) will be applied in assessing all proposals for wind farms and turbines." The LDP policy on wind energy also states that the Council: "will use the South Ayrshire Landscape Capacity Study (or any subsequent updates to that study) to help us decide the effect of proposals on the landscape."
4.5.2 The Council has not yet (January 2015) adopted supplementary guidance in relation to wind farms.

4.5.3 The South Ayrshire Landscape Wind Energy Capacity Study (Carol Anderson Landscape Associates, 2013) aims to inform strategic planning for wind energy in line with SPP and to also provide guidance on the appraisal of individual wind farm and wind turbine proposals in South Ayrshire.

4.5.4 The following is an extract from the Summary of the South Ayrshire Landscape Wind Capacity Study:

"The study considers the sensitivity of 20 landscape character types within South Ayrshire to a range of wind turbine developments. Four development typologies were considered in the sensitivity assessment, these principally categorised on the basis of turbine height. The assessment considers key sensitivities related to landscape character and visual amenity. Potential cumulative issues associated with existing and consented wind farm developments are also considered in the assessment. Constraints and opportunities for wind energy development are set out for each landscape character type and guidance is given on location. Further generic guidance on the siting of small turbines below 50m height is also provided in the study."

4.5.5 The main findings from the South Ayrshire Landscape Wind Capacity Study are as follows:

- "Existing wind farm developments are largely located in upland landscapes and these have relatively limited visibility from the more settled lowlands, coasts and valleys of South Ayrshire."

- "There is some scope to site additional wind farm development with turbines above 50m height within some upland areas of South Ayrshire although this will be limited by potential cumulative and other landscape and visual constraints including effects on adjacent smaller scale settled valleys, coastal and lowland landscapes."

- "There is no scope to accommodate turbines above 50m height within the smaller scale, well-settled lowlands, coasts and valleys due to their increased landscape sensitivity to tall turbines, including potential cumulative effects with wind farm development in adjacent upland areas."

- "Narrow incised and diverse valleys, the coastal edge and the Loch Doon and Carrick Forest area are highly sensitive to most forms of turbine development. Ongoing review of cumulative landscape and visual effects of multiple wind turbine developments will be necessary to ascertain when capacity is close to being reached."

4.5.6 The proposed development is located within character type 17c: Foothills with Forest and Wind Farm, which lies between the Girvan Water and Stinchar Valleys in South Ayrshire and include the operational wind farm of Hadyard Hill.

4.5.7 Under the heading of "Guidance for development" for landscape character type 17c the South Ayrshire Landscape Wind Capacity study states that:

"There is very limited scope for the large typology (turbines >70m) to be accommodated within this landscape. Turbines should be well set back from the more sensitive outer edge of these foothills to avoid significant impact on the 'landmark' hills..."
which form highly visible containing edges to the smaller-scale settled Stinchar and Girvan Water valleys and to reduce cumulative effects on these valleys. The adjacent Rugged Uplands, Lochs and Forest character type (21) is also highly sensitive and some impact on the character and views from this landscape is likely to be unavoidable if development were located in the broader eastern basin of these foothills. There is likely to be little scope for multiple wind farm developments to be accommodated due to its often limited extent and narrowness of these foothills and the need to avoid the higher, more defined hills on the edges of this landscape.

There may be some limited scope for the medium typology (50-70m) to be located in this landscape as turbines of this size may be more able to be contained by landform in the eastern part of these foothills, thus minimising visibility from adjacent valleys. This typology would still be likely to impact on landmark hills and intrude on views from adjacent valleys if sited close to the outer fringes of these foothills however.

All turbines should be sited to avoid intrusion on views from the minor public road/National Cycle Route 7 to the south to the Carrick Hills and the dramatic pass of the Nick of the Balloch.

The detailed assessment considers larger typologies only. Smaller turbines <50m would have significant cumulative effects with any larger typologies which may be located within the core of this landscape although there would be some limited scope to site the small-medium typology (turbines 30-50m) on broader shoulders and more gentle upper hill slopes at the transition with the Middle Dale (12) and the Intimate Pastoral Valley (13) of the upper Girvan valley and away from the setting of 'landmark' hills. The potential for cumulative effects to arise with any further wind farm development sited in these foothills is a key limitation and should be considered carefully when reviewing applications however.

The small typology (15-30m) should only be sited in association with built development which lies on the fringes of this character type. Detailed siting and design should accord with the guidance set out in section 24 of this report."

4.6 References


4.7 Glossary

NPF3  National Planning Framework
SPP    Scottish Planning Policy
LDP    South Ayrshire Local Development Plan
# Chapter 5: Landscape and Visual Impact Assessment

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5 Landscape and Visual Impact Assessment

5.1 Introduction

5.1.1 This chapter considers the likely significant effects on the landscape and visual receptors, associated with the construction, operation and decommissioning of the proposed Hadyard Hill Extension Wind Farm. The specific objectives of the chapter are to:

- describe the landscape and visual baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation.

5.1.2 The assessment has been carried out by chartered Landscape Architects at Optimised Environments Limited (OPEN) on behalf of the applicant. The LVIA has been undertaken between 2014 and 2015. The Landscape Architects have BA (Hons) in Landscape Architecture and are Members of the Landscape Institute and comply with their Code of Professional Conduct.

5.1.3 There are four technical appendices to this LVIA, included in Volume 4 of the ES, which should be read in conjunction with the LVIA. They are as follows:

- Technical Appendix 5.1: Methodology, a detailed description of the methodology used in the landscape and visual assessment (a summary is provided in Section 5.3 of this chapter).
- Technical Appendix 5.2: Initial Assessment of Landscape Effects, which contains in tabulated form, the initial assessment and cumulative assessment of all of the landscape character receptors included in the assessment. The receptors that were found to have potential to undergo a significant effect are assessed in full in Sections 5.7 and 5.9 of this chapter.
- Technical Appendix 5.3: Initial Assessment of Visual Effects, which contains in tabulated form, the initial assessment and cumulative assessment of all of the viewpoints and visual receptors included in the assessment. The receptors that were found to have potential to experience a significant effect are assessed in full in Sections 5.8 and 5.9 of this chapter.
- Technical Appendix 5.4: Residential (Visual) Amenity Survey (RAS), which contains a survey of inhabited properties within a 2.5 km radius of the proposed development.

5.1.4 Figures 5.1 – 5.53 accompany the text of this LVIA and are referenced in the text where relevant.

Project Terminology

5.1.5 The terminology used in the LVIA is consistent with that set out in Chapter 1: Introduction of this ES. It refers to the ‘proposed development’ for the Hadyard Hill
Wind Farm Extension and the ‘site’ for the development area. At points in the LVIA, it is necessary to refer to individual turbines or groups of turbines, in which case the terminology refers to the ‘proposed turbines’ for the proposed development turbines. The assessment uses the term ‘turbines’ when referring generally to wind turbines.

5.1.6 Where distances between receptors and the proposed development are used in this LVIA, they refer to the distance from the closest edge of the receptor to the closest turbine of the proposed development, unless otherwise stated.

5.2 **Scope of Assessment**

5.2.1 The aim of the Landscape and Visual Impact Assessment (LVIA) is to determine the significant effects that the proposed development would have on the landscape and visual receptors during the construction, operation and decommissioning phases. This chapter considers the potential for likely significant effects as a result of the proposed development, as described in Chapter 2: Proposed Development.

5.2.2 For the purpose of the assessment, the potential effects are grouped into four categories as described below:

5.2.3 Physical landscape effects are restricted to the area within the site boundary as shown on Figure 2.1 (“the site”), and are the direct effects on the fabric of the site, such as the removal of trees or alteration to ground cover. This category of effects is made up of landscape elements, which are the components of the landscape that may be physically affected by the proposed development. These effects are most likely to occur during construction and decommissioning phases.

5.2.4 Landscape character is the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and the way that this pattern is perceived. Effects on landscape character arise either through the introduction of new elements that physically alter this pattern of elements, or through visibility of the proposed development, which may alter the way in which the pattern of elements is perceived. This category of effects is made up of landscape character receptors, which fall into two groups; landscape character areas and designated areas. These effects are most likely to occur in relation to the operational phase, but would also occur during the construction and decommissioning phases.

5.2.5 The assessment of effects on views is an assessment of how the introduction of the proposed development will affect views throughout the study area. The assessment of effects on views is carried out in two parts; an assessment of the effects that the proposed development will have on representative viewpoints; and an assessment of the effects on views from principal visual receptors, which are the notable settlements, routes, features and attractions found throughout the study area. These effects are most likely to occur in relation to the operational phase of the wind turbines, but would also occur during the construction and decommissioning phases.

5.2.6 Cumulative effects may arise where the study areas for two or more wind farms overlap. (The dimensions of the cumulative study areas are defined in SNH’s Visual Representation of Wind Farms Version 2 (SNH 2014c)). In these circumstances the proposed development may give rise to an incrementally greater landscape character or visual effect on any given baseline than the impact of the proposed development itself. Again, wind farms may combine to have a sequential effect, irrespective of any overlap in study areas. It is the incremental effect of the addition of the proposed development to the cumulative situation that is assessed in the LVIA, not the overall effect of wind farms across the study area.
Project Interactions

5.2.7 This LVIA has been carried out in conjunction with the design iteration of the proposed development as documented in Chapter 3: Design Evolution and Alternatives, and has closely informed the final layout and design. Interaction also occurs with Chapter 8: Cultural Heritage in respect of the assessment of effects on Gardens and Designed Landscapes and Chapter 9: Ecology in respect of the assessment of effects on landscape elements.

Consultation

5.2.8 Consultation responses relating to landscape and visual issues were received from the following consultees:

- South Ayrshire Council;
- Scottish Natural Heritage;
- Forestry Commission; and
- Scottish Ministers.

5.2.9 South Ayrshire Council (SAC) and Scottish Natural Heritage (SNH) have been consulted through a pre-application meeting and subsequent correspondence. Consultation has led to agreement on the content of the viewpoint list, content of the cumulative wind farm list and the requirements for the visualisations, which it is agreed will adhere to guidance set out in ‘Visual Representation of Wind Farms Version 2’ (SNH 2014c)

5.2.10 The consultation responses are summarised in Technical Appendix 1.1: Consultation Register, which also describes how the ES addresses each of the issues raised. The key issues arising from these responses, and which are addressed in this chapter, are summarised below.

5.2.11 Based on the consultation responses and the known environmental sensitivities, this assessment considers the following:

- effects on views and landscape setting of residential properties in the immediate area;
- effects on settlements including Barr, Dailly, Crosshill, Straiton, Girvan, Maybole and Pinwherry;
- effects and cumulative effects on views from the A714 and National Cycle Route 7;
- effects on landscape character, in particular the valley landscapes to the north and south;
- effects on landscape designations and Merrick Wild Land Area; and
- the cumulative effects in respect of the concentration of existing and proposed wind farm development in this area.

Issues Scoped Out

5.2.12 The scope of this assessment takes account of the committed mitigation measures both incorporated into the design and those standard construction and decommissioning mitigation measures incorporated into the proposed development,
as described in Chapter 2: Proposed Development, and Technical Appendix 2.4: Construction Environmental Management Plan.

5.2.13 On the basis of the desk based and survey work undertaken, the professional judgement of the EIA team, experience from other relevant projects and policy guidance or standards, the following topic areas presented in Table 5.1 below have been ‘scoped out’ of the assessment process:

<table>
<thead>
<tr>
<th>Potential Effect</th>
<th>Basis for scoping out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative effects with turbines beyond 35 km from the proposed development.</td>
<td>A Search Area Base Plan that covers a 60 km radius from the proposed development has been used to understand the wider cumulative context. Cumulative wirelines demonstrate the limited influence that cumulative developments in the 25-35 km radius have on the cumulative situation and this has been verified during site visits. This has led to the approach of using a 35 km radius for the CLVIA. Cumulative Wind Farms are shown in Figure 5.13.</td>
</tr>
<tr>
<td>Cumulative effects with turbines less than 50 m in height.</td>
<td>The Search Area Base Plan shows turbines over 50 m within the 35 km radius of the proposed development. Cumulative developments less than 50 m in height have been found to have a limited influence on the cumulative situation owing to their smaller scale, especially in relation to the larger scale of the existing Hadyard Hill Wind Farm which has a more notable influence. This has been verified during site visits.</td>
</tr>
<tr>
<td>Cumulative effects that include scoping stage wind farms.</td>
<td>Scoping stage wind farms have been scoped out from the cumulative assessment owing to the uncertainty of them becoming operational. Their inclusion tends to occur when especially close range to the proposed development. There are no such close range examples to the proposed development.</td>
</tr>
<tr>
<td>Cumulative effects with other forms of development</td>
<td>Other forms of development have been scoped out from the cumulative assessment as there are no known large scale developments other than wind farms within 10 km of the proposed development that would otherwise give rise to potential cumulative effects.</td>
</tr>
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5.3 Assessment Methodology

Baseline Characterisation

Study Area

5.3.1 The LVIA covers a study area of 35 km radius, which follows guidance given in SNH’s ‘Visual Representation of Wind Farms Version 2’ (SNH 2014c). The 35 km study area is measured beyond an ‘enclosing circle’ around the proposed turbines, as shown in Figure 5.1. Graphic information, including a zone of theoretical visibility (ZTV) diagram, has been produced to cover the 35 km study area. The study area is not intended to provide a boundary beyond which the development would not be seen, but rather to define the area within which the development may have a significant landscape or visual effect. It is considered highly unlikely for a significant effect to occur towards the edges of the study area and this is confirmed by the assessment undertaken.

5.3.2 Additional graphic information has been produced which shows a 15 km radius. This is to assist readers with the more detailed assessments that relate to this closer range area.
5.3.3 Cumulative effects are assessed with other existing and proposed wind farms within a distance of up to 35 km radius, in accordance with relevant cumulative assessment guidance.

**Desk Study / Field Survey**

5.3.4 The desk study has involved the collation and interpretation of information from a variety of sources to assist in the preparation of the LVIA methodology and baseline descriptions.

**Methodology**

5.3.5 The following sources have been used in the preparation of the methodology and as guidance in the preparation of the written assessment and production of visualisations:

- Scottish Natural Heritage (2014) Visual Representation of Wind Farms, Version 2 (updated December 2014);
- Scottish Natural Heritage (March 2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments;
- Scottish Natural Heritage (2014) Siting and Designing Wind Farms in the Landscape, Version 2;
- Scottish Natural Heritage and The Countryside Agency (2002) Landscape Character Assessment Guidance for England and Scotland; and
- Landscape Institute (2011) Landscape Institute Advice Note 01/11, Photography and photomontage in landscape and visual impact assessment.

**Landscape Character Assessments**

5.3.6 The assessment of landscape character is based on the classification system identified in a series of SNH publications referred to as Landscape Character Assessments (LCAs). Collectively, these classify all of Scotland’s landscapes into different landscape character types (LCTs) defined as “tracts of countryside which have a unity of character due to particular combinations of landform and landcover and a consistent and distinct pattern of constituent elements.” Each LCT shares distinct characteristics that are typical of that landscape.

5.3.7 The following sources have been used to identify the landscape character types to be included in the assessment and to assist in their baseline description:

- Scottish Natural Heritage (1998). Dumfries and Galloway landscape assessment. Review No.94; and
- Carol Anderson Landscape Associates (2013). South Ayrshire Landscape Wind Capacity Study (LWCS).

5.3.8 The South Ayrshire LWCS presents an update on the classification of LCTs in this area, and although focussed on the potential effects of wind farm development in each
LCT, does provide guidance on the relative sensitivity of each LCT to wind farms in these areas. The updated LCTs are used principally as the basis for this assessment. The distribution of LCTs is shown on Figure 5.3.

5.3.9 The LWCS considers the sensitivity of key characteristics of each LCT or sub-type to different types of wind farm development, using criteria based on key landscape and visual characteristics. Landscape sensitivity, visual sensitivity and landscape value are assessed separately and then combined to arrive at an overall sensitivity for each landscape character type to wind farm development.

5.3.10 Potential cumulative landscape and visual issues are also considered prior to the judgement on opportunities and constraints that are present within each landscape character type. In relation to the *Foothills with Forest and Wind Farm* LCT the LWCS considers the medium and large typologies of potential wind farm development ‘due to the relatively sparsely settled nature of this landscape’.

5.3.11 These typologies are defined in the LWCS as follows:

- Medium: 50-80 m blade tip single turbines/groups of turbines; and
- Large: 80-130 m blade tip single turbines/groups of turbines.

5.3.12 The South Ayrshire LWCS

*Landscape Designations*

5.3.13 A designated landscape is an area of landscape identified as being of importance at international, national or regional level, either defined by statute or identified in development plans or other documents. The landscapes are designated in relation to their special qualities or features which warrant protection through the planning system.

5.3.14 There are three ways in which such designations are relevant to the LVIA:

- The presence of a designation can give an indication of a recognised value that may increase the sensitivity of a landscape character receptor, viewpoint or visual receptor, and may therefore affect the significance of the effect on that receptor;
- The presence of a relevant designation can lead to the selection of a representative viewpoint within the designated area, as the viewpoint will provide a representative outlook from that area; and
- Designated areas may be included as landscape character receptors so that the effects of the proposed development on the special qualities, which have merited designation, can be specifically assessed.

5.3.15 Landscape designations are used, along with LCTs, in the assessment of effects on landscape character. Those landscape designations which occur in the study area include Scenic Areas (SAs) in South Ayrshire, Sensitive Landscape Areas (SLAs) in East Ayrshire, Regional Scenic Areas (RSAs) in Dumfries and Galloway, and Gardens and Designed Landscapes (GDLs) in all regions. A policy review of these designations is presented below.

*Scenic Areas*

5.3.16 Scenic Areas (SAs) are areas of land designated for their importance at the regional level, by South Ayrshire Council. They are protected through Development Plan
Policy. In reference to protecting the landscape, the ‘South Ayrshire Local Development Plan’ states

“We will consider proposals within or next to Scenic Areas (as defined on the LDP environment map) against the following conditions:

a. The significance of impacts and cumulative impacts on the environment, particularly landscape and visual effects as informed by the “Ayrshire Landscape Character Assessment (SNH 1998)”.

b. How far they would benefit the economy.

c. Whether they can be justified in a rural location.”

5.3.17 There are no detailed citations for the South Ayrshire SAs although their basis is referenced in the Local Development Plan as being SNH’s “Ayrshire Landscape Character Assessment”. There are three SAs in the study area; Heads of Ayr, the Carrick Hills, and South Carrick, as shown in Figure 5.4.

Gardens and Designed Landscapes

5.3.18 Historic Scotland is responsible for recording Gardens and Designed Landscapes (GDLs), which are contained in an Inventory. The GDLs are afforded protection under Scottish Planning Policy (SPP 2014).

5.3.19 The descriptions contained in the Inventory identify the special qualities which merit the designation of each GDL. The effect of the proposed development is assessed in relation to these special qualities. There are 11 Inventory Gardens and Designed Landscapes in the study area as shown on Figure 5.4. These are typically set in the lower-lying landscapes of the more enclosed valley landscapes, where often mature tree cover restricts visibility of the wider landscape. The initial assessment of the GDLs is contained in Technical Appendix 5.2.

Wild Land Areas

5.3.20 A map of ‘Wild Land Areas’ (WLA) was published in June 2014 (SNH 2014). The new map supports recently published updates to SPP and the National Planning Framework for Scotland (Scottish Government 2014).

5.3.21 SPP refers to the Wild Land Areas mapping, published by SNH, at paragraph 200:

‘Wild land character is displayed in some of Scotland’s remoter upland, mountain and coastal areas, which are very sensitive to any form of intrusive human activity and have little or no capacity to accept new development. Plans should identify and safeguard the character of areas of wild land as identified on the 2014 SNH map of wild land areas.’

5.3.22 SNH’s presents the methodology applied in the assessment of effects on wild land with 2014 WLAs forming the basis of the wild land assessment (SNH 2007). The ‘Guidance Note’ is in the process of being updated, but pending this it has been followed along with adaptations.

Field Survey

5.3.23 Field survey has involved reconnaissance of the different landscape character types, designated areas, Wild Land Area, principal visual receptors and viewpoints in order
to establish the baseline description. Wirelines and photomontages have been used during field survey as the basis of assessing the potential effects of the proposed development on each viewpoint and have helped to develop an understanding of the wider effects on principal visual receptors and landscape receptors.

Assessment of Effects

Sensitivity Criteria

5.3.24 Sensitivity is an expression of the ability of a landscape or visual receptor to accommodate the proposed development. The sensitivity is determined through a combination of the value of the receptor, and the susceptibility of the receptor to the proposed development.

5.3.25 Levels of sensitivity - high, medium to high, medium, medium to low, low and negligible- are applied in order that the judgement used in the process of assessment is made clear. The criteria used to determine sensitivity differ for the effects on landscape receptors and visual receptors, as well as the cumulative effects on both. These criteria are explained in full in Technical Appendix 5.1.

Magnitude of Effect

5.3.26 Magnitude of effect is an expression of the extent of the effect on the landscape and visual receptors that would result from the introduction of the proposed development. The magnitude of effect is assessed in terms of the size and scale of the effect. The geographical extent of the area influenced is described in relation to the magnitude of effect.

5.3.27 Levels of magnitude of effect - high, medium to high, medium, medium to low and low - are applied in order that the judgement used in the process of assessment is made clear. The criteria used to determine magnitude of effect differ for the effects on landscape receptors and visual receptors, as well as the cumulative effects on both. These criteria are explained in full in Technical Appendix 5.1.

Significance Criteria

5.3.28 The objective of the assessment of the proposed development is to predict the significant effects on the landscape and visual resource. The LVIA effects are assessed to be either significant or not significant.

5.3.29 The significance of effects is assessed through a combination of two considerations; the sensitivity of the landscape or visual receptor, and the magnitude of effect that will result from the proposed development. In accordance with the Landscape Institute’s GLVIA3, OPEN’s methodology requires the application of professional judgement. Although it is not reliant on the use of a matrix, the matrix presented in Table 5.2 has been included to illustrate how combinations of the ratings for sensitivity and magnitude of effect can give rise to significant effects, as well as to give an understanding of the threshold at which significant effects may arise.
### Table 5.2: Illustrative Matrix of Significance of Effects

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Magnitude</th>
<th>High</th>
<th>Medium to High</th>
<th>Medium</th>
<th>Medium to Low</th>
<th>Low</th>
<th>Negligible</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>significant</td>
<td>significant</td>
<td>significant</td>
<td>significant / not significant</td>
<td>not significant</td>
<td>not significant</td>
<td></td>
</tr>
<tr>
<td>Medium to High</td>
<td>significant</td>
<td>significant</td>
<td>significant</td>
<td>significant / not significant</td>
<td>not significant</td>
<td>not significant</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>significant</td>
<td>significant</td>
<td>significant</td>
<td>not significant</td>
<td>not significant</td>
<td>not significant</td>
<td></td>
</tr>
<tr>
<td>Medium to Low</td>
<td>significant / not</td>
<td>not significant</td>
<td>not significant</td>
<td>not significant</td>
<td>not significant</td>
<td>not significant</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>significant / not</td>
<td>not significant</td>
<td>not significant</td>
<td>not significant</td>
<td>not significant</td>
<td>not significant</td>
<td></td>
</tr>
</tbody>
</table>

5.3.30 Effects that are assessed within the darker grey boxes in the matrix are assessed to be significant in terms of the requirements of the EIA Regulations. Those effects that are assessed within the light grey boxes may be significant, or not significant, in terms of the EIA Regulations depending on the specific factors and effect that is assessed in respect of a particular landscape or visual receptor. In accordance with GLVIA3, experienced professional judgement is applied to the assessment of all effects and reasoned justification is presented in respect of the findings of each case.

### Cumulative Effects

5.3.31 SNH's guidance, ‘Assessing the Cumulative Impact of Onshore Wind Energy Developments’ (SNH, 2012) is widely used across the UK to inform the specific assessment of the cumulative effects of wind farms. This guidance provides the basis for the methodology for the cumulative assessment.

5.3.32 ‘The purpose of the Cumulative Landscape and Visual Impact Assessment (CLVIA) is to describe, visually represent and assess the ways in which a proposed windfarm would have additional impacts when considered in addition to other existing, under construction, consented or proposed windfarms. It should identify the significant cumulative effects arising from the proposed windfarm.’ (SNH, 2012, p12).

5.3.33 The guidance defines the following types of cumulative effects:

- Cumulative landscape effects are those effects that ‘can impact on either the physical fabric or character of the landscape, or any special values attached to it’ (SNH, 2012, p10); and

- Cumulative visual effects are those effects that can be caused by combined visibility, which ‘occurs where the observer is able to see two or more developments from one viewpoint’ and/or sequential effects which ‘occur when
the observer has to move to another viewpoint to see different developments’ (SNH, 2012, p11).

- Perceived cumulative effects are those which may arise ‘where two or more developments are present but one or more is never seen by the observer’ (SNH, 2012, p11).

5.3.34 The degree to which cumulative effects occur, or may occur, as a result of more than one proposed wind farm development being constructed or becoming operational are a result of:

- The distance between individual wind farms/relevant developments;
- The interrelationship between their Zones of Theoretical Visibility (ZTV);
- The overall character of the landscape and its sensitivity to wind farms/other relevant development;
- The siting, scale and design of the wind farms/developments themselves; and
- The way in which the landscape is experienced.

5.3.35 The methodology for the assessment of cumulative landscape and visual effects involves the undertaking of a baseline study of the existing and potential future wind farm influence, an evaluation of sensitivity and magnitude of effect, and an assessment of significance. The full methodology applied in the cumulative assessment is set out in Technical Appendix 5.1: Landscape and Visual Assessment Methodology.

5.3.36 The aim of the CLVIA is to focus on and determine the likely significant cumulative landscape and visual effects. Significant cumulative landscape and visual effects are likely to arise where wind turbines/development becomes a prevailing landscape and visual characteristic as a result of the addition of the proposed development.

5.4 Baseline Conditions

Introduction

5.4.1 The baseline section of the LVIA records the existing conditions of the study area. Establishing a baseline helps to gain an understanding of what makes the landscape distinctive, what its important components or characteristics are, and how it is changing prior to the introduction of the proposed development.

5.4.2 The baseline conditions are presented under the following headings:

- Landscape character;
- Landscape related planning policies and designations;
- Visual receptors and views; and
- Cumulative wind farm developments.

5.4.3 Operational and under construction wind farms are regarded as part of the baseline landscape character and visual amenity of the area, such that any changes resulting from the proposed development are assessed within this context.
Landscape Character

Landscape Character Types

5.4.4 Section 5.7: The Assessment of Effects on Landscape Character considers the effects of the proposed development on the specific characteristics of each LCT. An initial assessment has been carried out and the findings presented in Technical Appendix 5.2. This identifies those LCTs which have potential to give rise to significant effects and which require to be assessed in detail, and are as follows:

- Foothills with Forest and Wind Farm 17c;
- Middle Dale 12;
- Intimate Pastoral Valley 13 (River Stinchar);
- Coastal Foothills 17e;
- Maybole Foothills 17d; and
- Rugged Uplands 21.

5.4.5 The site lies within the Foothills with Forest and Wind Farm LCT as identified in the South Ayrshire LWCS. This combines a sub division of the broader Foothills with Forest LCT with a sub division of the Foothills LCT as identified in the original Ayrshire LCA, and reflects the change in character that has been brought about by the introduction of the existing Hadyard Hill Wind Farm in this LCT.

5.4.6 The Foothills with Forest and Wind Farm LCT comprises a group of medium sized hills which form a north-east to south-west ridge with an internal, gently undulating upland plateau. The hills are rounded and covered either by open grassland or blocks of commercial forestry. They are made distinct by the presence of the 52 turbines of the existing Hadyard Hill Wind Farm, which occupy much of the upland plateau.

5.4.7 To the north of the Foothills with Forest and Wind Farm LCT lies the Middle Dale LCT of the Water of Girvan. This gently undulating valley landscape is enclosed by low foothills to the north and south. It is a settled landscape, characterised by a mix of mature woodland and small scale fields of pasture. Historic estates occupy parts of the valley and their gardens and designed landscapes add to the rural character.

5.4.8 To the south of the Foothills with Forest and Wind Farm LCT lies the Intimate Pastoral Valley LCT of the River Stinchar. This is a narrower valley with a greater sense of enclosure from the hills to the north and south. Small fields of pasture extend onto the lower slopes from the narrow valley floor and mature woodland and hedgerows form a pattern of enclosure. Dispersed properties are mainly concentrated along the minor road, following a distinctly linear pattern through the valley.

5.4.9 To the west of the Foothills with Forest and Wind Farms LCT lies the Coastal Foothills LCT. While these hills are not especially high, they are prominent, largely owing to their contrast with the lower-lying coast to the west, and valley to the east. Across the higher ground, the predominance of rough grasses and broad enclosures, gives the landscape a sense of openness, simplicity and exposure, which acts in contrast to the smaller scale and intimate landscapes of the neighbouring valleys.

5.4.10 To the south of the Intimate Pastoral Valley LCT of the River Stinchar, lies the Rugged Uplands LCT of Carrick Forest. The character of this landscape is characterised by hills which are more elevated and less rounded than the foothills and which are considered rugged on account of the degree of exposed rock and more uneven
landform. Large forest blocks tend to cover the lower and middle hill slopes, modifying
the character of what would otherwise be open moorlands with rough grasses. Small
lochs and lochans occur, which add visual interest to this upland landscape.

5.4.11 While the LCTs have been used as the basis of the assessment, the detailed
assessment has drawn information from field work that has been carried out across
the study area. This describes the LCTs in more detail and considers the sensitivity
of these landscapes in response to the addition of the proposed development.

Landscape Designations and Wild Land Areas

5.4.12 Section 5.7: The Assessment of Effects on Landscape Character considers the effects
of the proposed development on the specific characteristics of the landscape
designation or WLA. An initial assessment has been carried out and the findings
presented in Technical Appendix 5.2. This identifies those areas which have potential
to experience significant effects and which require to be assessed in detail, and are
as follows:
- South Carrick SA;
- Bargany GDL; and
- Merrick Wild Land Area.

5.4.13 The site lies within the South Carrick SA as identified in the South Ayrshire Local Plan
(2014). There is no detailed citation for this designated area although the local plan
states that it is based on the LCTs identified in the 'South Ayrshire Landscape
Character Assessment'. This means that the Scenic Area comprises all the LCTs
south of the Maybole Foothills LCT, with the exception of South Ayrshire Plateau
Moorlands and Forestry and Wind Farms LCT and part of the Rugged Uplands with
Lochs and Forest LCT.

5.4.14 Bargany is a GDL which lies within the Middle Dale LCT of the Water of Girvan to the
west of Dailly. Bargany House is a Category A listed building, enclosed by mature
woodland which characterises much of the estate. The designated landscape
comprises a framework of mature woodland enclosing open parkland and
encompasses a section of the Water of Girvan.

5.4.15 Merrick WLA is the only identified WLA to occur in the study area. It is centred on the
highest hill, the Merrick, and encompasses the Rugged Uplands which surround it.
The landscape comprises large and mostly rounded hills, with steep sides and rocky
outcrops in places. There is little development evident in the Merrick WLA although
forestry operations are relatively extensive across the lower and middle slopes.

Principal Visual Receptors

5.4.16 There are a number of principal visual receptors which represent people who may be
living in settlements, travelling along roads, railways or paths or visiting attractions in
the study area. These have been considered in the assessment as views from them
may be affected by the proposed development. It is not possible to consider every
potential visual receptor in the study area due to the geographical extent that it covers.
The assessment therefore concentrates on the 'principal' visual receptors that may
gain visibility of the proposed development. The principal visual receptors are shown
on Figure 5.6 and in conjunction with the ZTV on Figure 5.11.

5.4.17 The landscape to the south and east of the study area is predominantly upland with
few principal visual receptors other than the main and minor roads and small
settlements located in the valleys, as well as the hill summits enjoyed predominantly by walkers. Across the lower lying landscape to the north of the study area there is a concentration of principal visual receptors in the form of small and medium settlements and roads, especially along the coast around Ayr. Principal visual receptors to the west are largely limited to the coast beyond which the study area covers the Irish Sea.

5.4.18 The principal visual receptors in close proximity to the proposed development which have the greatest potential for significant effects to arise, include the small settlements and roads in the Water of Girvan Valley to the north and River Stinchar Valley to the south and the minor roads across the foothills where the proposed development would be located.

**Settlements**

5.4.19 The proposed development lies within an area of foothills where settlement is sparse and limited to isolated farmsteads or properties set on the middle or lower hill slopes. Although still rural in character and small in scale, settlement occurs more commonly in the surrounding river valleys. Within the wider study area, settlement occurs mainly in the lower lying areas to the north and west with a concentration of villages and towns occurring along the coast. To the east and south the combination of elevated landform and extensive forestry means that here, settlement is typically sparse and isolated.

5.4.20 It is considered that villages and towns beyond 15 km will not have the potential to experience significant effects, owing to their typically enclosed nature and limited visibility as a result, and have therefore have been discounted from the assessment. Technical Appendix 5.3 provides an initial assessment of the effects on the villages and towns. This has identified the following villages as having the potential to undergo significant effects and therefore requiring a detailed assessment in Section 5.8;

- Barr; and
- Dailly.

5.4.21 Villages to be assessed have been those identified in the South Ayrshire Local Development Plan (2014).

5.4.22 In addition to the assessment of villages and towns as principal visual receptors a detailed residential survey of the effects on the visual amenity of individual properties and groups of properties has been carried out within a 2.5 km radius of the proposed development, and this is presented in Technical Appendix 5.4.

**Roads**

5.4.23 The location and extent of roads reflects the topography of the area, with main routes concentrated across the lowland landscapes to the north and following the coast from north to south. In the upland landscapes to the east and south, the roads follow the river valleys, while minor roads cut across the lower foothills. The closest roads to the proposed development are the minor road between Bargrennan and Crosshill (NCR7), and the minor road between Milton Bridge and the B741.

5.4.24 It is not possible, or necessary, to assess the potential effects of the proposed development on every route, however some of the key routes require consideration in the assessment. Four principal criteria have been considered in determining the inclusion of routes in the assessment:
• The extent to which the route traverses the study area or extends across a notable part of it;
• The importance of the route in terms of recognition, signage, traffic volume and usage;
• The extent of theoretical visibility of the proposed development from the route; and
• The potential for cumulative effects along the route.

5.4.25 Technical Appendix 5.3 provides an initial assessment of the effects on the roads. This has identified the following roads as having the potential to undergo significant effects and therefore requiring a detailed assessment in Section 5.8:

• B734;
• B741;
• NCR7 / Bargrennan to Crosshill minor road; and
• Barr to Balloch minor road.

Railways

5.4.26 Two railway lines pass through the study area; one from Glasgow to Stranraer and the other from Glasgow to Carlisle. The Glasgow to Stranraer line passes north to south through the study area, with stations at Maybole and Girvan and coming within 10 km of the proposed development. The Glasgow to Carlisle line passes through the north east edge of the study area at a distance beyond 30 km of the proposed development.

5.4.27 Technical Appendix 5.3 provides an initial assessment of the effects on the railways. This has identified that neither of the railway lines have the potential to undergo significant effects and therefore do not require a detailed assessment.

Long Distance Routes and Core Paths

5.4.28 National Cycle Route 7 (NCR7) is the only cycle route in the study area. It connects Sunderland to Inverness, with the section through the study area extending from Newton Stewart to Troon via Maybole and Ayr. At its closest it comes within less than 1 km of the proposed development, following the minor road between Bargrennan and Crosshill.

5.4.29 There are a number of long distance footpaths in the study area, including the Southern Upland Way and the Ayrshire Coastal Path. These are too distant from the proposed development to undergo significant effects.

5.4.30 The Finalised Draft South Ayrshire Core Paths Plan shows a network of paths across the study area (SAC 2009). Those of most relevance to the assessment occur within the first 10 km radius of the proposed Development. Core Path SA46 passes through the site, while Core Path SA1 follows the route of NCR7 to the east and Core Path SA51 passes close to the south-western side of the site.

5.4.31 Technical Appendix 5.3 provides an initial assessment of the effects on the long distance routes and core paths. This has identified the following routes and paths as having the potential to undergo significant effects and therefore requiring a detailed assessment in Section 5.8:

• NCR7 / Core Path SA1.
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Attractions and Visitor Facilities

5.4.32 There are a number of attractions and facilities available for visitors across the study area, reflecting the interest of both the natural and built environment. There are a number of country estates which are open to the public, the most prestigious being Culzean Castle which sits on the coast to the north of Maidens, but with also the Blairquhan, Kilkerran and Bargany estates which occupy the Water of Girvan valley to the north of the proposed development.

5.4.33 The Coastal Links at Turnberry and Troon are home to world famous championship golf courses while many more courses occur intermittently across the study area, the closest being Brunston Castle Golf Course to the north of the proposed development. The influence of Robert Burns is evident in this area with Johnnie Souter’s Cottage located in Kirkoswald and the Robert Burns Birthplace Museum located in Alloway.

5.4.34 In addition to NCR7, the Southern Upland Way and the Ayrshire Coastal Route, walkers are attracted to the higher summits of the Merrick and Cairnsmore of Carsphairn as well as the intermediate hill ranges of South Carrick. Attractions off the coast include the isles of Ailsa Craig and Arran, and sailing is popular along this coastal edge.

5.4.35 Attractions and Visitor Facilities are not assessed specifically within the LVIA although viewpoints have been selected to represent the most popular locations which have potential to undergo significant effects.

Viewpoints

General Visibility of the Proposed Development

5.4.36 The ZTV on Figure 5.7a shows how the landform influences the pattern of theoretical visibility across the 35 km study area. The pattern shows a concentration of almost continuous theoretical visibility within the immediate surrounding area and then a more fragmented pattern beyond. The cumulative ZTV on Figure 5.14 shows a comparison between the extents of visibility of operational Hadyard Hill and the proposed development, in which it can be seen that they are broadly similar with the proposed development generally increasing extents marginally, but with more notable areas of increase to the east and north-east.

5.4.37 Of the 31 proposed turbines, 25 would cover a substantial area of land to the east of the operational Hadyard Hill Wind Farm, with the remaining six located to the south. From landscape and visual receptors to the north-west, west and south-west, the proposed development would largely be seen to the rear of the operational development. From landscape and visual receptors to the north and south, the extents of the proposed development would be seen at its fullest extents. From receptors to the east, the proposed development would be seen in concentrated extents, and seen as the closest range part of the overall development in conjunction with Hadyard Hill Wind Farm.

5.4.38 Visibility would occur almost continuously across the upland plateau where the proposed development would be located and where the operational Hadyard Hill Wind Farm already exists. The levels of visibility would be highly variable owing to the horizontal spread of the turbines, combined with the variable elevation of the landform, which means that seldom would all the proposed turbines be visible from any one point. In these close range extents, the proposed turbines would appear large in...
scale, and although slightly larger than the Hadyard Hill Wind turbines, they would appear broadly comparable in scale.

5.4.39 On the north facing slopes of the Middle Dale LCT to the north of the proposed development, there is no visibility of the proposed development, due to the screening effect of the enclosing ridge of hills, including Maxwellston Hill (314 m AOD), Hadyard Hill (324 m AOD) and Barony Hill (319 m AOD). On the south facing slopes, on the opposite side of the valley, visibility gradually increases with elevation, although actual visibility will often be precluded by the screening effect of tree cover. Theoretical visibility across the broader part of the Middle Dale LCT to the north, is almost continuous albeit showing low levels of visibility, then a band of higher levels of visibility, extends across the Carrick Hills and over the flatter coastal landscapes around Ayr. Here, the extent of built form as well as tree cover would reduce the extents of actual visibility.

5.4.40 To the south, although variable in terms of levels, theoretical visibility does occur almost continuously up to the high ridge that runs through the Plateau Moorland LCT and Rugged Uplands LCT from Garleffin Hill (228 m AOD) in the south-west through Cairn Hill (479 m AOD) to Eldrick Hill (486 m AOD) in the north-east. To the south of this ridgeline, the extents of visibility is limited with only small patches occurring along the series of summits which extend north from the Merrick (843 m AOD) to Cornish Hill (467 m AOD) and further south-east along the ridge of the Rhinns of Kells.

5.4.41 To the south-west, a patch of theoretical visibility occurs across the Plateau Moorlands LCT where Arecleoch Wind Farm is located, and occurs as a result of the intervening hills being marginally lower than those to the south and south-east.

5.4.42 To the east, theoretical visibility occurs almost continuously up to Garleffin Fell (429 m AOD) and Glenalla Fell (425 m AOD), although actual visibility would be reduced by the extent of forest cover. Beyond these hills, visibility becomes dissipated with smaller patches of distant visibility localised on the higher west facing slopes and summits of hills, including Cairnsmore of Carsphairn. Again actual visibility would be further reduced by the extent of forest cover.

5.4.43 Visibility extends up to the first ridgeline of the Coastal Foothills LCT to the west which runs through Saugh Hill (293 m AOD) and Laggan Hill (269 m AOD). Beyond this it occurs as patches centred on the higher east facing slopes and summits. Beyond 10 km to the west, the study area covers a large part of the Irish Sea where there are few visual receptors and while to the north-west, visibility is shown being of a high proportion of the turbines, to the south-west it is shown as being of a lower proportion.

5.4.44 In summary, visibility of the proposed development is largely concentrated within the first 5-7 km radius, with large patches extending out into the 10 km radius. More distant visibility does extend in a band to the north, where the land is lower-lying, and to the south-west where there are no big hills to screen visibility. Conversely, there is limited extents of visibility beyond the 5-10 km radius to the east and south because the bigger hills which sit behind the Foothills with Forest and Wind Farms LCT, would screen visibility. Where visibility of the proposed development occurs, typically there would be existing visibility of Hadyard Hill Wind Farm, as shown on the cumulative ZTV on Figure 5.14, although the proposed development would also add new extents of visibility.
Viewpoint Selection

5.4.45 The assessment of landscape and visual effects is informed by a series of 22 viewpoints, which are shown in conjunction with the blade tip ZTV on Figure 5.7 and with the hub height ZTV on Figure 5.8, and listed in Table 5.3 below. These are selected to cover visual receptors of specific importance, such as recognised viewpoints, settlements, important routes, designated landscapes and remote landscapes including hill tops. Their selection attempts to achieve a good geographic spread, representative of a mix of LCTs and also takes into account visibility of cumulative wind farms. In terms of range, the majority of the viewpoints are within the first 10 km as this is where it is most likely that significant effects will occur, but also representation is made of more distant viewpoints which are of particular sensitivity. The viewpoint list has been agreed with SAC and SNH.

<table>
<thead>
<tr>
<th>No</th>
<th>Viewpoint</th>
<th>Grid Reference</th>
<th>Distance / Direction</th>
<th>Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A77 north of Girvan</td>
<td>219250 / 599171</td>
<td>7.89 km WNW</td>
<td>Road-users / Residents</td>
</tr>
<tr>
<td>2</td>
<td>Grey Hill</td>
<td>216474 / 592795</td>
<td>10.84 km WSW</td>
<td>Walkers</td>
</tr>
<tr>
<td>3</td>
<td>A714, Laigh Letterpin</td>
<td>220267 / 592636</td>
<td>7.47 km WSW</td>
<td>Road-users / Residents</td>
</tr>
<tr>
<td>4</td>
<td>B734 near Merkland</td>
<td>224013 / 591431</td>
<td>5.71 km SW</td>
<td>Road-users / Residents</td>
</tr>
<tr>
<td>5</td>
<td>Girvan – Barr Hill Path</td>
<td>220088 / 595257</td>
<td>6.70 km W</td>
<td>Walkers</td>
</tr>
<tr>
<td>6</td>
<td>Barr Village</td>
<td>227704 / 594404</td>
<td>2.16 km S</td>
<td>Road-users / Residents</td>
</tr>
<tr>
<td>7</td>
<td>Merrick Summit</td>
<td>242754 / 585555</td>
<td>15.74 km SE</td>
<td>Walkers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Wild Land Area</td>
</tr>
<tr>
<td>8</td>
<td>South Balloch</td>
<td>232933 / 595518</td>
<td>1.77 km SE</td>
<td>Road-users / Residents</td>
</tr>
<tr>
<td>9</td>
<td>Colonel Hunter Blair Monument,</td>
<td>239207 / 603941</td>
<td>7.91 km NE</td>
<td>Walkers</td>
</tr>
<tr>
<td></td>
<td>Kildoach Hill</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>River Stinchar - Minor road</td>
<td>230527 / 595793</td>
<td>1.13 km S</td>
<td>Road-users / Residents</td>
</tr>
<tr>
<td>11</td>
<td>Brunston Castle Golf Course</td>
<td>226243 / 601467</td>
<td>4.58 km NNW</td>
<td>Residents / Golfers</td>
</tr>
<tr>
<td>12</td>
<td>Dailly</td>
<td>227143 / 601222</td>
<td>3.67 km N</td>
<td>Road-users / Residents</td>
</tr>
<tr>
<td>13</td>
<td>Crosshill</td>
<td>232999 / 606640</td>
<td>7.12 km N</td>
<td>Road-users / Residents</td>
</tr>
</tbody>
</table>
### Table 5.3: Viewpoint Selection

<table>
<thead>
<tr>
<th>No</th>
<th>Viewpoint</th>
<th>Grid Reference</th>
<th>Distance / Direction</th>
<th>Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>B7045, west of Kirkmichael</td>
<td>233419 / 608763</td>
<td>9.28 km N</td>
<td>Road-users / Residents</td>
</tr>
<tr>
<td>15</td>
<td>Monument, Maybole</td>
<td>229581 / 609414</td>
<td>9.77 km N</td>
<td>Walkers / Golfers</td>
</tr>
<tr>
<td>16</td>
<td>B734 near Doon Hill</td>
<td>225746 / 596576</td>
<td>0.93 km W</td>
<td>Road-users</td>
</tr>
<tr>
<td>17</td>
<td>Hadyard Hill</td>
<td>227069 / 599246</td>
<td>2.28 km NNW</td>
<td>Walkers</td>
</tr>
<tr>
<td>18</td>
<td>North Threave</td>
<td>224473 / 604109</td>
<td>7.52 km NNW</td>
<td>Road-users / Residents</td>
</tr>
<tr>
<td>19</td>
<td>Cairnsmore of Carsphairn</td>
<td>259445 / 598001</td>
<td>26.69 km E</td>
<td>Walkers</td>
</tr>
<tr>
<td>20</td>
<td>NCR7 near Doughty Hill</td>
<td>233096 / 599166</td>
<td>0.35 km WSW</td>
<td>Walkers</td>
</tr>
<tr>
<td>21</td>
<td>Shalloch on Minnoch</td>
<td>240452 / 590707</td>
<td>10.59 km SE</td>
<td>Walkers / Wild Land Area</td>
</tr>
<tr>
<td>22</td>
<td>Cornish Hill</td>
<td>240525 / 594265</td>
<td>9.02 km ESE</td>
<td>Walkers / Wild Land Area</td>
</tr>
</tbody>
</table>

5.4.46 The process of identifying viewpoints involves extensive investigation to ensure that the final viewpoints are representative of the highest levels of visibility around the study area, and that they clearly illustrate the predicted visibility of the proposed development. Additional potential viewpoints were also investigated, where they were suggested by the statutory consultees or correspond with viewpoints used in previously submitted LVIAs for other wind farm developments.

5.4.47 The process of identifying viewpoints involves extensive investigation to ensure that the final viewpoints are representative of levels of visibility around the study area, and that they clearly illustrate the predicted visibility of the proposed development. Additional potential viewpoints were also investigated, where they were suggested by the statutory consultees or correspond with viewpoints used in previously submitted LVIAs for other wind farm developments.

5.4.48 The viewpoint assessment is used to inform and illustrate the assessment of effects on landscape character, as well as the assessment of effects on views and principal visual receptors. Technical Appendix 5.3 provides an initial assessment of the effects on the viewpoints and Section 5.8: Assessment of Visual Effects provides a more detailed assessment where there is potential for significant effects to arise. The relevant information is extrapolated from the viewpoint assessments, in the assessment of effects on landscape character and the assessment of effects on principal visual receptors.
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Cumulative Baseline

5.4.49 In terms of the cumulative assessment, both SNH and GLVIA3 advise in respective guidance that the assessment of the cumulative impacts associated with the proposed development should focus on the effects of the proposed development in combination with existing, under construction, consented and application stage wind farms awaiting determination. Schemes that are at the pre-planning or scoping stage are not generally considered in the assessment of cumulative effects because firm information on which to base the assessment is not available. There can be specific occasions where the inclusion of such schemes is considered to be necessary by the statutory consultees, but in respect of the proposed development this is not the case.

5.4.50 The developments included within the CLVIA have been agreed at the pre-application stage with the statutory consultees and are set out in Table 5.4 below. As stated in guidance (SNH, 2012, p15) ‘At every stage in the process the focus should be on the key cumulative effects which are likely to influence decision making, rather than an assessment of every potential cumulative effect’.

5.4.51 The cumulative situation changes frequently as applications are made or withdrawn, and the layouts of submitted application wind farms are changed. It is therefore necessary to set a cut-off date when the sites and layouts to be included are fixed, and this has been the 15th December 2014. Any changes in the cumulative situation after this date are not normally incorporated in the assessment. One addition has been made to the list since the cut-off date, namely Kirk Hill, an application wind farm, included owing to its close proximity to the proposed development and potential to contribute to significant cumulative effect. Cumulative Wind Farms are shown in Table 5.4 below.

5.4.52 The scale of wind farm is also of relevance to the CLVIA. The greatest influence as part of the cumulative context will arise in relation to development in close proximity to the proposed development. The larger that development, the higher the likelihood of a significant cumulative effect.

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Status</th>
<th>Number of turbines</th>
<th>Height of turbines</th>
<th>Distance from proposed development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hadyard Hill</td>
<td>Operational</td>
<td>52</td>
<td>100/110</td>
<td>0.39</td>
</tr>
<tr>
<td>Dowhill Farm</td>
<td>Operational</td>
<td>1</td>
<td>77</td>
<td>8.59</td>
</tr>
<tr>
<td>Mark Hill</td>
<td>Operational</td>
<td>28</td>
<td>110</td>
<td>9.72</td>
</tr>
<tr>
<td>Arecleoch</td>
<td>Operational</td>
<td>60</td>
<td>118.4</td>
<td>17.79</td>
</tr>
<tr>
<td>Windy Standard</td>
<td>Operational</td>
<td>36</td>
<td>53.5</td>
<td>27.42</td>
</tr>
<tr>
<td>Artfield Fell</td>
<td>Operational</td>
<td>15</td>
<td>74</td>
<td>29.08</td>
</tr>
<tr>
<td>Balmurrie Fell</td>
<td>Operational</td>
<td>7</td>
<td>80</td>
<td>29.38</td>
</tr>
<tr>
<td>Hare Hill</td>
<td>Operational</td>
<td>20</td>
<td>63.5</td>
<td>33.48</td>
</tr>
<tr>
<td>Torrs Hill</td>
<td>Under construction</td>
<td>2</td>
<td>100</td>
<td>22.08</td>
</tr>
</tbody>
</table>
## Table 5.4: Cumulative Wind Farms

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Status</th>
<th>Number of turbines</th>
<th>Height of turbines</th>
<th>Distance from proposed development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windy Standard II</td>
<td>Under construction</td>
<td>30</td>
<td>80/120</td>
<td>25.62</td>
</tr>
<tr>
<td>Tralorg</td>
<td>Consented</td>
<td>8</td>
<td>100</td>
<td>4.48</td>
</tr>
<tr>
<td>Assel Valley</td>
<td>Consented</td>
<td>10</td>
<td>110</td>
<td>5.02</td>
</tr>
<tr>
<td>North Threave</td>
<td>Consented</td>
<td>1</td>
<td>53.71</td>
<td>8.00</td>
</tr>
<tr>
<td>Chapleton Farm</td>
<td>Consented</td>
<td>3</td>
<td>67</td>
<td>8.21</td>
</tr>
<tr>
<td>Dersalloch</td>
<td>Consented</td>
<td>23</td>
<td>110/115/125</td>
<td>8.62</td>
</tr>
<tr>
<td>Kilgalloch</td>
<td>Consented</td>
<td>96</td>
<td>146.5/125</td>
<td>20.47</td>
</tr>
<tr>
<td>Airies Farm</td>
<td>Consented</td>
<td>14</td>
<td>126.5</td>
<td>27.89</td>
</tr>
<tr>
<td>Afton</td>
<td>Consented</td>
<td>27</td>
<td>100/120</td>
<td>29.37</td>
</tr>
<tr>
<td>Glenchamber</td>
<td>Consented</td>
<td>11</td>
<td>126.5</td>
<td>31.68</td>
</tr>
<tr>
<td>Hare Hill Ext</td>
<td>Consented</td>
<td>39</td>
<td>70/75/81/86/91</td>
<td>34.14</td>
</tr>
<tr>
<td>Crofthead Farm</td>
<td>Consented</td>
<td>1</td>
<td>77</td>
<td>34.52</td>
</tr>
<tr>
<td>Penwhapple</td>
<td>Application</td>
<td>1</td>
<td>102</td>
<td>1.37</td>
</tr>
<tr>
<td>Linfairn Farm</td>
<td>Application</td>
<td>17</td>
<td>126.5</td>
<td>3.99</td>
</tr>
<tr>
<td>High Troweir</td>
<td>Application</td>
<td>1</td>
<td>79</td>
<td>4.26</td>
</tr>
<tr>
<td>Kirk Hill</td>
<td>Application</td>
<td>8</td>
<td>110</td>
<td>6.55</td>
</tr>
<tr>
<td>Millenderdale</td>
<td>Application</td>
<td>7</td>
<td>125</td>
<td>9.52</td>
</tr>
<tr>
<td>Breaker Hill</td>
<td>Application</td>
<td>9</td>
<td>86.5</td>
<td>11.40</td>
</tr>
<tr>
<td>Keirs Hill</td>
<td>Application</td>
<td>17</td>
<td>149</td>
<td>11.61</td>
</tr>
<tr>
<td>Glenmount</td>
<td>Application</td>
<td>19</td>
<td>130</td>
<td>11.65</td>
</tr>
<tr>
<td>Straid Farm</td>
<td>Application</td>
<td>14</td>
<td>99.5</td>
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<tr>
<td>Creeside Farm</td>
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<td>Knockshinnoch</td>
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<td>17.52</td>
</tr>
<tr>
<td>Benbrack</td>
<td>Application</td>
<td>18</td>
<td>130</td>
<td>20.41</td>
</tr>
<tr>
<td>Polquhain</td>
<td>Application</td>
<td>9</td>
<td>100</td>
<td>20.46</td>
</tr>
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<td>South Kyle</td>
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<td>20.89</td>
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<td>Stranoch</td>
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<td>110/135</td>
<td>24.42</td>
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<td>Quantans Hill</td>
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<td>25.87</td>
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<td>Ashmark Hill</td>
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<td>116</td>
<td>27.29</td>
</tr>
<tr>
<td>Gass</td>
<td>Application</td>
<td>9</td>
<td>126.5</td>
<td>28.78</td>
</tr>
</tbody>
</table>
Table 5.4: Cumulative Wind Farms

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Status</th>
<th>Number of turbines</th>
<th>Height of turbines</th>
<th>Distance from proposed development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glen App</td>
<td>Application</td>
<td>14</td>
<td>126.5</td>
<td>29.13</td>
</tr>
<tr>
<td>Longburn</td>
<td>Application</td>
<td>20</td>
<td>135</td>
<td>31.55</td>
</tr>
<tr>
<td>High Cumnock</td>
<td>Application</td>
<td>8</td>
<td>132</td>
<td>32.49</td>
</tr>
<tr>
<td>Fowlers Farm</td>
<td>Application</td>
<td>1</td>
<td>67</td>
<td>34.62</td>
</tr>
<tr>
<td>Garleffan</td>
<td>Application</td>
<td>6</td>
<td>135</td>
<td>34.64</td>
</tr>
</tbody>
</table>

5.4.53 An initial assessment is undertaken to identify which landscape and visual receptors have the potential to undergo significant cumulative effects. This is documented in Technical Appendices 5.2 and 5.3 and highlights which receptors are to be assessed in detail in the CLVIA. Those receptors which are identified as not having the potential to undergo significant cumulative effects, are not included in the detailed assessment, but are noted with reasons given for their exclusion.

5.5 Likely Significant Effects

Introduction

5.5.1 This section identifies those components of the proposed development which are likely to give rise to significant effects and describes how the effects may change with the phasing between construction, operation and decommissioning.

Description of the Proposed Development

5.5.2 Chapter 2: Proposed Development provides descriptions of the site, the main components of the proposed development, the associated infrastructure and the phases of construction, operation and decommissioning.

Phasing of the Proposed Development

5.5.3 The proposed development would have three stages during which impacts on the landscape and visual resource would occur: construction, operation and decommissioning. The key operations and potential impacts that may occur during these phases are outlined in Table 5.5 below.

Table 5.5: Likely Effects of Construction, Operation and Decommissioning

<table>
<thead>
<tr>
<th>Activity / Potential Effects</th>
<th>Specific Element</th>
<th>Potential of Receptors to be Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Earthworks for infrastructure; Construction plant; Compound and batching plant; Construction of sub-station; Construction of operations building; Forestry felling;</td>
<td>Forestry / rough grassland removed or altered where construction plant and facilities will be located and where tracks, borrow pits, foundations and crane pads will be constructed. Landscape character of immediate and surrounding LCTs potentially affected by the addition of construction facilities</td>
</tr>
</tbody>
</table>
Table 5.5: Likely Effects of Construction, Operation and Decommissioning

<table>
<thead>
<tr>
<th>Activity / Potential Effects</th>
<th>Specific Element</th>
<th>Potential of Receptors to be Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction / upgrading of access tracks; Construction of turbine foundations / crane pads; Presence and activity of cranes; Presence of emerging wind turbines / met masts; Excavation and reinstatement of borrow pits; and Movement of associated traffic.</td>
<td>and plant, the presence and activity of the cranes and emergence of wind turbines and met masts. Viewpoints and principal visual receptors potentially affected by the addition of construction facilities and plant, the presence and activity of the cranes and emergence of wind turbines.</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Wind turbines; Access tracks; Substation; Construction compound; Batching plant; Clear felled areas; Earthworks; and Permanent meteorological masts;</td>
<td>Landscape character potentially affected by the presence of wind turbines and tracks. Viewpoints and principal visual receptors potentially affected by the presence of wind turbines and tracks. Landscape and visual receptors potentially cumulatively affected by presence of wind turbines and tracks in conjunction with other wind farm developments.</td>
</tr>
<tr>
<td>Decommissioning</td>
<td>Decommissioning plant; Temporary construction facilities; Presence and activity of cranes; Removal of met masts, substations and operations building; Removal of exposed concrete plinths from hard standings and crane pads; and Presence of dismantled wind turbines.</td>
<td>Rough grassland removed or altered where decommissioning plant and facilities will be located. Landscape character of immediate and surrounding LCTs potentially affected by the addition of decommissioning facilities and plant, the presence and activity of the cranes and deconstruction of wind turbines. Viewpoints and principal visual receptors potentially affected by the addition of decommissioning facilities and plant, the presence and activity of the cranes and deconstruction of wind turbines.</td>
</tr>
</tbody>
</table>

5.5.4 It is anticipated that construction and decommissioning of the proposed development would be undertaken in stages as described in Chapter 2: Proposed Development of this ES. The construction effects assessed in this section are therefore predicted to occur during this period and end at the start of the operational stage. It is anticipated that the proposed development would be in operation for 25 years. On completion of its operational life, the proposed development would either extend its operation,
having obtained the necessary consents, or be decommissioned and removed. The grid connection will be subject to a separate application.

5.5.5 In addition to the effects on the physical elements, landscape character and visual amenity, as outlined in Table 5.5 above, there would also be the cumulative effects that may arise through the addition of the proposed development to other wind farms in the area.

**Cumulative Effects**

5.5.6 The cumulative effects that would arise as a result of the proposed development would relate chiefly to the operational Hadyard Hill Wind Farm. The proposed development is a 31 turbine extension to the existing 52 turbines, and together they occupy the same hill group.

5.5.7 In a new wind farm development, the majority of effects on the landscape and visual resource stem from the introduction of the completely new elements of the turbines, which can provide a contrast to the existing scale, form, character and pattern of the landscape receptor or view. However, in the case of this proposal for a wind farm extension, the existing wind farm is already likely to be an influence in the majority of landscape receptors and views, and the proposed development would, therefore, not constitute a completely new component. A high level of integration can help to avoid immediately apparent or notably contrasting effects on landscape and visual receptors, as the proposed development would appear to relate to the existing wind farm, which is already an established component of the landscape receptor or view.

5.5.8 In respect of the proposed development, there are a number of factors which contribute towards the integration of the proposed development with Hadyard Hill Wind Farm, most notably:

- The location of the proposed development in the same *Foothills with Forest and Wind Farms* LCT;
- The proximity of the proposed development to the Hadyard Hill Wind Farm such that it would be apparent as an extension; and
- The comparable scale and proportioning of the proposed and existing turbines which contributes to the unity of the two developments.

5.5.9 The proposed development would, however, add a relatively large scale extension to the existing development and would give rise to a number of factors that would increase the potential for likely significant effects:

- The introduction of visibility to landscape and visual receptors where previously there has been none;
- The increased extent of visibility in the valley landscapes to the north and south;
- The additional extent of wind farm development visible along the foothills with the potential of elongating the overall effect; and
- The additional extent of wind farm development in the context of the wider cumulative situation.
Nature of the Effect

5.5.10 The nature of effect refers to whether the effects of the proposed development are beneficial, neutral or adverse. Judgements on the nature of effect are based on professional experience and reasoned opinion informed by best practice guidance.

5.5.11 Adverse, neutral or beneficial, effects are assessed based on the following definitions:

- Beneficial effects contribute to the landscape and visual resource through the enhancement of desirable characteristics or the introduction of new, beneficial attributes. The removal of undesirable existing elements or characteristics can also be beneficial, as can their replacement with more appropriate components.

- Neutral effects occur where the proposed development neither contributes to, nor detracts from, the landscape and visual resource and can be accommodated with neither beneficial or adverse effects, or where the effects are so limited that the change is hardly noticeable. A change to the landscape and visual resource is not considered to be adverse simply because it constitutes an alteration to the existing situation.

- Adverse effects are those that detract from or weaken the landscape and visual resource through the introduction of elements that contrast, in a detrimental way, with the existing characteristics of the landscape and visual resource, or through the removal of elements that are key in its characterisation.

5.5.12 This assessment adopts a precautionary approach, which assumes that significant landscape and visual effects will be weighed on the negative side of the planning balance although beneficial or neutral effects may arise in certain situations, particularly where wind farm extensions are experienced in the context of an operational development. Unless it is stated otherwise, the effects of the proposed development are considered to be adverse.

Duration and Reversibility

5.5.13 The effects of the proposed development are of variable duration, and are assessed as short-term or long-term, and permanent or temporary/reversible. It is anticipated that the operational life of the proposed development would be 25 years. The turbines, permanent meteorological masts, site access tracks, the operations building and substation would be apparent during this time, and these effects are considered to be long-term.

5.5.14 Other infrastructure and operations, such as the construction and decommissioning processes and plant, including tall cranes for turbine erection and dismantling, and construction compounds, would be apparent only during the construction and decommissioning stages of the proposed development and are considered to be short-term effects although they may last the 22 months of the construction stage and a shorter period for the decommissioning stage. The forestry removal would also have a short-term effect, although its loss may have longer term effects.

5.5.15 The reversibility of effects is variable. The most apparent effects on the landscape and visual resource, which arise from the presence of the turbines, are temporary as the turbines would be removed on decommissioning, as would the substation, operations buildings and permanent meteorological mast. The effects of the tall cranes and heavy machinery used during the construction and decommissioning periods are also temporary, as are the borrow pits which would be restored.
5.5.16 The access tracks may be retained at decommissioning at the request of the landowner, or would otherwise be regraded and reinstated. Turbine foundations and underground cabling would be left in-situ below ground with no residual landscape and visual effects.

5.5.17 In order to avoid repetition, the duration and reversibility of effects are not reiterated throughout the assessment.

5.6 Mitigation

5.6.1 In respect of the mitigation of landscape and visual effects these are carried out through the iterative design process and are therefore embedded in the final layout. Chapter 2: Proposed Development describes the components of the final layout and Chapter 3: Design Evolution and Alternatives describes the iterative design process which was followed in order to prevent, reduce or offset potential landscape and visual effects.

5.6.2 No additional mitigation, over and above the design and standard mitigation measures, is proposed. The residual effects of the proposed development are assessed in the following sections.

5.7 Assessment of Landscape Effects

Introduction

Assessment of Effects on Landscape Elements

5.7.1 The first category of effects covered in the assessment of landscape effects is physical effects, which are direct effects on the fabric of the site, such as the removal of ground cover vegetation, to facilitate construction of the access tracks and crane pads. Physical effects are found only on the site, where existing landscape elements may be removed or altered by the proposed development. This category of effects is made up of landscape elements, and in this case there are two elements involved; rough grassland and coniferous forestry. The methodology for the assessment of physical effects is described in full in Technical Appendix 5.1.

Rough Grassland

Baseline Condition

5.7.2 Rough grassland and coniferous forestry form a patchwork of landcover across the site. This type of landcover is typical throughout much of the upland areas of South Ayrshire and neighbouring Dumfries and Galloway. It contributes to the open and exposed character of the foothills landscape, and while ecological diversity occurs at a detailed scale, the general effect is of a homogenous landcover.

Sensitivity

5.7.3 Rough grassland, of the type that covers a large part of the site, is a characteristic feature of the Scottish landscape, extensive across upland areas associated with, and managed for, hill sheep farming. Rough grasslands contribute to the rough and less modified character of the landscape. It is a relatively abundant landscape element that is not rare or recognised for its value, and although, within the diversity at the detailed scale there is flora and fauna that are of greater value, the overall value of the rough grassland as a landscape element is medium to low.
5.7.4 The susceptibility of the rough grassland to the proposed development is low as it is relatively easy to re-instate this type of landcover as the grasses are sufficiently invasive to enable them to re-colonise disturbed areas. Furthermore, it would be a relatively small proportion of a much wider area that would be affected. The combination of the value of the rough grassland and its susceptibility to the proposed development, results in a medium to low sensitivity.

**Magnitude of Effect**

5.7.5 Changes to the rough grassland element would result from the removal of the soil and vegetation from the routes of the new access tracks, and along the edge of the existing access tracks where widening would be required, from the areas of the temporary construction compounds, and longer term sub-station, operations building, crane pads, turbine and meteorological mast stand foundations, and from the borrow pits.

5.7.6 The magnitude of effect on the rough grassland element would be medium to low. The proposed development would result in the removal of a relatively small proportion of this extensive landscape element, albeit comprising some large areas at a local level. This rating has also taken into account the relative ease with which this vegetation type can be re-colonised and the extent of additional rough grassland that would be created as a result of the forestry removal. The location of the turbines, tracks and other associated infrastructure have been carefully located so as to avoid the more sensitive habitats within this landscape element.

5.7.7 The effect would occur during the construction phase, with either no or very limited additional change occurring during the operational or decommissioning phases.

**Significance of Effect**

5.7.8 The physical effect of the proposed development on the rough grassland during the construction stage would be not significant. This is primarily due to the medium to low sensitivity of the landscape element, the limited proportion of the landscape element that would be affected, and the high potential for the visual mitigation of any direct effects through reinstatement of the rough grassland ground cover. Although the effect would be not significant, the nature of the effect would be adverse.

**Coniferous Forestry**

**Baseline**

5.7.9 Three large blocks of commercial forestry cover the site, one around and to the north of Mull of Miljoan and Corphin Hill to the south-west, one around Braker Hill and Green Larg to the south-east and extending further south-east, and one around Craiginmoddie to the north-east and extending further north-east. Seventeen of the 31 proposed turbines would be located in areas that are currently cultivated for forestry. The proposal would be to clear fell all forestry within the site boundary.

5.7.10 Forestry plantations are a characteristic of the foothills landscape, evident often as part of a mosaic with the rough grasslands. The planned geometric edges of the blocks, the row formation of the plantations, the single species and age of each block, and the rotational clear felling of the management process denote the managed state of the forestry on site. While forestry can be considered to enhance the character and scenic qualities of a landscape, as well as the biodiversity of habitats, commercial forestry, such as the blocks on site, make little contribution to either. The forestry on the site presents a modification of the landscape, whereby the natural landcover has
been notably altered and this detracts from the intrinsic qualities of the foothills landscape.

Sensitivity

5.7.11 Forestry occurs across 39% of the site. The sensitivity of the forestry is reduced by the fact that it has been planted as a commercial crop, which will eventually be felled. It is not indigenous or naturalised woodland, and does not contribute to the integrity of the landscape or typify its inherent characteristics. This is evident from the use of single species; the often geometric layout of the plantations; and the rotational systems of planting and clear felling which mean large areas are the same age, and are likely to be felled at the same time. There is also a high potential for mitigation as rough grassland would replace the forestry and re-colonise these areas with relative ease. The forestry does, however, form a notable characteristic of the South Ayrshire landscape and provides contrast to the open grasslands on the hills.

5.7.12 The value of the coniferous forestry is medium to low on account of its cultivated origins and appearance, balanced against the contribution it makes generally to the character of the landscape. The susceptibility of the coniferous forestry is low due to the relative ease with which it can be reinstated. The combination of these factors results in a medium to low sensitivity being attributed to the coniferous forestry on the site.

Magnitude of Effect

5.7.13 All forestry on the site would be removed as part of the construction stage of the proposed development. This would have a notable impact on the character of the site, owing to the broad extents of forestry which occurs across the site area, and its distinct appearance owing to its dark colour, texture and scale, especially in contrast to the rough grasslands. Clear felling would remove all forestry from the site and while this could be considered to detract from the character of the landscape, it would allow the landscape to be reinstated as a continuous open moorland, without the fragmentation otherwise caused by the forestry blocks. With the exception of the north-east corner, the blocks that would be removed would go in their entirety, thus preventing residual strips or blocks that might otherwise appear discordant with the predominantly open landscape.

5.7.14 The forestry removal would involve extensive activity of machinery used for the clear felling process and this would add to the magnitude of the effect. The loss of forestry would reduce the sense of enclosure, and with areas of clear felling appearing disturbed owing to the broken ground and deposition of debris.

5.7.15 Taking these factors into account the magnitude of effect on the physical element of the forestry would be medium to high during the construction stage when the forestry removals would take place and then during operation and decommissioning there would be no further change. This finding relates chiefly to the extent of forestry across the site and the residual effects of clear felling, despite the long term benefits of removing large blocks of commercial forestry to restore the open moorland.

Significance of Effect

5.7.16 The effect of the proposed development on the coniferous forestry would be significant during the construction phase and then not significant during the operational and decommissioning phases, when there would be no further change. The significant effect relates to the scale of the forestry removal, despite its limited
sensitivity as a landscape element and the longer term benefits that may arise from its removal. The nature of the effect would be adverse.

**Summary of Effects on Landscape Elements**

5.7.17 The principal effects that the proposed development would have on the landscape elements of the site are the removal of large areas of forestry and small areas of rough grassland. The effects of the forestry removal have been assessed as significant during the construction stage of the proposed development and not significant during the operational and decommissioning stages. The effects of the removal of the rough grassland have been assessed as not significant.

**Assessment of Effects on Landscape Character**

*Introduction*

5.7.18 Effects on landscape character occur both on the site, where the pattern of elements that characterises the landscape would be directly altered by the addition of the proposed development to the landscape; and off-site, around the study area, where visibility of the proposed development may indirectly alter the way in which this pattern of elements is perceived. For example, if the proposed development is visible from the *Intimate Pastoral Valley* LCT of the River Stinchar, the perceived experience of this area may be altered as the visibility of the proposed development introduces different contextual characteristics despite its physical location in another separate area.

5.7.19 The detailed methodology for the assessment of effects on landscape character is described in Technical Appendix 5.1. An initial assessment has been carried out to identify those receptors that have the potential to undergo significant effects and therefore require a detailed assessment and this is documented in Technical Appendix 5.2

5.7.20 It should be noted that levels of magnitude of effect on landscape character receptors are generally found to be lower than the magnitude of effect on viewpoints that lie within these landscape character areas. This means that if a viewpoint is assessed to undergo a medium-high magnitude of effect it does not necessarily follow that the landscape character area within which it lies would also undergo a medium-high magnitude of effect, but may undergo a medium magnitude of effect instead, for example.

5.7.21 This is because the effects on viewpoints are assessed within the context of a specific outlook of the site and are usually specifically selected to gain a direct view over the site. The proposed development is the principal consideration in the viewpoint assessment, and influences that lie in other areas of the view are considered to a lesser degree. The landscape character of a receptor is not, however, determined so specifically by the outlook over the proposed development, and there are many other considerations, both visual and perceptual, that combine to give an area its landscape character. This means that the degree of influence of the proposed development may be slightly less on landscape character than on a specific view. Viewpoints are referred to in this assessment as they do give a useful indication of the appearance of the proposed development from the landscape areas, but the level of magnitude of effect may vary between the viewpoint assessment and the landscape character assessment.

5.7.22 This is particularly true of areas that lie slightly further away from the site. In the immediate vicinity of the site, up to around 2 km away – the magnitude of effect on
viewpoints and landscape character is likely to be similar, but beyond this, the magnitude of effect on landscape character is found to often diminish more rapidly as the influence of the turbines is subsumed in the many other influences on landscape character.

**Assessment of Effects on Landscape Character Areas**

**Introduction**

5.7.23 The first group of receptors covered in the assessment of effects on the landscape character is the LCTs that cover the study area as shown in Figure 5.3 and shown in conjunction with the ZTV in Figure 5.8a and 5.8b (showing 15 km radius at a larger scale).

5.7.24 It should be noted that many of the LCTs included in the assessment cover large areas and the effects of the proposed development could therefore vary widely across a single LCT. The distinction within single LCTs where effects may be significant and where effects would not be significant is of particular importance in the assessment, and where this is the case, the assessment describes in detail the geographical extents of the effects.

5.7.25 The initial assessment has indicated that parts of six LCTs have potential to undergo significant effects as a result of the proposed development. These are:

- Foothills with Forest and Wind Farm 17c;
- Middle Dale 12 (Water of Girvan);
- Intimate Pastoral Valley 13 (River Stinchar);
- Coastal Foothills 17e;
- Maybole Foothills 17d; and
- Rugged Uplands 21.

5.7.26 The effect on each of these LCTs is assessed below. The other LCTs that cover the study area were found through the initial assessment to not have the potential to undergo significant effects and have therefore not been assessed in any further detail.

**Foothills with Forest and Wind Farm**

**Baseline**

5.7.27 The Foothills with Forest and Wind Farm LCT covers the hills which sit between the Middle Dale LCT of the Water of Girvan to the north and the Intimate Pastoral Valley LCT of the River Stinchar to the south. They follow the same north-east to south-west alignment as the river valleys and provide a sense of enclosure to these landscapes. The Foothills form ridgelines to the north and south of the LCT between which a gently undulating plateau occurs.

5.7.28 The hills which form the northern ridgeline comprise Barony Hill (319 m AOD) in the north-east, Hadyard Hill (324 m AOD), Maxwellston Hill (314 m AOD) and the unnamed hill (275 m AOD) in the south-west. They form an enclosing ridgeline and distinct skyline to the Middle Dale LCT of the Water of Girvan, with steep slopes ascending up towards Hadyard and Maxwellston Hills. They are relatively open with a covering of rough grassland used for hill sheep farming. Small bands of trees extend onto the lower slopes from the adjacent wooded valley and only a few isolated
farmsteads or properties occur, associated with the B734 (NCR7) or Hadyard Hill minor road, which cross the hills from north to south.

5.7.29 The southern ridgeline starts with Glenalla Fell and Craig of Dalwine (418 m AOD) in the north-east before extending on to Daljedburgh Hill (374 m AOD), Mull of Miljoan (356 m AOD), Auchensoul Hill (314 m AOD), Kirkland Hill (297 m AOD) and Benan Hill (281 m AOD) in the south-west. The hills form steep, southern slopes that provide a distinct enclosure to the Intimate Pastoral Valley LCT of the River Stinchar. They are mostly open owing to the rough grassland cover, with forestry occurring where the hill tops round onto the undulating upland plateau, or in the north-east, more extensively across the hill slopes. Roads and settlement are mostly contained in the shelter of the River Stinchar valley, with only a few isolated farmsteads and properties extending onto the lower hill sides and minor roads crossing over the hills.

5.7.30 As the name of this LCT suggests, the upland plateau is characterised by forest and wind farms. Forestry occurs as medium sized blocks set intermittently across the undulating landform. Their geometric edges and single species denote their modified nature. The 52 turbines of Hadyard Hill Wind Farm form a very prominent feature on this plateau being seen as large scale vertical structures with moving blades which contrast with the otherwise largely undeveloped character of this landscape.

5.7.31 Other operational wind farms are also visible from this LCT, although none are especially close in range. Mark Hill can be seen from the upland plateau and south facing slopes at a minimum distance of 6 km to the south and Arecleoch can be seen from similar extents at a range of 12.5 km to the south-west. Windy Standard is a distant feature only visible on clear days owing to its distant range of 27 km and seen only from the eastern end of the LCT.

Sensitivity

5.7.32 The value of the Foothills with Forest and Wind Farm LCT landscape is medium. It is not subject to any national landscape designations but is subject to the regional designation of the South Carrick SA. The presence of wind farm development and commercial forestry characterises this LCT and denotes the extent of human intervention.

5.7.33 The susceptibility of this LCT to the proposed development is medium. Wind farm development is an established part of the baseline character and a defining feature of this landscape, such that the addition of further development would not appear out of character.

5.7.34 The combination of the value of the landscape and its susceptibility to the proposed development leads to an overall sensitivity of medium.

Magnitude of Effect

5.7.35 The ZTV in Figure 5.7 shows that visibility of the proposed development would occur across the majority of this LCT with the exception of small patches to the north-west, west and south-west and larger patches across the east and north-east. The levels of visibility would vary across the LCT with the highest levels occurring centrally and close to the proposed development.

5.7.36 The location of the Hadyard Hill Wind Farm in this LCT, already establishes a baseline in which this type of development is a characteristic feature. The Cumulative ZTV in Figure 5.14 shows that the majority of the LCT, which would gain visibility of the proposed development, already gains visibility of the existing development. The
proximity of the proposed development to the existing development means that it
would appear as an extension and this keeps this type of development physically
contained within this LCT.

5.7.37 In the western half of the LCT the proposed development would typically be seen as
5 or 6 turbines with the remainder of the turbines screened by the intervening hills that
Hadyard Hill Wind Farm are set upon. The proposed development would therefore
occur as a small proportion of the number of turbines visible. The similarities in
location, as well as the scale and proportioning of the turbines, mean the proposed
development would appear well integrated. Infrastructure would comprise the
operations building next to the B734, the south-western met mast, potentially two
borrow pits set in the clear felled forestry and relatively short sections of new access
track. In the context of the existing Hadyard Hill Wind Farm, these components would
appear congruous and comparatively small scale. In this western part of the LCT the
proposed development would give rise to a medium to low magnitude of effect.

5.7.38 Where the existing Hadyard Hill turbines are located the levels of visibility of the
proposed turbines are higher with patches of 15-21, 22-28 and 29-31 occurring. The
fact that the existing turbines are located in this part of the LCT would reduce the
effect that the addition of the proposed turbines would have, as they would have a
comparatively weaker influence on the character of the landscape. Most of the
proposed turbines would be seen set to the east of the existing turbines with the
exception of six which occur to the south. In terms of infrastructure, tracks in this part
of the LCT would be mostly existing tracks with some new sections of track and
potentially borrow pits, although the effect of these would be reduced by their location
in areas of clear felled forestry. The magnitude of effect in this section would be
medium to low.

5.7.39 To the east of the majority of the existing turbines, where the majority of the proposed
turbines are located, the proposed development would have a more notable effect
through the direct alteration of the character and pattern of the landscape as well as
visibility, with high levels of turbines visible and in some areas introducing turbine
visibility where previously it did not occur. Infrastructure, including tracks, borrow pits,
sub-stations and met mast, would be apparent and these would add to the level of
development in this part previously undeveloped part of the LCT. The magnitude of
effect on the LCT between the Hadyard Hill minor road and the forest edge of Garleffin
Fell would be medium. Although there is an existing influence from Hadyard Hill Wind
Farm, the influence of the proposed turbines would be greater owing to their closer
proximity.

5.7.40 Further east of this, the levels of visibility would fall to typically 1-7 turbines or no
visibility and there would be limited visibility of infrastructure. The exception to this
would occur along the hills Clauchie Hill (377 m AOD) and Glenalla Fell (425 m AOD)
where levels of visibility are theoretically higher. This area is extensively afforested
and so actual influence through visibility would be notably less than theoretical
visibility. Here the magnitude of effect on the Foothills with Forest and Wind Farms
LCT would be medium to low in the patches where visibility would occur, and there
would be no effect where there would be no visibility.

Significance of Effect

5.7.41 During the operational stage, the effect of the proposed development on the character
of the Foothills with Forest and Wind Farms LCT would be not significant across the
majority of the LCT, owing principally to the baseline influence of the existing Hadyard
Hill Wind Farm and the integration of the proposed development as an extension to it.
A **significant** effect would, however, arise across the central to eastern section between the Hadyard Hill minor road to the west, the forest edge of Garleffin Fell to the east, the Barony Hill to Cairn Hill ridge to the north, and the LCT boundary to the south. In this area, the proximity of the proposed turbines and associated infrastructure would increase the potential effect.

5.7.42 During the construction and decommissioning stages, **significant** effects would occur across the central to eastern section owing to the use of tall cranes to erect and dismantle the turbines. Additional works associated with extensive forestry removal and the construction of new tracks, borrow pits, met masts, the sub-station, operations building and batching plant would give rise to **significant** effects between the B734 and the forest edge of Garleffin Fell. The effect on the remaining parts of the LCT during construction and decommissioning would be **not significant**.

**Middle Dale – Water of Girvan**

**Baseline**

5.7.43 The **Middle Dale** LCT associated with the Water of Girvan lies to the north of the **Foothills with Forest and Wind Farm** LCT where the proposed development would be situated and to the south of the **Maybole Foothills** LCT. It occurs as a band of low-lying land following the north-east to south-west alignment of the meandering Water of Girvan. It is contained by **Foothills** to the south and north and is distinct from these areas on account of the enclosure afforded by the valley landform and the extent of mature woodland which occurs within it.

5.7.44 The **Middle Dale** LCT starts in the north-east at Straiton and continues on to Bargany to the south-west. The landform is relatively low and level along the valley floor with the valley sides gently undulating towards the steeper slopes of the adjoining **Foothills**. Mature woodland forms a pattern of enclosure and gives a sense of intimacy; mostly deciduous in type but with occasional blocks of coniferous plantation, especially along the upper margins. Intermittent fields of pasture provide grazing for livestock and farmsteads are accessed by a network of minor roads and tracks.

5.7.45 The settled nature of the **Middle Dale** LCT has a historical dimension, with a number of castles and country homes located along its length and many with substantial grounds. Of these, Kilkerran, Bargany and Blairquhan have grounds listed as GDLs. The few villages which occur are mostly small in scale and traditional in character, situated along the B741 or parallel minor roads which all align with the orientation of the valley.

5.7.46 The relationship between the **Middle Dale** and the **Foothills with Forest and Wind Farms** LCTs varies depending on the extent of tree cover. Where substantial tree cover occurs, views are often contained within the valley landscape and this reduces the association with the neighbouring **Foothills**. Where unenclosed areas occur and views extend out, the **Foothills** form an important skyline feature marking the enclosure of the valley landscape.

5.7.47 Wind farm development in this LCT is limited to a few small scale domestic turbines. Despite the close proximity of this landscape to operational Hadyard Hill Wind Farm, visibility is limited. This is due to the existing turbines being set on the plateau behind the ridgeline, such that the extents of the development is largely screened by the ridgeline, and then further screened by the extent of tree cover throughout the valley.
Sensitivity

5.7.48 The value of the Middle Dale LCT landscape is medium to high. It is not subject to any national landscape designations but is subject to the regional designation of the South Carrick SA. Furthermore, the LCT contains three GDLs which are of national importance. While the Middle Dale LCT is not characterised by any remarkable landscape features it is an attractive pastoral landscape.

5.7.49 The susceptibility of this landscape to the proposed development is medium. Existing Hadyard Hill Wind Farm forms a part of the baseline character of this landscape, readily visible from the open parts of the northern valley slopes, albeit with visibility limited from the valley floor and southern valley slopes. The Foothills with Forest and Wind Farm LCT ridgeline, forms an important feature to the character and enclosure of the Middle Dale LCT and this adds to the susceptibility of the LCT to the proposed development.

5.7.50 The combination of the value of the landscape and its susceptibility to the proposed development leads to an overall sensitivity of medium to high.

Magnitude of Effect

5.7.51 The ZTV in Figure 5.7 shows a distinct pattern of visibility in which there would be practically no visibility across the southern part of the LCT and then bands of increasingly higher levels of visibility occurring across the valley floor and up the northern slopes, in parallel alignment with the direction of the valley. The southern valley slopes that lie along the northern edge of the Foothills would gain no visibility owing to the screening effect of the steep hill slope and there would therefore be no effect as a result of the proposed development.

5.7.52 Along the valley floor, theoretical visibility is shown to occur as 1-7 or 8-14 turbines. Wirelines show that visibility would comprise turbines partially screened by the intervening hill ridge, such that tips and blades would be visible, and often seen as an extension to the existing development. Their prominence across this LCT would be reduced by the screening effect of the extensive tree cover. This would result in patchy visibility occurring typically at ranges of 3-6 km and the magnitude of effect would be low.

5.7.53 An exception occurs in the area around Dailly where the cumulative ZTV in Figure 5.14 shows that the proposed development would be introducing visibility where currently there is no visibility of the existing Hadyard Hill Wind Farm. Wirelines show that visibility opens up where the ridgeline subsides around Dobbingstone Burn, such that the proposed development would be seen as a group of 8-14 turbines at fuller extents and within the range of 1-5 km. The proposed development would be seen as a new focus, set on the ridgeline and this would redefine the character of the landscape. The magnitude of effect would be medium for the area between Glengee Wood to the north-east and Brunston Castle to the south-west and between Dobbingstone Burn along the southern edge of the LCT and the northern boundary edge to the south of Kirk Hill.

5.7.54 On the more elevated slopes to the north of the Water of Girvan, theoretical visibility is shown to occur as 15-21 and 22-28 turbines with some visibility of 29-31 along the northern edge. Both deciduous and coniferous woodland is relatively extensive across these slopes such that actual visibility would be greatly reduced. Where visibility would occur, the turbines would be seen from distances beyond 3.5 km and seen as an integrated part of the existing wind farm, albeit increasing the horizontal
extents of wind farm development along the ridge. Overall the magnitude of effect would be medium within the section between Brunston Castle and Ruglen, but medium to low or lower in the remaining areas on either side.

5.7.55 Infrastructure would not be readily visible from much of this LCT with the exception of some tracks which would be visible from the area around Dailly and the more elevated northern slopes behind Dailly. The limited extent of their visibility means that the overall magnitude of effect would not increase above medium.

Significance of Effect

5.7.56 The effect of the proposed development on the character of the Middle Dale LCT would be not significant for the majority of the LCT. This finding relates principally to the screening effect of the woodland cover which greatly reduces the extents of visibility from this LCT and where visibility of the proposed development would occur, it would mostly be seen in the context of the existing development. A significant effect would, however, occur in the localised area around Dailly, where the proposed development would have a defining influence on the character of the landscape. This effect would occur extending up to the northern edge of the LCT between Brunston Castle and Ruglen, and to the east of Dailly extending down to the southern edge around Dobbingstone Burn.

5.7.57 As the majority of the construction and decommissioning operations would be located behind the foothills and therefore largely screened by the ridgeline, it would have a limited influence on the character of the LCT. The main feature would be the erection and dismantling of the turbines and the additional visibility of tall cranes associated with this process. This would give rise to a significant effect across the same extents where the operational development would have a significant effect and not significant across the remaining parts of the LCT.

Intimate Pastoral Valley – River Stinchar

Baseline

5.7.58 The Intimate Pastoral Valley LCT, associated with the River Stinchar, lies to the south of the Foothills with Forest and Wind Farm LCT where the majority of the proposed development would be situated. Two turbines lie just within the northern edge of the Intimate Pastoral Valley LCT, an area which is more characteristic of the Foothills LCT than the Intimate Pastoral Valley LCT. The valley occurs as a narrow band of low-lying land following the north-east to south-west alignment of the meandering River Stinchar. It is contained by the Foothills with Forest and Wind Farm LCT to the north, Rugged Uplands LCT to the south-east and South Ayrshire Plateau Moorlands with Forest and Wind Farms LCT to the south. It is distinct from these areas on account of the enclosure afforded by the valley landform, and the more settled and cultivated character of the landscape.

5.7.59 The LCT extends from the Balloch plantation in the north-east, to Ballantree on the coast in the south-west, with also a spur following the Duisk River extending south beyond Barrhill. This assessment focuses on the section which lies between the Balloch Plantation and the A714 at Pinwherry as this is where it would be most likely for significant effects to occur, based on proximity to the proposed development and levels of visibility shown on the ZTV (Figure 5.7).

5.7.60 This section of the LCT comprises two relatively long and straight sections; the first from Balloch Plantation to Milton Bridge, following an east to west direction and the second from Milton Bridge to Pinwherry following a north-east to south-west direction.
The valley floor tends to be narrow with hill slopes rising up to form a distinct sense of enclosure and accentuating the importance of the surrounding ridgelines on the character of this landscape.

5.7.61 The sense of enclosure is further emphasised by the extent of mature tree cover forming riparian, policy or shelter-belt woodland within the valley, more notably in the section between Milton Bridge and Pinwherry, while larger blocks of coniferous woodland extend up parts of the enclosing hill slopes. The intermittent openings are formed as small fields of lush pasture and farmsteads sit intermittently along the B734 and the minor road between Barr and Balloch.

5.7.62 Development in this LCT is typically small in scale and rural in character. Despite the close proximity of this landscape to operational Hadyard Hill Wind Farm, visibility is limited, with no visibility occurring on the south facing slopes between Barr and Pinwherry and low levels of visibility occurring across the remainder of the LCT. This is due to the existing turbines being set on the plateau behind the ridgeline, such that the extents of the development is largely screened by the ridgeline, with further screening occurring as a result of the extent of tree cover throughout the valley. Hadyard Hill Wind Farm does, nonetheless, establish this type of development as an influence across the majority of the LCT.

Sensitivity

5.7.63 The value of the Intimate Pastoral Valley LCT is medium. It is not subject to any national landscape designations, but is subject to the regional designation of the South Carrick SA. The landscape is in relatively good condition, albeit characterised by farming and forestry practices, with areas of clear felling giving rise to a disturbed appearance.

5.7.64 The susceptibility of this landscape to the proposed development is medium to high. While visibility of Hadyard Hill Wind Farm occurs within substantial parts of the valley, the extents of visibility are patchy and only small parts of the wider development tend to be visible. There is a greater degree of enclosure than occurs in the Middle Dale LCT and despite some visibility of existing turbines, the narrowness of this valley, combined with the steepness of the northern slopes, means the ridgeline forms an important component in the character of the valley.

5.7.65 The combination of the value of the landscape and its susceptibility to the proposed development leads to an overall sensitivity of medium to high.

Magnitude of Effect

5.7.66 The ZTV shows that Barr marks a divide in the two distinct patterns of visibility. To the west there is only visibility on the southern slopes, while to the east of Barr there is visibility on both northern and southern slopes with the exception of some small patches to the east of South Balloch. Furthermore, to the west the LCT is more enclosed by forestry, while to the east it is more open.

5.7.67 To the west of Barr, theoretical visibility occurs as bands parallel to the alignment of the valley, increasing in level with elevation, such that 1-7 turbines would be seen from the valley floor and then narrow bands of 8-14, 15-21 and 22-28 turbines up the valley side, with a broader band of 29-31 turbines occurring along the more elevated southern edge of the LCT and around Barr. Actual visibility would be partially reduced by the extent of coniferous and deciduous woodland which occurs in this western part of the LCT, especially in relation to the larger blocks which occur across the upper slopes to the south.
5.7.68 There would be no effect on the northern side of the valley owing to the absence of visibility. From the valley floor the magnitude of effect would be medium to low on account of the small number of turbines that would be visible and the extent to which they would be screened by the intervening ridgeline, such that mostly tips with some blades would be visible, and despite the absence of visibility of the existing Hadyard Hill Wind Farm.

5.7.69 With the increase in elevation, levels of visibility also increase, as the proposed turbines would be seen to increased extents on and behind the intervening ridgeline. The existing presence of Hadyard Hill Wind Farm would moderate the effect of the proposed development as it would not occur as a new influence on the character of the LCT. It would, nonetheless, add to the horizontal extents of development within a prominent section of the skyline and this would give rise to a medium magnitude of effect across the southern slopes between the B734 and Doularg Hill and Changue Hill. Further west of the Traboyack valley the effect would be medium to low owing to the greater distance from the proposed development, which would be beyond 5 km, and the orientation of the landform more towards the north-west than the north and therefore less closely associated with the ridgeline where the proposed development would be located.

5.7.70 The land rises steeply around Barr and form the hill slopes to the north the magnitude of effect would be medium to high owing to the close range of the turbines and the prominent feature they would make within the neighbouring foothills. Along the northern edge of the LCT to the north of Barr where the visibility is shown on the ZTV to comprise 1-7 turbines, from the minimum distance of 1 km they would appear large in scale and incongruous with the setting.

5.7.71 Although visibility of the Hadyard Hill Wind Farm already occurs to the east of Barr, visibility is limited to a small number of turbines which are mostly concealed by landform. The proposed development would introduce a closer range example which would appear prominent from many parts of this LCT owing to its position on the enclosing northern ridge to the valley. The valley floor and surrounding lower slopes are relatively free from tree cover such that visibility of the proposed development would be fairly extensive and, here, the magnitude of effect would be medium to high.

5.7.72 Infrastructure would not be readily visible from most parts of the Intimate Pastoral Valley LCT owing to the screening effect of the foothills ridge, with the exception of the meteorological masts, which would rise above the ridge and tracks which would be visible from the more elevated parts. The presence of these components would not notably alter the magnitude of effect ratings owing to their comparatively smaller scale and lesser presence.

Significance of Effect

5.7.73 During the operational stage, the effect of the proposed development on the character of the Intimate Pastoral Valley LCT would be significant in the part to the east of Barr, to the west of Barr as far as the Traboyack valley and across the hills around Barr. This relates to the broad extents of visibility in which the proposed development would appear as a prominent feature, regardless of some existing influence from the Hadyard Hill Wind Farm. The effect of the proposed development on the remaining parts of the LCT would be not significant, largely owing to the screening effect of the intervening foothills ridge and tree cover within the valley. The nature of the effects would be adverse.
5.7.74 During the construction and decommissioning stages, significant effects would occur across the same extents as described above. Although many of the operations would be largely concealed by the ridgeline of the foothills, the tall cranes associated with the erection and dismantling of the turbines would be evident along and behind the ridgeline and would add to the prominence of the proposed development. Although not so apparent from much of the valley landscape, forestry removal would also be evident during the construction stage, especially over Mull of Miljoan (356 m AOD) and Daljedburgh Hill (374 m AOD). The effect on the remaining parts of the LCT during these stages would be not significant.

Coastal Foothills

Baseline

5.7.75 The Coastal Foothills LCT, associated with the South Ayrshire coast, lies to the west and south-west of the Foothills with Forest and Wind Farm LCT where the proposed development would be located. It occurs as a series of low but prominent hills, following the north-east to south-west alignment of the wider landscape. It is bordered by the Intimate Pastoral Valley LCT of the Girvan Water to the south and the Raised Beach LCT of the Irish Sea coast to the north. It is distinct from these areas on account of the elevated landform, and the more remote and less modified character of the landscape.

5.7.76 Although the hills are relatively low, ranging in height from 214 m AOD to 297 m AOD, they appear larger owing to the contrasts in elevation with the surrounding context of the valley and coastal landscapes. The hills have steep slopes, levelling through rounded summits to small upland plateaux. Collectively they form gently undulating ridgelines following the general north-east to south-west trend of the wider landscape.

5.7.77 Land use predominantly comprises hill sheep farming, set within large fields defined by stone dykes. The landscape is simple and relatively open, with little forestry or development occurring, especially in the more elevated parts. This adds to the sense of space, as well as remoteness, and views open out in all directions. The main draw of views is seaward, where Ailsa Craig and the Isle of Arran are visible on clear days. The landward views are less remarkable, comprising mostly low hills and plateau moorland.

5.7.78 The valley of the Bynehill Burn bisects this LCT, and provides a lower lying route for the A714 and the west coast rail line to cut through the hills. Small settlements and individual properties occur intermittently along the road and a greater concentration of mature tree cover provides a more intimate character.

5.7.79 The north-eastern edge of the LCT borders the Foothills with Forest and Wind Farms LCT, where it comes within 1 km of the closest Hadyard Hill Wind Farm turbine. This wind farm is especially visible across the east facing slopes of the adjacent hills, as well as across the hills further south-west. Arecleoch and Mark Hill Wind Farms are also visible, set on the Plateau Moorland LCT to the south and south-east, albeit seen only from the more elevated and south-facing parts of the LCT.

Sensitivity

5.7.80 The value of the Coastal Foothills LCT is medium. It is not subject to any national landscape designations, but is subject to the regional designation of the South Carrick SA. The Coastal Foothills LCT is not characterised by any remarkable landscape features, although the hills are attractive and provide an important part of the coastal setting.
5.7.81 The susceptibility of the Coastal Hills LCT is medium. Wind farm development is already evident from this LCT, most notably in the form of especially close range, Hadyard Hill Wind Farm, but also Arecleoch and Mark Hill; their presence establishing this type of development as part of the baseline character.

5.7.82 The combination of the value of the landscape and its susceptibility to the proposed development leads to an overall sensitivity of medium.

Magnitude of Effect

5.7.83 The ZTV on Figure 5.7 shows that the majority of the LCT would gain no visibility, but that visibility would occur across the east facing slopes of the closest range hills to the immediate west and then in patches across the more elevated north-east facing slopes further south-west in the LCT. From the closest range hills the proposed development would be visible, albeit seen to the rear of the existing Hadyard Hill Wind Farm. This would have the effect of reducing the prominence of the proposed turbines as they would be seen at a greater distance than the existing turbines and therefore appear smaller in scale. Furthermore, they would be seen as an integrated extension to the existing layout without notably increasing the horizontal or vertical extents. They would, nonetheless, add to the density of development visible in this view.

5.7.84 Infrastructure would be visible from the closer and more elevated parts of the Coastal Foothills LCT, mostly in the form of tracks seen cut into the landcover of the foothills, but also the met masts would be visible, albeit their comparatively fine form and smaller scale making them appear much less prominent than the turbines. Taking all these factors into account, the magnitude of effect during the operational stage of the proposed development would be medium to low from the area of the Coastal Foothills LCT to the north-east of the A714.

5.7.85 From the hills further south-west in the LCT, which would gain visibility at a greater distance from the proposed development, the magnitude of effect during the operational stage would be low. Again, the proposed turbines would be seen set behind the existing turbines, largely contained within the existing extents of wind farm development and seen at a greater distance, and also infrastructure would not form a readily apparent feature.

5.7.86 Other components of the proposed development that would be visible from this LCT would be forestry removal during construction and the erection and dismantling of turbines during construction and decommissioning. Forestry removal would be seen across the hill tops of the Foothills with Forests and Wind Farms LCT, but would not form a notable influence on the character of the Coastal Foothills LCT as it would be largely seen to occur behind the existing turbines and forestry removal is a common feature of this landscape. The magnitude of effect would be low.

5.7.87 The construction and dismantling of the turbines would involve the use of tall cranes which would add to the presence of vertical structures on the site. While these operations would make the proposed development a more prominent feature, it would still be contained behind existing Hadyard Hill Wind Farm and this would moderate the effect such that it would not increase above medium to low.

Significance of Effect

5.7.88 The effect of the proposed development on the character of the Coastal Hills LCT during the construction, operational and decommissioning stages would be not significant. Visibility is not extensive across this LCT and where it would occur, the addition of the proposed development would be seen to the rear of the existing
Hadyard Hill Wind Farm. The proposed development would not redefine the character of the *Coastal Hills* LCT. The nature of the effect would be adverse.

**Maybole Foothills 17d**

*Baseline*

5.7.89 The *Maybole Foothills* LCT sits to the north of the *Middle Dale* LCT of the Girvan Water. It forms the northern enclosure to the valley, opposite the *Foothills with Forest and Wind Farms* LCT, which forms the southern enclosure to the valley. All three LCTs follow the same north-east to south-west alignment. The *Maybole Foothills* LCT comprises low hills which collectively form a low and level ridge, aligned north-east to south-west, with the hill slopes facing out to the south-east or north-west, depending on whether they occur to the north or south of the ridgeline. The south-east facing slopes have an association with the *Foothills with Forest and Wind Farms* LCT as they are orientated towards it, across the *Middle Dale* LCT of the Water of Girvan.

5.7.90 The *Maybole Foothills* are low, typically ranging between 100 m and 120 m. They comprise a southern ridge which sits on the edge of the *Middle Dale* LCT, where the high point is Kirk Hill (249 m AOD) and a northern ridge which sits on either side of the town of Maybole, where the high point is Mochrum Wood (270 m AOD). The hills are gently undulating with the land generally falling southwards towards the Water of Girvan. The majority of the LCT comprises improved pasture in enclosed fields which typically extend across the hills, such that there are few unmodified areas and little sense of remoteness. The landscape is relatively open, with woodland occurring mostly as shelter-belts or small blocks.

5.7.91 The town of Maybole lies within this LCT, along with a number of other smaller settlements. These are all connected through a network of ‘A’, ‘B’ and minor roads. Other developments include small scale turbines, and the existing Hadyard Hill Wind Farm is readily visible from the southern and northern ridges of this LCT.

*Sensitivity*

5.7.92 The value of the *Maybole Foothills* LCT is medium. It is not subject to any national landscape designations or regional landscape designations. It is a landscape that has been modified largely by agricultural practices and which contains few unmodified areas. Although the landscape is well managed, there are no exceptional landscape features or characteristics that add to its value.

5.7.93 The susceptibility of this LCT to the proposed development is medium. Visibility of Hadyard Hill Wind Farm already occurs from the *Maybole Foothills* LCT, establishing this type of development as part of the baseline character. There is, however, susceptibility to additional development, owing to the close association between the *Maybole Foothills* LCT and the *Foothills with Forest and Wind Farms* LCT and the prominence of the *Foothills* ridgeline.

5.7.94 The combination of the value of the landscape and its susceptibility to the proposed development leads to an overall sensitivity of *medium*.

**Magnitude of Effect**

5.7.95 The ZTV in Figure 5.7 shows that theoretical visibility would be concentrated in three separate bands of high levels of visibility (22-28 and 29-31 turbines) with some smaller, more fragmented patches occurring intermittently. The first band lies on the southern edge of the LCT abutting the *Middle Dale* LCT. The relatively open nature
of this agricultural landscape means that actual visibility would be closely comparable to theoretical visibility. The proposed development would be seen as an extension to the existing development, but would also add to the horizontal extents of the overall development along the ridgeline of the Foothills. This would be seen at a range of 5.5-8 km and from a relatively small area once the wooded areas were discounted. The magnitude of effect on this part of the LCT would be **medium**.

5.7.96 The second band of visibility lies along the south facing slopes of the ridge where Maybole is situated. Again the landscape is relatively open, such that theoretical visibility is closely comparable with actual visibility. The proposed development would be seen at a range of 10-12 km which would make the turbines appear relatively small in scale. The magnitude of effect would mainly relate to the additional horizontal extents of the proposed development, seen in conjunction with the existing Hadyard Hill Wind Farm, which overall would be **medium to low**.

5.7.97 The third band of visibility occurs to the north, centred on Guiltree Hill (193 m AOD). While the existing development is visible from this part of the LCT, the proposed development would appear to the fore. Seen at a range of 10-12 km to the nearest turbine, the proposed development would appear relatively small and the magnitude of effect would be **low**.

5.7.98 Other components of the proposed development that would be visible from this LCT would be forestry removal during construction and the erection and dismantling of turbines during construction and decommissioning. Forestry removal would be seen across the more visible hill tops associated with Craigimoddie, but would not form a notable influence on the character of the Maybole Foothills LCT as forestry removal is a common feature of this landscape. Furthermore, the forestry removal would simplify the landcover of the foothills ridge and make it appear less fragmented. The magnitude of the effect would be **low**.

5.7.99 While the majority of the operations would be contained behind the ridgeline, the construction and dismantling of the turbines would involve the use of tall cranes which, along with the turbines, would be visible from this LCT, especially the closer range southern ridge. These operations would make the proposed development a more prominent feature, and the magnitude of effect during these stages would be **medium** from the closer range ridge and **medium to low** from the more distant ridges.

**Significance of Effect**

5.7.100 The effect of the proposed development on the character of the majority of the Maybole Foothills LCT would be **not significant**. This relates principally to the patchy extents of visibility across the LCT, the distance at which visibility would occur and the existing influence of Hadyard Hill Wind Farm. The nature of the effect would be adverse.

5.7.101 A **significant** effect would arise within the localised area along the southern boundary of the LCT between Quarrel Hill and Glenshalloch Wood and this effect would occur during the construction, operation and decommissioning stages of the proposed development. The nature of the effect would be adverse.

**Rugged Uplands 21**

**Baseline**

5.7.102 The Rugged Uplands LCT occurs to the south and east of the Foothills with Forest and Wind Farms LCT where the proposed development would be located. The
eastern end of the *Intimate Pastoral Valley* LCT lies between these two landscapes. While the *Rugged Uplands* extend into East Ayrshire to the east and Dumfries and Galloway to the south, it is the LCT that lies in South Ayrshire that is assessed here, as it has the greatest potential to undergo significant effects owing to its relatively close proximity.

5.7.103 The *Rugged Uplands* are made distinct from the *Foothills* by their more elevated and rugged landform, steeper slopes and occasional craggy outcrops. Lochs are also a feature of this upland landscape and add to the scenic interest. The principal land use is commercial forestry with large forest blocks covering extensive tracts of land. The forestry is a feature of the rural character, although its modified nature and appearance can detract from the natural qualities of the LCT. In contrast, the land in between is open moorland of un-improved or semi-improved pasture, used mainly for hill sheep farming. Despite these land-use practices, parts of this LCT do possess a sense of remoteness.

5.7.104 Development is relatively sparse in the *Rugged Uplands* LCT with access provided only by the few minor roads, although a more extensive network of forest roads lead through the commercial plantations. Settlement is limited to the occasional isolated property or farmstead and there are a number of abandoned properties in rural parts.

5.7.105 There are no wind farms in this LCT, although a number of developments are visible from it, most notably Hadyard Hill Wind Farm, seen at the minimum distance of 2.8 km to the north. Visibility extends across the ridge of hills that lies to the immediate south of the *Intimate Pastoral Valley* LCT and then across the north-west facing slopes and summits of the hills in the Shalloch ridge. Mark Hill and Arecleoch are visible to the west and south-west at more distant ranges.

**Sensitivity**

5.7.106 The value of the *Rugged Uplands* LCT is medium. It is not subject to any national landscape designations, but is subject to the regional designation of the South Carrick SA. While the hills in the Shalloch ridge add to the scenic value of the LCT owing to their elevation, broad scale and rugged landform, the majority of the LCT is largely unremarkable in scenic terms, comprising lower hills characterised by extensive tracts of coniferous forestry.

5.7.107 The susceptibility of this LCT to the proposed development is medium. Visibility of Hadyard Hill Wind Farm already occurs from large parts of the *Rugged Uplands* LCT, establishing this type of development as part of the baseline character. There is also wide scale forestry which denotes the extent to which this LCT has been modified.

5.7.108 The combination of the value of the landscape and its susceptibility to the proposed development leads to an overall sensitivity of medium.

**Magnitude of Effect**

5.7.109 The ZTV shows visibility would occur almost continuously across the northern hills of the LCT that lie closest to the proposed development, as well as more patchily across the Shalloch ridge in the centre of the LCT.

5.7.110 While the north-western part of the LCT is covered in forestry, there is a ridge of hills which have remained open, extending from Fell Hill (465 m AOD) and Cairn Hill (479 m AOD) in the south-west, through Craiginreoch (565 m AOD) and Pinbreck Hill (499 m AOD) to Eldrick Hill (486m AOD) and the un-named hill further north-east (434 m AOD). Visibility would occur along this ridge and with the orientation of the
landform towards the Foothills with Forest and Wind Farm LCT to the north, the proposed development would form a prominent feature.

5.7.111 The elevation of the *Rugged Uplands* ridge means that the proposed development would be seen at relatively full extents, and at a range of 4-7 km the turbines would form medium scale structures. They would be seen as an extension to the existing Hadyard Hill Wind Farm, owing to their close proximity and extent of overlap, and appear comparable in scale, albeit slightly more prominent owing to their higher base elevation. Components of the infrastructure would also be visible as sections of access tracks and met masts, although the scale and influence of these components would not be as notable as that of the turbines. The proposed development would make a defining influence on the character of this northern part of the LCT, largely owing to the orientation of the landform towards the proposed development, and the magnitude of effect would be medium.

5.7.112 Visibility also occurs in patches along the ridge that comprises Cornish Hill (467 m AOD), Shalloch (545 m AOD) and Shalloch on Minnoch (768 m AOD). Visibility is shown to be fairly continuous across the north-west facing slopes of the closest range hills and then patchy across the higher slopes and summits beyond. Visibility would comprise the majority of the proposed development seen at a range of 7-12 km. The turbines would be seen set on the same hill ridge as the existing Hadyard Hill Wind Farm, increasing the horizontal extents, albeit contained in the same LCT as the existing turbines.

5.7.113 The differences in the assessment of effects on this part of the LCT compared to the ridge of hills on the northern edge relate to the combination of distance from, and association with the foothills on which the proposed development would be located. The more distant range reduces the influence that the turbines would have on the LCT by making them appear smaller in scale and occupying a smaller proportion of the wider foothills landscape. While site infrastructure, such as tracks and met masts, would be visible from these hills, they would have a limited influence on the magnitude of effect owing to distance.

5.7.114 In contrast to the strong association between the northern ridge of the LCT and the foothills ridge where the proposed development would be located, the Shalloch ridge does not have such a strong association, largely due to the orientation of the landform to the north. This means that the proposed development would not have such a strong influence on the character of the Shalloch ridge, considering also the patchy extents shown on the ZTV. It would, nonetheless, increase the extents of wind farm development in the foothills and this would give rise to a medium to low magnitude of effect.

5.7.115 Across the majority of the LCT there would be no effect owing to a combination of no visibility or visibility occurring where there is blanket coniferous forestry.

**Significance of Effect**

5.7.116 During the operational stage, the effect of the proposed development on the character of the *Rugged Uplands* LCT would be significant across the ridge of hills in the north of the LCT and not significant across the remaining parts of the LCT. The significant effect would relate primarily to the orientation of this close range and elevated hill ridge towards the proposed development, which, in turn, would increase its influence on the character of the hill ridge. The not significant effect relates principally to the patchy extents of visibility across the wider LCT, the extent to which forestry would further
reduce visibility, the distance at which visibility would occur and the influence of the existing Hadyard Hill Wind Farm.

5.7.117 During the construction and decommissioning stages, **significant** effects would occur across the same extents as described above. The elevation of the ridge along the north of the LCT would mean that the construction and decommissioning operations, in particular the erection and dismantling of the cranes would be readily visible and would form a prominent feature. Furthermore, the forestry clearance during the construction stage would be apparent and would add to the magnitude of effect. The effect on the remaining parts of the LCT during these stages would be **not significant**.

**Landscape Designations and WLAs**

**Introduction**

5.7.118 The initial assessment in Technical Appendix 5.2 has found that the following designations and WLA require detailed assessment:

- South Carrick SA;
- Bargany GDL; and
- Merrick WLA.

**South Carrick Scenic Area**

**Baseline**

5.7.119 The South Carrick Scenic Area covers the majority of the South Ayrshire region. It is broadly based on the LCTs that lie to the south of the Maybole Foothills, with the exception of the South Ayrshire Plateau Moorlands and Forestry and Wind Farms LCT which lies along the southern edge of the designated area. The broad extents of this designated area means that it includes a mix of LCTs from **Intimate Pastoral Valleys** to **Rugged Uplands**. The contrasts in these character types is evident in the mix of land uses which occur, with settlements, roads and industrial developments occurring intermittently in the lowland landscapes, and forestry, farmland and wind farms occurring intermittently in the upland landscape.

5.7.120 Baseline descriptions for the majority of the LCTs which make up the SA are presented in the Assessment of Effect on Landscape Character Types above and collectively form the baseline description for the South Carrick SA. There is no detailed citation in respect of the SAs.

**Sensitivity**

5.7.121 The sensitivity ratings for the constituent LCTs as assessed in the section above conclude that the valley landscapes of the Middle Dale and Intimate Pastoral Valley are medium to high, primarily on account of the importance of the Foothills ridgeline to the character of these landscapes, while the Foothills with Forest and Wind Farm, Coastal Foothills, Maybole Foothills and Rugged Uplands LCTs are medium, primarily on account of the existing influence of wind farm development, as well as commercial forestry, on the character of these landscapes.

5.7.122 Despite the regional designation, the presence and extent of land-uses which detract from the scenic qualities of the natural landscape prevent the ratings from being higher. The presence of wind farm developments in the SA, as well as electricity transmission lines, small scale industry, roads and settlements, reduce the
susceptibility of the LCT to the proposed development, despite there being areas in the SA that are of scenic value.

5.7.123 The sensitivity of the SA is therefore generally medium to high in the valleys and medium in the hills, although depending on the rating of the constituent LCTs.

Magnitude of Effect

5.7.124 Across the South Carrick SA the magnitude of effect would be variable. The effects which would lead to a significant effect are described below in respect of the relevant LCTs.

5.7.125 The magnitude of effect would be medium in the part of the Foothills with Forest and Wind Farms LCT that extends from the Hadyard Hill minor road in the west to the edge of Garleffin Wood in the east, and from the ridge between Baroney Hill and Cairn Hill in the north, to the edge of the LCT in the south. The location of the proposed turbines in the west of this area, combined with the more limited, or no visibility of Hadyard Hill Wind Farm in the east of this area, increases the influence of the proposed turbines on the landscape character.

5.7.126 The magnitude of effect would be high in the Intimate Pastoral Valley LCT to the immediate south of the Foothills with Forest and Wind Farms LCT owing to the close proximity of the proposed development and its association with the prominent ridgeline that encloses this valley to the north. Further east along the valley, the magnitude of effect would be medium to high across the elevated land around Barr and then medium through the valley to the west of Barr, where notably fewer of the turbines would be visible owing to the screening effect of middle range landform and the enclosure of close range tree cover.

5.7.127 To the north of the Foothills with Forest and Wind Farm LCT, where the Middle Dale LCT occurs, a medium magnitude of effect would occur in the part of the valley to the north-west of the main group of proposed turbines. This effect relates to the proximity of this area to the proposed development and the extent of visibility that occurs across it, in which the proposed turbines would form a notable influence. This area extends from the southern boundary of the LCT where Dobbingstone Burn is located and extends to the northern boundary south of Kirk Hill. To the west it extends as far as Dailly and Brunston Castle and to the east as far as Ruglen.

5.7.128 In the Rugged Uplands LCT to the south of the Foothills with Forest and Wind Farm LCT a medium magnitude of effect would occur along the northern ridge of this LCT, and although separated from the proposed development by the Intimate Pastoral Valley LCT, the orientation of the landform towards the proposed development means that it would form a prominent influence on the character of this LCT, despite the existing influence of Hadyard Hill Wind Farm.

5.7.129 The magnitude of effect across the remaining LCTs which make up the SA would be either medium to low, low or there would be no effect. The factors that have influenced this finding include the distance of the LCT from the proposed development, the levels of visibility of the proposed development that would occur across the LCT, the existing influence of the operational Hadyard Hill Wind Farm, and the level of integration between the existing and proposed developments.

Significance of Effect

5.7.130 The effect of the proposed development on the South Carrick SA correlates with the findings of the assessment of effects on the LCTs, with significant effects arising in
parts of the Foothills with Wind Farms and Forest LCT, the Intimate Pastoral Valley LCT, the Middle Dale LCT and the Rugged Uplands LCT, as defined in the paragraphs above.

**Bargany Garden and Designed Landscape**

**Baseline**

5.7.131 Bargany Gardens forms the grounds to the category A listed Bargany House. The gardens lie between the B741 to the north, the Dailly to Old Dailly minor road to the south, the village of Dailly to the east and Cairnhill to the west. They cover a fairly extensive area set in the Middle Dale LCT of the Water of Girvan, which flows from north-east to south-west through the grounds.

5.7.132 The reasons for the gardens’ inclusion in the Inventory of Gardens and Designed Landscapes relates to the designed landscape of W.S. Gilpin from c.1826 which forms a setting to Bargany House and contributes to the local scenery. The main phases of the gardens' development took place during the mid to late 18th century with improvements early 19th century and new gardens created in the early 20th century.

5.7.133 The main components of the GDL include the Walled Garden, Woodland Garden and Parkland. The Walled Garden lies within the Parkland to the east of the house, covering an area of 4 acres although with large parts covered in grass and only small plots planted up. The Woodland Garden lies to the west of the house and comprises mostly mature coniferous trees, with an understorey of Rhododendrons and Azaleas. The Parkland extends from Bargany House to the north, south and east, characterised by mature deciduous trees and open expanses of grassland.

5.7.134 The landscape is largely enclosed by tree cover, especially in the more formal areas around Bargany House and this limits visibility of, and association with, the surrounding landscapes. The more open parkland areas, especially to the north where the land is more elevated, have more of a visual connection with the surrounding landscapes including the Foothills with Forest and Wind Farms LCT to the south.

5.7.135 Development in the GDL comprises Bargany House and a series of traditional cottages associated with the house. More modern development has taken place in the north-east corner where a club house and holiday houses associated with Brunston Castle Golf Course are located. This development is not in-keeping with the traditional character of the estate and detracts from the overall appearance.

**Sensitivity**

5.7.136 The value of Bargany Garden is medium to high. The GDL is a designation of national importance and recognised in SPP. Historic Scotland’s citation of Bargany, presented in the Inventory, rates the Scenic Value as Outstanding ‘due to its contribution, particularly the woods and parks, to the surrounding scenery.’ The reason that the value of the GDL is not rated as high is because large parts of the gardens are in the process of restoration.

5.7.137 The susceptibility of Bargany Garden is medium. Despite the relatively close proximity of the proposed development, the extent of tree cover across the estate and the introverted character this creates reduces the susceptibility of the GDL to the proposed development. There are, however, a number of open areas within the GDL from which open views are experienced although these typically represent the less sensitive farmland parts of the grounds.
5.7.138 The combination of the medium to high value and the medium to low susceptibility results in an overall medium to high sensitivity.

Magnitude of Effect

5.7.139 The ZTV shows that visibility occurs as bands, with the 1-7 turbines band covering the southern part of the GDL, the 8-14 band covering the central part and the 15-21 band covering the northern edge. There are patches along the southern edge which are shown to gain no visibility.

5.7.140 Bargany House and the more ornamental parts of the GDL associated with it are located in the southern part. The ZTV shows that 1-7 turbines would be theoretically visible while wirelines representative of this southern area show that visibility would comprise five or six tips or blades set behind the downslope of Craig Hill to the left of Hadyard Hill. Mature tree cover is fairly extensive across this southern part such that actual visibility would be reduced. Taking these factors into account, the magnitude of effect would be low.

5.7.141 In the central part of the GDL where visibility is shown to comprise 8-14 turbines, the proposed turbines would typically be seen at fuller extents with some seen set on the ridgeline, while the remainder are set behind it. While the area around Bargany Mains is largely enclosed by woodland, which would reduce actual visibility and keep the magnitude of effect as low, the more open areas to the east would allow views out above the tree tops and here the magnitude of effect would be medium.

5.7.142 In the northern part of the GDL visibility is shown to comprise small patches of 15-21 turbines, and although there is dense tree cover along the eastern boundary, there is a sufficiently open and elevated aspect to allow clear views toward the proposed development (as represented by viewpoint 11). Here, the magnitude of effect would be medium.

5.7.143 The proposed turbines would typically be seen as a medium scale and compact group, from a range of 3.5-7 km. They would be set lower on the ridge than the high point of Hadyard Hill and occupy a small proportion of the wider ridgeline. Without baseline visibility of Hadyard Hill Wind Farm, they would, however, introduce a new feature into views from the GDL, associated with the prominent ridgeline of the Foothills LCT.

Significance of Effect

5.7.144 During the operational stage, the effect of the proposed development on the character of Bargany Gardens would be not significant across the southern part and west central part of the GDL. This would be on account of the limited visibility of the turbines combined with the enclosure of the mature policies. In the east central part and northern part the effect would be significant owing to the fuller extents of visibility that come with the higher elevation and the more open character of the landscape.

Merrick Wild Land Area

Baseline

5.7.145 The assessment of effects on wild land follows a different methodology than that used for the other landscape and visual receptors, as presented in Technical Appendix 5.1. SNH’s Wild Land Area map (2014) defines the Wild Land Areas, and is used as the basis for the assessment.
5.7.146 The location of the proposed development at a minimum distance of 7.5 km from the Merrick WLA, means there would be no direct effects on the WLA, only indirect effects arising from the visibility of the proposed development from parts of the WLA.

5.7.147 The magnitude of effect that the addition of the proposed development would have on the WLA can be assessed against the physical attributes and perceptual responses which have formed the basis for its identification as wild land. Citations detailing the qualities of wildness found in each in WLA have not yet been produced and therefore the assessment is based on desk study and site work to determine to what extent the attributes and responses are evident across the WLA and how these would be altered, if at all, by the introduction of the proposed development.

**Methodology**

5.7.148 The relative wildness of the WLA has already been established through the process of its identification by SNH in the Map of Wild Land Areas. Figure 5.5 shows the extents of the Merrick Wild Land Area and also shows the Levels of Wildness, highlighting the limited extents of dark green which denotes a high level of wildness, and the more extensive lighter green and beige which denotes a medium level of wildness.

5.7.149 The following Table 5.6 from SNH guidance has been used to help assess the extent to which the physical attributes may be affected by the proposed development. The strength of these physical attributes and the condition of wildness is determined as high, medium, low or negligible according to various criteria, which are described in the SNH guidance as follows:

<table>
<thead>
<tr>
<th>Physical attribute</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>Negligible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived naturalness</td>
<td>Area perceived as generally natural.</td>
<td>Majority of area perceived as generally natural.</td>
<td>Some of area perceived as generally natural.</td>
<td>Area is not perceived as generally natural.</td>
</tr>
<tr>
<td>Lack of constructions or other artefacts</td>
<td>No or minimal perceptible evidence of artefacts.</td>
<td>Some artefacts visible but are not prominent.</td>
<td>Some artefacts visible and are prominent.</td>
<td>Several artefacts clearly visible and are prominent.</td>
</tr>
<tr>
<td>Little evidence of contemporary land uses</td>
<td>Contemporary land use not apparent.</td>
<td>Some contemporary land use apparent though not significantly detracting.</td>
<td>Some contemporary land use apparent and locally detracting.</td>
<td>Contemporary land use apparent and detracting.</td>
</tr>
<tr>
<td>Rugged or otherwise challenging terrain</td>
<td>Rough, tough terrain. Steep ground requiring an appreciable level of fitness to traverse and sturdy footwear. Navigation across this terrain requires</td>
<td>Appreciable skill in navigation required, requiring degree of accuracy. Rough terrain with some steep ground and requiring fitness</td>
<td>Some rough areas, but generally easy to cross. Slightly strenuous. Navigation reasonably straightforward landform/ tracks providing</td>
<td>Easily traversed terrain requiring no navigation skill.</td>
</tr>
</tbody>
</table>
Table 5.6 Physical Attributes

<table>
<thead>
<tr>
<th>Physical attribute</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>Negligible</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>high degree of skill.</td>
<td>and sturdy footwear.</td>
<td>relatively easier to cross terrain.</td>
<td></td>
</tr>
<tr>
<td>Remoteness and inaccessibility</td>
<td>No roads, tracks or paths. No key routes available for crossing area.</td>
<td>Some route availability through landform, but no roads, tracks or paths in area.</td>
<td>Few tracks or paths available to traverse area but wider area still relatively inaccessible.</td>
<td>Close to public roads, with easily accessed network of paths or tracks.</td>
</tr>
</tbody>
</table>

5.7.150 The magnitude of effect on the physical attributes is defined in levels, as described in the SNH guidance:

- **“High: total loss or alteration to attribute;**
- **Medium: partial loss or alteration to attribute;**
- **Low: minor loss or alteration to attribute resulting in a change to the baseline; and**
- **Negligible: very minor or no loss to the baseline attribute. The introduction of the development does not change the baseline assessment”.**

5.7.151 The level of change to perceptual criteria is not defined in the same way, but rather each of the perceptual criteria is assessed to be present or absent, taking into consideration the addition of the proposed development.

5.7.152 The significance of the effect on the physical attributes and perceptual criteria is then assessed. The guidance describes the significance of the effect as being “**determined by considering the ratings given to all attributes in each location. The overall judgement cannot be a formulaic one, but the basis of the judgements made should be clear and concise. As stated in SNH’s Wildness policy, if any one of the perceptual responses are no longer present then an area cannot be defined as wild and therefore the impacts must be significant. It is important that the physical attributes are assessed before the perceptual responses as along with a sound knowledge of the area this will assist in the more subjective judgements to be made”.**

5.7.153 The guidance goes on to say that “**The degree to which the categories of physical attributes may change along with any losses in perceptual attributes will require professional informed judgement in concluding if these impacts constitute a significant adverse effect on the extent and condition of the resource”.**

**Baseline**

5.7.154 The Merrick WLA centres on the Merrick Hill range at the core of the Galloway Hills. It extends from Glen Trool in the south to the Shalloch Hills in the north, following the ridge of hills from Benyellary (719 m AOD) through Merrick (843 m AOD), Kirriereeoch (786 m AOD), Tarfessock (697 m AOD) to Shalloch on Minnoch (768 m AOD). The hills are categorised as part of the **Rugged Granite Uplands** LCT and are characterised by steep and craggy hills.

5.7.155 In terms of the physical attributes and perceptual responses of the Merrick WLA, the Table 5.7, below, sets out the baseline assessment and sensitivity ratings.
### Table 5.7: Baseline Physical Attributes and Perceptual Responses

<table>
<thead>
<tr>
<th>Physical Attributes</th>
<th>Baseline Assessment and Sensitivity Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived naturalness</td>
<td>The perceived naturalness of this landscape is moderated by the influence of forestry and farming practices which have modified the landcover and introduced enclosure and access tracks. On the elevated hills, at the core of the WLA, a greater perception of naturalness occurs where there is separation from farming and forestry land uses.</td>
</tr>
<tr>
<td>Lack of constructions or other artefacts</td>
<td>There are few constructions or other artefacts in the WLA as there are no wind turbines or electricity transmission lines and very few properties. These features do however occur in the surrounding landscape with Mark Hill 12.5 km west of the nearest WLA boundary and Hadyard Hill 10 km north-west. The extent of visibility of both wind farms is limited mainly to the close range facing slopes and upper slopes and summits of the hills. These appear as relatively distant features associated with the peripheral landscapes, with a lesser influence occurring within the core of the WLA. Hill sheep farming extends across the moorland areas of the WLA and associated stone dykes appear as artefacts in this landscape.</td>
</tr>
<tr>
<td>Little evidence of contemporary land uses</td>
<td>Large scale forestry has a direct effect in parts of the WLA, with extensive areas covered through Glen Trool and north alongside the Buchan Burn. It also has indirect effects, being evident in the lower hills which surround the WLA.</td>
</tr>
<tr>
<td>Rugged or otherwise challenging terrain</td>
<td>A surfaced road provides access into Glen Trool, forest tracks extend into the surrounding forestry and a path leads up to the summit of the Merrick. While navigating through the WLA is straight-forward, away from the paths the land is often hummocky and water-logged and occasionally there are steep and craggy slopes.</td>
</tr>
<tr>
<td>Remoteness and inaccessibility</td>
<td>Once on the open hills above the forestry there is some sense of remoteness although the depth and height of the hills is insufficient to separate the core of the WLA from the influences of development in the surrounding landscapes. The WLA is largely accessible owing to the provision of tracks in the surrounding landscape and the predominant open moorland across the WLA.</td>
</tr>
<tr>
<td>Perceptual responses</td>
<td>Baseline Assessment and Sensitivity Ratings</td>
</tr>
<tr>
<td>A sense of sanctuary, solitude or refuge</td>
<td>The presence of modern land uses and artefacts through much of this WLA detracts from the sense of sanctuary / solitude / refuge, although this is evident to some degree along the upland ridge where there is separation from the surrounding modified landscapes and the views open up across the wider upland landscape.</td>
</tr>
<tr>
<td>Risk or anxiety - hazard</td>
<td>The perceptual response of risk or anxiety is present in the core of the WLA where the more elevated landform and associated exposed conditions lead to a sense of remoteness and isolation. Outwith the core, the lower elevation of the landform combined with the farming and forestry land uses reduces the sense of remoteness and isolation.</td>
</tr>
<tr>
<td>Arresting/inspiring</td>
<td>The WLA has some arresting / inspiring qualities relating to the openness of the hills and their combination with the intermittent lochs.</td>
</tr>
</tbody>
</table>
Apart from Merrick, the hills are not mountainous and therefore lack the scale and ruggedness of WLAs elsewhere.

The core of the WLA is physically challenging especially across the steeper and more rugged slopes of the higher hills. Towards the edges of the WLA it is generally gently sloping without any extreme slopes and only occasional outcrops. The landcover generally comprises low moorland grasses.

**Extent of Visibility**

5.7.156 The ZTV on Figure 5.11 shows that areas with visibility occur as patches which become increasingly smaller with distance from the proposed development. On the northern boundary of the WLA there is a patch of visibility which covers the northern slopes of the Shalloch Hills and a patch across the summit of Shalloch on Minnoch (768 m AOD). Beyond this, visibility becomes limited to smaller areas on the higher north facing slopes and summits.

### Table 5.8: Magnitude of Effect on Merrick Wild Land Area

<table>
<thead>
<tr>
<th>Physical Attribute</th>
<th>Magnitude of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived naturalness</td>
<td>As this physical attribute relates to the ‘perceived naturalness’ of the WLA, the location of the proposed development outwith the WLA means that it would have no effect.</td>
</tr>
<tr>
<td>Lack of constructions or other artefacts</td>
<td>The proposed development would have no direct effect on the ‘lack of construction or other artefacts’ experienced within the WLA. Its location 7.5 km from the nearest boundary means that there is the potential for an indirect effect to occur as visibility may alter the perception of this physical attribute. The magnitude of effect would be limited by the presence of the existing Hadyard Hill Wind Farm and other wind farm developments which already present evidence of contemporary land uses at similar ranges. Furthermore, the proposed development occurs an extension to Hadyard Hill Wind Farm, thus adding to the extents of an existing development and appearing well integrated. The extents of areas of visibility across the WLA are patchy, being seen only from higher north facing slopes and summits. Where visibility does occur the proposed development would be seen at a minimum distance of 7.5 km although from the core of the Merrick where Levels of Wildness are high, this would be 10 km.</td>
</tr>
<tr>
<td>Little evidence of contemporary land uses</td>
<td>The proposed development would have no direct effect on the ‘little evidence of contemporary land uses’ experienced within the WLA. Its location 7.5 km from the nearest boundary means that there is the potential for an indirect effect to occur as visibility may alter the perception of this physical attribute. The magnitude of effect would be limited by the presence of the extensive forestry operations which already present evidence of contemporary land uses in and adjacent to the WLA. Furthermore, the proposed development would be seen integrated with the existing Hadyard Hill Wind Farm and the extents of visibility across the WLA are patchy, being seen only from higher north facing slopes and summits. Where visibility does occur the proposed development would be seen at a minimum distance of 7.5 km although from the core of the Merrick where Levels of Wildness are high, this would be 10 km.</td>
</tr>
<tr>
<td>Physical Attribute</td>
<td>Magnitude of Effect</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Rugged or otherwise challenging terrain</td>
<td>As this physical attribute relates to the rugged or otherwise challenging terrain of the WLA, the location of the proposed development at a distance of 7.5km outwith the WLA means that it would have no effect.</td>
</tr>
<tr>
<td>Remoteness and inaccessibility</td>
<td>As this physical attribute relates to the remoteness and inaccessibility of the WLA, the location of the proposed development outwith the WLA at a distance of 7.5 km means that it would have no effect.</td>
</tr>
<tr>
<td>A sense of sanctuary, solitude or refuge</td>
<td>The proposed development would have no direct effects on the ‘sense of sanctuary, solitude or refuge’ experienced within the WLA. Its location 7.5 km from the nearest boundary does mean there would be potential for indirect effects owing to its visibility, although the areas where this occurs are patchy in extents. It would be seen in the context of existing wind farms at similar ranges, most notably Hadyard Hill to which it would appear as an extension. Although it would not appear as a new feature, it would be seen to increase the visible extents of wind farm development in this sector which may to some extent, detract further from the sense of sanctuary, solitude or refuge.</td>
</tr>
<tr>
<td>Risk or anxiety - hazard</td>
<td>As this perceptual response relates to the sense of risk or anxiety experienced within the WLA, the location of the proposed development at a distance beyond 7.5 km outwith the WLA means that it would have no effect.</td>
</tr>
<tr>
<td>Arresting/inspiring qualities, sense of awe – prospect</td>
<td>The proposed development would have no direct effects on the ‘arresting / inspiring qualities, sense of awe – prospect’ experienced within the WLA. Its location 7.5 km, from the nearest boundary and the patchy extents of the areas from where it would be visible, means that any indirect effects would be limited. It would be seen in the context of existing wind farms at similar ranges, most notably Hadyard Hill to which it would appear as an extension.</td>
</tr>
<tr>
<td>Physically challenging</td>
<td>As this perceptual response relates to the perception of the WLA being physically challenging, the location of the proposed development at a distance beyond 7.5 km outwith the WLA means that it would have no effect.</td>
</tr>
</tbody>
</table>

**Significance of Effect**

5.7.157 The assessment of the extent to which the proposed development would alter the baseline physical attributes and perceptual responses contained in Table 5.8 above, highlights the limited effect that the proposed development would have on the Merrick Wild Land Area. This finding relates to the location of the proposed development outwith the WLA, at a minimum distance of 7.5 km from the nearest boundary and with patchy extents of visibility occurring typically at longer ranges. Furthermore, the proposed development would be seen integrated with an existing wind farm, and although increasing the extents of wind farm development visible in this sector, would not be adding a separate development in a new sector. The effect of the proposed development on the Merrick Wild Land Area would be not significant.
Summary of Landscape Effects

5.7.158 The assessment of effects on landscape elements, landscape character types, landscape designations and the Merrick Wild Land Area, is summarised in Table 5.9 below.

<table>
<thead>
<tr>
<th>Landscape Receptor</th>
<th>Sensitivity</th>
<th>Magnitude of Effect</th>
<th>Significance of the Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rough Grassland</td>
<td>medium to low</td>
<td>medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>Coniferous Forestry</td>
<td>medium to low</td>
<td>medium to high</td>
<td>Significant during construction. Not significant during operation / decommissioning</td>
</tr>
<tr>
<td>Foothills with Forest and Wind Farms</td>
<td>medium</td>
<td>medium</td>
<td>Significant during construction / operation / decommissioning</td>
</tr>
<tr>
<td>Middle Dale</td>
<td>medium high</td>
<td>medium</td>
<td>Significant during construction / operation / decommissioning</td>
</tr>
<tr>
<td>Intimate Pastoral Valley</td>
<td>medium high</td>
<td>medium / medium</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>medium to low / low / no effect</td>
<td>Not significant</td>
</tr>
<tr>
<td>Coastal Foothills</td>
<td>medium</td>
<td>medium to low / low</td>
<td>Not significant</td>
</tr>
<tr>
<td>Maybole Foothills</td>
<td>medium</td>
<td>medium / medium / low / no effect</td>
<td>Significant in remaining parts</td>
</tr>
<tr>
<td>Rugged Uplands</td>
<td>medium</td>
<td>medium</td>
<td>Significant in remaining parts</td>
</tr>
<tr>
<td>South Carrick Scenic Area</td>
<td>medium to high / medium</td>
<td>Variable across SA</td>
<td>Significant in parts of Foothills with Forest and Wind Farm / Middle Dale / Intimate Pastoral Valley / Maybole Foothills / Rugged Uplands</td>
</tr>
<tr>
<td>Bargany Gardens</td>
<td>medium high</td>
<td>variable</td>
<td>Significant in north-east part Not significant in remaining part</td>
</tr>
<tr>
<td>Merrick Wild Land Area</td>
<td>medium high</td>
<td>medium to low</td>
<td>Not significant</td>
</tr>
</tbody>
</table>
5.7.159 The findings show that significant effects would occur in parts of the Foothills with Forest and Wind Farm LCT, the Middle Dale LCT, the Intimate Pastoral Valley LCT, the Maybole Foothills LCT and the Rugged Uplands LCT, while the effect on the remaining parts of these LCTs and all other LCTs would be not significant.

5.8 Assessment of Visual Effects

Introduction

5.8.1 Effects on views are the changes to views that result from the introduction of the proposed development. The assessment of effects on views is carried out in two parts:

- The assessment of effects on the assessment viewpoints, which represent visibility of the proposed development from around the study area; and

- The assessment of effects on principal visual receptors such as settlements, roads and other routes, hilltops and visitor features.

5.8.2 The assessment of effects on views has been carried out through comprehensive site surveys along with the use of wirelines, photomontages and the ZTV, following the full methodology described in Technical Appendix 5.1.

Assessment of Effects on Viewpoints

5.8.3 The first part of the assessment of effects on views is undertaken with reference to the representative viewpoints.

5.8.4 The viewpoint locations are shown in conjunction with the blade tip ZTV on Figures 5.7a and b, and the hub height ZTV on Figures 5.8a and b. The viewpoints are illustrated in Figures 5.33-5.54, where a photograph of each view is accompanied by a computer-generated wireline of the proposed development and cumulative developments, and, for a number of the views, a photomontage. In the wirelines, the proposed development turbines are shown in red, operational wind farms are shown in black, under construction wind farms in purple, consented wind farms in green and application wind farms in blue.

5.8.5 The first step in the assessment of effects on the representative viewpoints is an initial assessment to ascertain which of the representative viewpoints have potential to be significantly affected by visibility of the proposed development. This process is presented in Technical Appendix 5.1 and indicates that all of the 22 assessment viewpoints have potential to undergo significant visual effects as a result of the proposed development. The potential effect on each of these viewpoints is assessed in full below.

Representative Viewpoints

Viewpoint 1: A77 North of Girvan

Baseline

5.8.6 This viewpoint is located on the A77 to the north of Girvan and adjacent to Girvan Mains. It is representative of the views of road-users on the A77 and residents at Girvan Mains. The direction of the view is east; perpendicular to the north-bound and south-bound movement of the traffic, with the closest proposed turbine seen at a range of 7.89 km.
5.8.7 The A77 (M77) is the main west coast road between Glasgow and Stranraer. The section between Turnberry and Ballantrae sits close to the coast and views are typically drawn westwards towards the Irish Sea. Around the viewpoint, the road sits inland such that the coast is not visible, and instead the view extends across the Lower Dale LCT of the Water of Girvan towards the ridge of the Foothills with Forest and Wind Farms LCT where the proposed development would be located.

5.8.8 The fore to middle-ground of the view is characterised by enclosed arable fields and strips of riparian woodland; evidence of the modification of this landscape for agricultural use. The foothills rise above the river valley, with Saugh Hill (293 m AOD) visible on the right and Maxwellston (314 m AOD) and Hadyard Hill (324 m AOD) clearly seen at the centre of the enclosing ridgeline. The hill slopes are largely open and present a contrast with the pattern of enclosure found in the valley. Although the hills are relatively low, they form a distinct and characterising feature in the view.

5.8.9 Operational Hadyard Hill Wind Farm is visible in the form of 12 turbines seen at a minimum distance of 5.21 km, mostly concentrated in the troughs between Saugh Hill, Maxwellston Hill and Hadyard Hill, with visible extents partially concealed by the ridgeline. No other operational wind farms are visible from this viewpoint, although consented Tralorg and Assel Valley Wind Farms would be seen associated with Saugh Hill at closer range to the viewpoint. A distillery is visible to the left of the view and this combined with the cluster of properties at Girvan Mains and the flow of traffic on the A77, increases the extent of human influence evident in this view.

Sensitivity

5.8.10 The value of the view is medium to low. The viewpoint is not representative of a formal viewpoint that people would visit with the purpose of enjoying scenic views. It is an incidental view that would be experienced at an oblique angle by road-users on the A77, selected because it gives fairly clear views from the road towards the proposed development.

5.8.11 The susceptibility of the road-users to the proposed development is medium to low. Visibility occurs from only a short section of the A77 and lies at a perpendicular angle to the direction of travel, such that the proposed development would not be as readily visible as if it were located in direct alignment. The proposed development would also be seen as an extension to operational Hadyard Hill, which is already visible to road-users and would therefore not be introducing a new type of development into this view.

5.8.12 The susceptibility of residents to the proposed development is medium. The availability of views from nearby properties is variable depending on their orientation and the screening effect of mature tree cover. Visibility towards the proposed development would be visible from some of the properties and some garden grounds, although the susceptibility of residents would be reduced by the existing influence of the Hadyard Hill Wind Farm.

5.8.13 The combination of the value of the view and the susceptibility for road-users leads to a medium to low sensitivity, while the combination for residents leads to a medium sensitivity.

Magnitude of Effect

5.8.14 The magnitude of effect as a result of the operation of the proposed development would be low. Parts of four of the 31 proposed turbines would be visible from this viewpoint, all seen in sufficiently close proximity to appear as an extension to the operational turbines and seen at a range of 7.89 km, such that the turbines would
appear as medium scale elements in the context of the wider view. The proposed turbine on the left is seen as a tip, integrated with the operational turbines, while the remaining three turbines are seen as part of the group of on the right, and although seen at almost full extents they appear compatible in terms of scale and height with the operational turbines. While the two turbines furthest right increase the extents of development, this increase is small and the turbines still remain well contained in the trough of the ridgeline. Site infrastructure would not be visible from this viewpoint.

5.8.15 As much of the site is concealed by the intervening ridgeline, the only additional effect that would arise during construction and decommissioning stages would be in relation to the visibility of cranes during the erection and dismantling of the turbines. The magnitude of this effect would be medium to low.

Significance of the Effect

5.8.16 The effect of operational stage of the proposed development on the views of road-users and residents would be not significant. This relates chiefly to the small number of turbines visible from this viewpoint, their proportional scale in relation to the scale of the hills, their location behind the ridgeline and their integration with the existing turbines. These factors ensure that the proposed development would not redefine the baseline character of the view.

5.8.17 The effect of the construction and decommissioning stages of the proposed development would also be not significant.

Viewpoint 2: Grey Hill

Baseline

5.8.18 The viewpoint is located at the summit of Grey Hill to the south-west of the proposed development. It is representative of the views of hill walkers. The direction of the view is north-east and the closest proposed turbine would be seen at a range of 10.84 km.

5.8.19 Grey Hill forms part of the Coastal Foothills LCT and although only 297 m AOD in height, affords panoramic views across both land and sea. The main attraction of the view is across the Irish Sea to Ailsa Craig and the Isle of Arran and then also along the west coast of the mainland. The views inland are comparatively unremarkable featuring mostly Foothills LCTs and Plateau Moorland LCTs.

5.8.20 With the content of the view mainly comprising either hills or sea, the character of the wider view is predominantly rural and undeveloped. Many of the roads and settlements are tucked into the valleys which are not readily visible from this elevated perspective, with the exception of Girvan, which can be seen as a small town set on the coast to the north.

5.8.21 Wind farm developments are readily evident in the upland landscape, with Hadyard Hill visible to the north-east at a range of 7.35 km, Mark Hill visible to the south-east at a range of 10.45 km and Arecleoch visible to the south at a range of 11.27 km. The wind farms are of similar size and scale and are all located in the upland landscapes, although with the first two back-clothed by distant landform, while Arecleoch is seen set against the open skyline.

5.8.22 Towards the proposed site, the Coastal Foothills LCT merges with the Foothills with Forest and Wind Farms LCT such that the Intimate Pastoral Valley LCT between is largely screened from view and collectively the hills form a wider upland mass. The
hills are characterised by their relatively low and well-rounded summits which are mostly covered in rough or semi-improved grasses. Blocks of coniferous forestry encroach up the hill sides towards some of the summits adding a dark and textured land cover and denoting the extent of human modification in this landscape. More distant hills are visible, with the Southern Uplands to the east and the Merrick range to the south-east.

**Sensitivity**

5.8.23 The value of the view is medium. While typically summits offer natural viewpoints for hill walkers, this summit does not appear to be well visited. There are no formal or informal routes to the summit, sign posts for walkers or parking provision. OS mapping shows a lower level route connecting the minor road at Knocklaugh with Byne Hill, but no routes to the summit of Grey Hill.

5.8.24 The susceptibility of hill walkers to the proposed development is medium. Views for walkers are exposed in all directions. The susceptibility is reduced by the fact that the main attraction for walkers is the views seawards in the opposite direction to the site. Furthermore, the existing presence of wind farm developments in the landward views ensures that the proposed development would not be seen as a new feature in the view.

5.8.25 The combination of the value of the view and the susceptibility of hill walkers leads to an overall sensitivity of **medium**.

**Magnitude of Effect**

5.8.26 The existing Hadyard Hill Wind Farm is visible as 47 turbines seen set across the **Foothills with Forest and Wind Farms** LCT and largely back-clothed by the distant hills. The proposed development would add a further 31 turbines to this view. They would be seen set behind the existing turbines on the same group of **Foothills** with the closest turbine at a range of 10.84 km.

5.8.27 The proposed development remains within the horizontal extents of the existing development and the close proximity of the developments ensures the proposed development would appear as an extension. The similar scale and proportioning of the turbines adds further to the integration of the two developments and from this viewpoint, both would be seen clearly associated with the internal plateau of the **Foothills with Forest and Wind Farms** LCT.

5.8.28 The proposed development would add to the density and depth of the overall wind farm development. With an increase of 31 turbines some overlap and stacking would occur and with an apparent increase in the extents of turbines on the hills behind, many of which would be seen against the open skyline, the addition of the proposed development would be apparent and there would be a magnitude of effect.

5.8.29 Overall, the magnitude of effect as a result of the operation of the proposed development would be **medium to low**. This takes into account the minimum distance of 10.84 km to the nearest proposed turbine and the location of the proposed development seen within a limited proportion of a much wider view, and to the rear of an existing development. While some of the tracks may be visible from this viewpoint, the distance, combined with the extent of development to the fore, means that they would not be a readily apparent feature and would not add notably to the magnitude of effect.
5.8.30 The erection and dismantling of the turbines using tall cranes would be the most evident part of the construction and decommissioning work, along with the removal of forest blocks during from the site during the construction phase. Although visible from this viewpoint, at the minimum distance of 10.84 km and with operational Hadyard hill in the foreground, the magnitude of these effects would be **medium to low**.

**Significance of the Effect**

5.8.31 The effect of the operational stage of the proposed development on the view from Grey Hill is **not significant**. This finding relates chiefly to the medium to low magnitude of effect arising as a result of the proposed development being located behind the existing and closer range Hadyard Hill Wind Farm.

5.8.32 The effect of the construction and decommissioning stages of the proposed development would also be **not significant**.

**Viewpoint 3: A714, Laigh Letterpin**

**Baseline**

5.8.33 The viewpoint is located on the A714, approximately 5 km south of Girvan, at a bend in the road where access into Laigh Letterpin occurs. It is representative of views of road-users on the A714 and residents in nearby properties. The direction of the view is east; perpendicular to the north-bound and south-bound movement of the road-users. The closest proposed turbine would be seen at a range of 7.47 km.

5.8.34 The view to the west is enclosed by the combination of the rising landform, mature tree cover and built form. To the east, where there is little tree cover and the landform falls away from the *Coastal Foothills* LCT into the *Intimate Pastoral Valley* LCT, the view opens up, extending through the valley of the Water of Assel towards the *Foothills with Forest and Wind Farms* LCT where the proposed development would be located.

5.8.35 The fore to middle-ground of the view is characterised by the gently undulating valley landscape and the close cover of the improved pasture. The presence of the A714, the Glasgow to Stranraer railway line, the farm buildings and residential properties all denote the settled nature of the valley landscape. The contrast with the *Foothills* landscape is made evident by the more elevated and hummocky landform and the more muted tones of the semi-improved and unimproved grasslands.

5.8.36 Development is evident in the upland landscape in the form of Hadyard Hill Wind Farm and Tormitchell Quarry. Both sit in the trough made by the closer range hills, and to which, the valley draws the viewer’s attention. While the wireline shows that 29 turbines are theoretically visible, the photograph shows that only 17 are readily apparent, with the remaining blades or tips barely discernible. The turbines are seen at a minimum distance of 4.05 km and as such form a readily apparent feature, with turbines dispersed across the hills, where blocks of forestry and grass form an underlying patchwork mosaic.

**Sensitivity**

5.8.37 The value of the view is medium. It is not a formal viewpoint people would visit with the purpose of enjoying the view. The viewpoint is representative of incidental and transitory views experienced along this section of the A714, and static and more focused views potentially experienced from the adjacent residential properties.
5.8.38 The susceptibility of road-users to the proposed development is medium to low. Visibility occurs from only a short section of the A714 and as the proposed development would lie at a perpendicular angle to the direction of travel, it would not be as readily visible as if it were located in direct alignment. The proposed development would also be seen integrated with operational Hadyard Hill, which is already visible and it would therefore not be introducing a new type of development to this view.

5.8.39 The susceptibility of residents to the proposed development is medium to high. In the small cluster of properties the principal orientation varies with one property facing north-east towards the proposed development, while the other facing north and screened to the east by tree cover.

5.8.40 The combination of the value of the view and the susceptibility for road-users gives an overall medium sensitivity, while for residents the overall sensitivity is medium to high.

Magnitude of Effect

5.8.41 While the wireline shows that the proposed development would add a further 17 turbines to the view, the photomontage shows that only five would be seen as full turbines with the remainder seen as blades or as tips. The horizontal extents of the proposed development would sit within the extents of the existing turbines such that it would not lead to a horizontal increase on either side.

5.8.42 The proposed development would appear well integrated with the existing development owing to the close proximity of the turbines, such that it would be apparent that they formed an extension. Their similar scale, proportioning and height in the landscape would add further to the level of integration.

5.8.43 The proposed development would appear contained within the trough in the ridgeline, and while this makes it less prominent than if it were set along the ridgeline, it adds to the prominence of the proposed development as it features in the focal point of the view. The proposed development would also add to the density of turbines within this part of the view and although contained within the existing extents, would be seen to add turbines behind the existing turbines, causing some overlap.

5.8.44 Taking these factors into account, the magnitude of effect as a result of the proposed development would be low. While some site tracks may be evident from this viewpoint, at a range beyond 7.47 km they would not form a prominent feature and would therefore not add to the magnitude of effect.

5.8.45 The erection and dismantling of the turbines using tall cranes would be the most evident part of the construction and decommissioning work, along with the removal of forest blocks during from the site during the construction phase. Although visible from this viewpoint, at the minimum distance of 7.47 km and with operational Hadyard Hill in the foreground the magnitude of effect would be medium to low.

Significance of the Effect

5.8.46 The effect of the operation of the proposed development on views from road-users on the A714 and residents at Laigh Letterpin would be not significant. This takes into account the existing presence of operational Hadyard Hill and the relatively small scale increase that the proposed development would make within the existing extents of development.
5.8.47 The effect of the construction and decommissioning stages of the proposed development would also be **not significant**.

**Viewpoint 4: B734, Merkland**

*Baseline*

5.8.48 This viewpoint is located on the B734 between the A714 and Barr. The view looks north-east towards the proposed development and is representative of the views of east-bound road-users, as well as the residents in the intermittent farmsteads and residential properties along the B734. The closest proposed turbine would be seen at a range of 5.71 km.

5.8.49 The section of the B734 between Pinwherry and Barr follows the course of the River Stinchar, being situated along the lower valley slopes on the southern side. The road is gently undulating and the variation in elevation, combined with the extent of tree cover, results in views alternately becoming open and enclosed. There are a number of short elevated sections where open views across the *Intimate Pastoral Valley LCT* to the adjacent *Foothills with Forest and Wind Farms LCT* occur.

5.8.50 The viewpoint from Merkland is representative of these open views. With the rising landform containing views to the south, the open aspect to the north becomes the natural draw for the viewer’s attention, with the landform of the valley channelling the focus along the ridgeline towards the foothills at the eastern end. The valley, itself, is organised into small fields of improved pasture enclosed by hedgerows and trees, with denser riparian woodland marking the course of the Stinchar through the narrow floor of the valley. The field pattern encroaches onto the middle slopes of the foothills on the opposite side of the valley, while the upper slopes remain characterised by an open landscape comprising rougher grasses with patches of scrub and woodland.

5.8.51 There is no visibility of operational Hadyard Hill Wind Farm or any other operational wind farms from this viewpoint, although visibility does occur, especially from sections of the B734 on the approach into Barr, from where a small number of tips or blades are visible behind the ridgeline. Otherwise, development is small in scale and rural in character with farmsteads and residential properties dispersed across the valley. It is also a landscape that has been modified by agricultural practices, although the upper parts of the adjacent foothills remain free from farm cultivation.

*Sensitivity*

5.8.52 The value of the view is medium. It is not a formal viewpoint people would visit with the purpose of enjoying the view. The viewpoint is representative of incidental and transitory views experienced along this section of the B734, and static and more focused views potentially experienced from the adjacent residential properties. While the view is unremarkable in scenic terms, it does present an attractive rural landscape of valley and uplands, which appear in good condition.

5.8.53 The susceptibility of road-users to the proposed development is medium. Visibility occurs intermittently along the B734 and as the proposed development would lie at an oblique angle to the north-east, it would only be readily visible to east-bound, and not west-bound road-users. There is currently no visibility of other wind farm developments from this section of the B734 and this increases the susceptibility of road-users to the proposed development.

5.8.54 Residential properties represented by this viewpoint typically front onto the B734 such that their orientation is mostly north-west or south-east. This would mean that
principal views would not be orientated towards the north-east where the proposed development would be located. Furthermore, tree cover would potentially screen views. Views may however occur from some properties and garden grounds and because wind farm development is not currently visible from this area, this also increases the susceptibility of residents to medium to high.

5.8.55 The combination of the value of the view and the susceptibility of road-users to the proposed development leads to an overall medium sensitivity and an overall medium to high sensitivity for residents.

Magnitude of Effect

5.8.56 While the wirelines show that the proposed development would be visible theoretically as 19 turbines, the photomontage shows that four tips would possibly be indiscernible and then the remaining turbines would be seen as three tips, two blades and nine turbines seen to below the nacelle. At a minimum distance of 5.71 km, the turbines would be seen as a relatively small and well contained group associated with the hills at the end of the valley. This is with the exception of a blade which would sit between Kirkland Hill (297 m AOD) and Auchensoul Hill (314 m AOD) which would present a fragmented appearance to the proposed development. The proposed development would introduce wind farm development into views where previously it was not a feature and in so doing alter the character of this rural view.

5.8.57 Although the location of the proposed development is at the point where views channelled along the valley are drawn to, from the B734 or residential properties this point is often obscured by intervening landform or tree cover such that the view would be very intermittent and often only partially visible. The proposed development would occupy only a small proportion of the wider view and would be seen in the context of a modified, rather than natural landscape, where settlement, farming and forestry are readily evident.

5.8.58 Taking all these factors into account, the magnitude of effect as a result of the proposed development would be medium. Site infrastructure would not be visible from this viewpoint.

5.8.59 The erection and dismantling of the turbines using tall cranes would be the most evident part of the construction and decommissioning work, and although visible from this viewpoint, the extent to which these operations would be concealed by the intervening landform would mean the magnitude of effect would be low.

Significance of the Effect

5.8.60 The effect of the operation of the proposed development on the views from the B734 and surrounding residential properties would be significant. This relates principally to the susceptibility of road-users and residents in a context where currently there is no wind farm development visible, despite the limited geographical extents of the visual influence.

5.8.61 The effect of the construction and decommissioning stages of the proposed development would be not significant.
Viewpoint 5: Girvan to Barr Hill Path

Baseline

5.8.62 This viewpoint is located close to Laggan Hill (269 m AOD) on the path between Girvan and Barr. It is representative of the views of hill walkers. The direction of the view is east towards the proposed development, which would be located a minimum distance of 6.70 km from the viewpoint.

5.8.63 The viewpoint is located in the northern part of the Coastal Foothills LCT where it abuts the Foothills with Forest and Wind Farms LCT and as a result is characterised by these upland landscapes. The view to the south extends to the Plateau Moorland and Plateau Moorland with Forest LCTs where wind farm development is evident, while the main attraction lies to the west where the views extend along the Ayrshire coast and out to the distinctive form of Ailsa Craig. To the north, the view extends across the valley to the high point of Saugh Hill (296 m AOD) marked by masts.

5.8.64 In the view towards the site, the foreground comprises gently undulating land covered with semi-improved grasses and enclosed by stone dykes. The land then falls away into the valley and the hills on the opposite side are generally low and rounded with improved grasses extending onto the ridgelines and blanket forestry covering more distant hill slopes. The height of the hills increases towards the east, revealing the context that the wider upland landscape makes to the middle-ground foothills.

5.8.65 There is evidence of this landscape being used for hill sheep farming, with stone dykes, fences and timber enclosures visible from this viewpoint, but no farmsteads and farm buildings, which typify the valley landscapes and, which in contrast, give a more settled appearance. Wind farms are the predominant type of development, seen in the eastern sector of the view where Hadyard Hill Wind Farm is seen at a range of 3.21 km, and in the southern sector where Mark Hill Wind Farm and is seen at a range of 9.95 km. The closer range met masts associated with the consented Assel Valley and Tralorg Wind Farms are visible in the central foreground and to the left in the middle-ground.

Sensitivity

5.8.66 The value of the view is medium. While typically summits offer natural viewpoints for hill walkers, this summit does not appear to be frequently visited. The Girvan-Barr hill path passes by in close proximity to the viewpoint and although signed and on a clear track at the start, it becomes very muddy and difficult to navigate. It is a walk with limited scenic value, which is likely to attract mostly local walkers.

5.8.67 The susceptibility of hill walkers to the proposed development is medium. While the expectation may be to experience a largely undeveloped upland landscape, walkers would be aware of the existing presence of wind farms owing to visibility of operational developments. As the proposed development would form an extension to one of the existing developments, walkers would not be as susceptible to its presence as if it were being introduced into a previously undeveloped view.

5.8.68 The combination of the value of the view and the susceptibility of hill walkers leads to an overall medium sensitivity.

Magnitude of Effect

5.8.69 Hadyard Hill Wind Farm forms a feature in the centre of the view at a minimum distance of 3.21 km. Although the wireline shows that theoretically 31 turbines are
visible, eight occur as tips such that only 23 are readily apparent, those on the right seen mostly to their full height, while those on the left, partially concealed by the intervening ridge. The wireline and photomontage show how the proposed development would sit behind the left side of the existing development and largely contained within its horizontal and vertical extents, with a small horizontal increase on the left and vertical increase to the overall height.

5.8.70 The magnitude of effect as a result of the proposed development would be medium to low. This is due chiefly to the integration of the proposed development with the existing development, whereby their close proximity ensures that the proposed development is apparent as an extension. Furthermore, the location of the proposed development behind the existing development and partly concealed by the intervening ridge reduces its prominence in the view. The turbines also appear comparable in scale and proportioning and this adds to a good level of integration.

5.8.71 Those factors which contribute to the medium part of the rating include the increased density to the layout on the left and the incidents of overlap and stacking which arise as a result. Furthermore, the increase in elevation of the turbines, whereby they sit higher on the hill, means they form a more prominent feature than they would if they maintained the lower elevation of the operational turbines. While some site tracks may be evident from this viewpoint, at a range beyond 6.70 km and set behind the operational development, they would not form a prominent feature and would therefore not add to the magnitude of effect.

5.8.72 The erection and dismantling of the turbines using tall cranes would be the most evident part of the construction and decommissioning work, and although visible from this viewpoint, at the minimum distance of 10.84 km and with operational Hadyard Hill in the foreground the magnitude of effect would be medium to low.

Significance of the Effect

5.8.73 The effect of the operational stage of the proposed development on this representative viewpoint would be not significant. Despite the additional height and density that the proposed development would add to wind farm development in the view, the largely contained extents in relation to the existing development ensures that it would not redefine the character of the view.

5.8.74 The effect of the construction and decommissioning stages of the proposed development would also be not significant.

Viewpoint 6: Barr

Baseline

5.8.75 This viewpoint is located on Glenginnet Road on the northern boundary of the village of Barr in the Stinchar Valley. The view is representative of the views of road-users travelling eastbound on the Glenginnet Road, as well as residents of the properties along this road. The view looks north-east towards the proposed development which would be located at a minimum distance of 2.16 km from the viewpoint.

5.8.76 The view comprises a foreground characterised by the edge of the village, where the properties face out across an open field which falls away to where it meets the riparian woodland of the Stinchar Valley. Although deciduous, the trees are mature and sufficiently dense to screen all but the upper slopes and summit of Mull of Miljoan (356 m AOD) which is located to the north. While roadside tree cover also screens views aligned with Glengennit Road, there is a gap in the cover and this allows the view to
extend along the valley to Delamford Hill (284 m AOD) where five of the operational Hadyard Hill turbines are visible, albeit with one seen fully and the remaining four seen as blades behind the hill slope at a minimum distance of 2.01 km.

5.8.77 The mature trees form a key feature of the view, presenting an attractive outlook for the local residents. The contrastingly open character of the foothills adds to the scenic interest of the view and forms a sense of enclosure to the valley. Despite this contrast, both landscapes appear modified, the valley landscape by the presence of the village and road as well as the agricultural land uses, and the foothills landscape by the forestry land uses, evident along the ridge of Mull of Miljoan and on the upper slopes where clear felling has occurred.

**Sensitivity**

5.8.78 The value of the view is medium to high. Although it is not taken from a formal viewpoint, it is representative of views from this open northerly aspect of the village. The street has been designed to relate the properties, private spaces and public spaces to the views of the adjacent rural landscape.

5.8.79 The susceptibility of residents to the proposed development would be medium to high. Although there is already some visibility of the Hadyard Hill Wind Farm, which ensures that the proposed development would not appear as a completely new feature in the view, this occurs to the north-east and therefore would not be readily apparent from the properties. The proposed development would occur to the north, as well as north-east and east, giving rise to the possibility that turbines would be visible from the properties, as well as private grounds and street.

5.8.80 The susceptibility of road-users to the proposed development would be medium to high. Road-users would already be aware of Hadyard Hill Wind Farm and therefore the proposed development would not be introducing a new feature to the view. The closer proximity and wider extents to which the proposed development would be visible would, however, make it a more apparent feature to road-users.

5.8.81 The combination of the value of the view and the susceptibility of residents and road-users leads to an overall medium to high sensitivity.

**Magnitude of Effect**

5.8.82 The wireline shows that the additional extent of theoretical visibility introduced by the proposed development would add a further 31 turbines to the already five existing turbines visible. The photomontage shows that not all these turbines would be easily seen, although the main group of five existing turbines can be seen and a further 24 of the proposed turbines would be readily apparent.

5.8.83 The turbines that would have the most notable effect are those located to the north and seen just behind the left side ridge of the Mull of Miljoan. This is because they are closest in range and occur close to the more elevated and prominent part of the skyline ridge. The three turbines which are already partially concealed by the ridge would be further screened by the mature tree cover, albeit more so in the summer than the winter months, and with blades potentially visible above the tree tops. T25 would, however be seen at almost its full height, appearing as a large scale and prominent feature. T24 and T29 would also be visible in association with the hill top, albeit seen only as blades.

5.8.84 The remaining turbines would be seen to the right of the existing Hadyard Hill turbines, their more distant location combined with their association with a less prominent
section of the ridge would make them less of a feature in the view compared to the
proposed turbines on Mull of Miljoan. They would, nonetheless, be seen as large
scale elements that increase the extents of wind farm development such that it would
be seen to wrap around much of the 180 degrees of the view.

5.8.85 In terms of site infrastructure, some site tracks may be evident from this viewpoint, in
the view towards the east, where the turbines are seen set along Milton Hill and
Daljedburgh Hill at a range beyond 3.50 km. These would add to the magnitude of
effect by adding a further modification to the otherwise homogenous ground cover.
The narrow band of forestry around the rim of these hills would also be removed,
although this change would not detract so noticeably from the character of the view.
Taking all these factors into account the magnitude of effect as a result of the
proposed development would be high.

5.8.86 While much of the construction and decommissioning operations would take place
behind the ridgeline, operations would be evident in the view to the east where a
number of the proposed turbines are seen to their bases. Although the clear felling of
forestry would occur in this direction, its minimal visibility on the edge of the rim means
that it would not be highly visible. The erection and dismantling of the turbines using
tall cranes would be the most evident part of construction and decommissioning, and
these operations would also be partly visible in association with the turbines behind
the ridgeline. The magnitude of effect during these stages would be medium to high.

Significance of the Effect

5.8.87 The effect of the operational stage of the proposed development on this view would
be significant. Although wind farm development is already visible from this viewpoint,
the prominence of the turbines on Mull of Miljoan would redefine the character of the
view by making wind farm development the defining feature. This finding also reflects
the sensitivity of the residents and road-users to the effects of the proposed
development.

5.8.88 The effect of the construction and decommissioning stages of the proposed
development would also be significant.

Viewpoint 7: Merrick

Baseline

5.8.89 The viewpoint is located on the summit of Merrick (843 m AOD). It is representative
of the views of hill walkers. The view looks north towards the proposed development,
which would be located at a minimum distance of 15.74 km from the viewpoint.
Merrick is the highest summit in the south of Scotland and affords panoramic views in
all directions. It lies at the heart of the Galloway Hills RSA and Merrick WLA.

5.8.90 The most popular route starts in Glen Trool to the south, from where a formal path
follows the course of the Buchan Burn, before passing through commercial forestry
and out onto the open slopes of Benyellary (719m AOD). Once past this summit, the
Neive of the Spit leads round the ridge and onto the summit of Merrick. With the
exception of the summits, upper ridge and north-facing slopes, the site is not visible
from the majority of this route.

5.8.91 Towards the site, a variety of landscapes can be seen, with the fore to middle-ground
characterised by the Rugged Granite Uplands LCT with Ballminnoch (598 m AOD)
and Shalloch on Minnoch (768 m AOD), which form open and elevated areas of
rugged hill ridges, with blanket forestry predominant over middle and lower slopes.
Elevations drop as the distance towards the site increases, with lower and less rugged hills forming low and gently undulating ridgelines, and where a mix of forestry plantations and open grassland from a large scale mosaic across the landform. Hadyard Hill Wind Farm is visible in the Foothills with Forest and Wind Farms LCT to the north-west at a range of 18.14 km, while the more distant Windy Standard, Windy Standard Extension and Hare Hill are visible to the NE at distances beyond 22 km.

5.8.92 The view to the east and south-east is characterised more extensively by the Rugged Granite Uplands LCT with views contained largely within the extents of these upland landscapes. The view to the east is defined by the long and rocky ridge of the Rhinns of Kells and to the south by a more complex group of interlocking hills which form the southern part of the Galloway Hills. To the south-west and west, the view is less dramatic, with the flatter landscape of the Plateau Moorland LCTs predominant. These landscapes contain the wind farm developments of Mark Hill at a range of 16.66 km to the west and Arecleoch at a range of 25.13 km to the south-west.

5.8.93 Despite the presence of the large scale forestry operations evident on the route to the summit, and the presence of wind farm developments, evident from the summit, there is still some sense of remoteness and wildness experienced from the core of the Merrick and which is reflected in the character and quality of the view. The view is largely characterised by the dramatic landform of the surrounding Rugged Granite Uplands LCT, to which the lower and less remarkable Foothills and Plateau Moorlands LCTs from more of a background feature.

Sensitivity

5.8.94 The value of the view is medium to high. The summit marks a natural viewpoint from which hill walkers appreciate the panoramic view. The Merrick is covered by the Regional Scenic Area designation. The rating is prevented from being high by the regional, rather than national designation of the landscape and while the Merrick marks the core of the wider Galloway Hills, evidence of large scale forestry and wind farm developments detract from the overall value of the view.

5.8.95 The susceptibility of hill walkers to the proposed development would be medium to high. Although the summit is not a formal viewpoint, a large part of the hill walking experience involves the enjoyment of panoramic views from the summit and this raises the value of the view. The rating is prevented from being high by the presence of existing wind farm development in the sectors to the north, north-east, west and south-west, which reduce the susceptibility of hill walkers to the proposed development.

5.8.96 The combination of the value of the view and the susceptibility of hill walkers leads to an overall medium to high sensitivity.

Magnitude of Effect

5.8.97 The proposed development would be seen set in the same group of Foothills and to partially overlap with the existing Hadyard Hill Wind Farm and therefore be apparent as an extension. The existing turbines are seen spread in horizontal extents along the Foothills, mostly concealed on the left by the intervening ridge such that only tip and blades are visible, but more exposed to the right where a gap in the upland ridgeline reveals them mostly at their full extents. At the range of 18.14 km they are seen as relatively small scale elements in the view.

5.8.98 The proposed development would add a further 31 turbines to the view, most of which would be readily discernible. The proposed development would overlap with the
existing development, with no increase to the horizontal extents on the left, but a notable increase on the right, where turbines would extend along the Foothills ridge and be seen to the fore of the distant outline of the North Arran hills. The more elevated location of the proposed turbines in contrast with the existing turbines also increases the vertical extents making them appear slightly more prominent in the view. While the turbines appear similar in scale, where they overlap, the closer range and higher elevation of the proposed turbines presents a small scale difference.

5.8.99 While these horizontal and vertical increases add to the magnitude of effect, there are a number of factors which moderate the effect. Firstly, there is the relationship between the Foothills LCT where the proposed development would be located and the Rugged Granitic Uplands LCT where the viewpoint is located. The lower and less remarkable Foothills LCT forms the background setting to the higher and more remarkable Rugged Granitic Uplands LCT. This association with the less prominent LCT in the view, in turn, reduces the prominence of the proposed development.

5.8.100 Secondly, there is the distance, with the proposed turbines seen from a minimum range of 15.74 km, which means that they would be seen as relatively small scale elements in relation to the surrounding landform. Thirdly, there is the relationship with the existing development, whereby the proposed development is not introducing wind farm development where it does not already exist. The proposed development consolidates wind farm development and avoids it spreading into previously undeveloped sectors or LCTs. Fourthly, in respect of the wider context the proposed turbines would occupy a relatively small proportion of the northerly sector and an even smaller proportion of the wider 360 degree view. The undeveloped sectors to the east and south would remain undeveloped.

5.8.101 The tracks would be the only component of the site infrastructure that would potentially be visible, although from the minimum distance of 15.74 km these would not form a readily apparent feature. Taking all these factors into account the magnitude of effect as a result of the proposed development would be medium to low.

5.8.102 The erection and dismantling of the turbines using tall cranes would be the most evident part of the construction and decommissioning work, and although visible from this viewpoint, at the minimum distance of 15.74 km and in the context of operational Hadyard Hill, the magnitude of this effect would be medium to low.

**Significance of the Effect**

5.8.103 The effect of the proposed development on the view would be **not significant**. Despite the sensitivities attached to the value of the view and the susceptibility of hill walkers, the proposed development would not redefine the character of the view. This relates chiefly to the characterisation of the view by the more scenic core of the surrounding Rugged Granitic Uplands LCT which would remain unaffected by the proposed development. Instead the proposed development would be associated with the background feature of the Foothills with Forest and Wind Farms LCT. Furthermore, there is the distance from which the proposed development would be seen, combined with the integration of the proposed development with the existing development, despite the increase to horizontal and vertical extents which would occur.

5.8.104 The effect of the construction and decommissioning stages of the proposed development would also be **not significant**.
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**Viewpoint 8: South Balloch**

**Baseline**

5.8.105 The viewpoint is located on the minor road linking South Balloch and Barr Village near the junction with the NCR7. The view is representative of road-users on the minor road and residents of North Balloch and South Balloch Farms and other nearby farmsteads and properties. The view looks west towards the proposed development which would be located at a minimum distance of 1.77 km from the viewpoint.

5.8.106 The defining characteristic of this view is the strong contrast between the relatively flat floor of the *Intimate Pastoral Valley* LCT and the relatively steep slopes of the *Foothills with Forest and Wind Farms* LCT. The valley of the River Stinchar is occupied by fields of improved pasture enclosed by fences and scant lines of vegetation, while clumps of slightly denser and more mature tree cover mark out the course of the river.

5.8.107 The foothills rise abruptly from the valley edge, with Daljedburgh (374 m AOD) seen as the main hill to the centre and right of the view, and Mull of Miljoan (356 m AOD) seen to the left of the view. The south-facing slopes of Daljedburgh remain open and uncultivated, with a covering of rough grasses and scrub woodland. The landform is incised where water collects into small burns. The skyline is characterised by the edge of the forest block which outlines the ridge in a dark band.

5.8.108 The ridgeline steps down to the lower Milton Hill (262 m AOD) and then wraps round to Mull of Miljoan and Auchensoul (314 m AOD) to enclose the wider valley landscape. The view is open and draws the viewer’s attention into the valley, where the ridgeline forms an important enclosing feature. Hadyard Hill Wind Farm is seen in this view as one turbine set behind the ridge towards Auchensoul Hill at a minimum distance of 4.17 km, and while the wireline shows a small number of other blades and tips, these are not readily discernible. Other development is typically small scale and rural comprising roads, farmsteads, fence lines and pole-mounted wires.

**Sensitivity**

5.8.109 The value of this view is medium. It is not a formal viewpoint, nor a place people would visit to enjoy scenic views. The viewpoint is representative of incidental and transitory views experienced along this section of the minor road, as well as static and more focused views potentially experienced from the adjacent residential properties. While the view is unremarkable in scenic terms, it does present an attractive rural landscape of valley and uplands, which appear in reasonable condition.

5.8.110 The susceptibility of road-users to the proposed development is medium to high for west-bound road-users, who would be facing towards the proposed development and medium to low for east-bound road-users who would be facing away, but would nonetheless be aware of its presence. Despite the transitory nature of the views, the close proximity of the road to the proposed development, combined with the prominence of the ridgeline in these views, increases the susceptibility of road-users.

5.8.111 The susceptibility of residents to the proposed development is medium to high. South Balloch and North Balloch are principally farmsteads where views from the residential parts are in most cases screened by farm buildings or tree cover. There may, however be the possibility of some views of the proposed development from internal spaces as well as private garden grounds. While wind farm development is a feature of the
baseline character, its limited visibility means that it would not notably reduce the susceptibility of residents.

5.8.112 The combination of the value of the view and the susceptibility of viewers leads to an overall sensitivity of road-users and residents to the proposed development that is medium to high.

**Magnitude of Effect**

5.8.113 The magnitude of effect as a result of the proposed development would be high. In total, 18 of the 31 turbines would be visible, the most prominent being T21 and T22 seen at almost their full height on Daljedburgh Hill at a minimum distance of 1.77 km. Three further turbines would be seen associated with this hill, albeit partially screened by the ridge. The proposed development would be seen to extend along the enclosing ridgeline, with three turbines seen behind Milton Hill and a further three behind Mull of Miljoan. A cluster of six turbines would be partially visible to the right of Daljedburgh Hill, although appearing much less prominent owing to their association with a distinct trough in the ridgeline.

5.8.114 The scale of the turbines, combined with their location along the enclosing ridgeline to the valley means that they would redefine the baseline character of the view, such that it would be defined by the presence of the turbines rather than the underlying landscape. They would appear large in contrast with the scale of the landform and incongruous with the largely undeveloped character.

5.8.115 Site infrastructure would be largely concealed behind the ridgeline. The only other notable change to the view would be the removal of forestry along the ridge of Daljedburgh Hill. This would improve the appearance of the ridgeline by exposing the natural landform and owing to its narrow extents on the ridge, the scarring effect of the disturbed land would not be apparent.

5.8.116 While much of the construction and decommissioning operations would take place behind the ridgeline, the erection and dismantling of the turbines using tall cranes would be the most evident part of the construction and decommissioning phases, and these operations would be visible, especially in association with the turbines on the ridgeline. The magnitude of effect during these stages would be medium to high.

**Significance of the Effect**

5.8.117 The effect of the operational stage of the proposed development on the viewpoint at South Balloch would be significant. This relates chiefly to the close proximity of the viewpoint to the proposed development as well as its association with the prominent ridgeline to the valley landscape in which the viewpoint is located.

5.8.118 The effect of the construction and decommissioning stages of the proposed development would also be significant.

**Viewpoint 9: Colonel Hunter Blair Monument, Kildoach Hill**

**Baseline**

5.8.119 The viewpoint is located on Kildoach (354 m AOD) close to the Colonel Hunter Blair Monument. It is representative of the views of hill walkers. The view looks south-west towards the proposed development which would be located at a minimum distance of 7.91 km from the viewpoint. The walk to the Colonel Hunter Blair Monument appears well used, with a defined path shown on OS mapping. The path
does not continue on to Kildoach which does not appear to be well visited. For this reason the viewpoint close to the monument has been selected to represent the views of the majority of hill walkers in this area.

5.8.120 The viewpoint is located on the edge of the Foothills with Forest west of Loch Doon LCT and looking back east across this LCT, the view is characterised by the gentle undulations of the landform and the rough grass cover. The less modified nature of this landscape gives this aspect of the view a sense of remoteness. There is no apparent development, although it is worth noting that consented Dersalloch would lie in close proximity to this viewpoint and blades would be visible above the intervening ridgeline.

5.8.121 The view to the south extends over the Intimate Pastoral Valley LCT to the Rugged Uplands LCT where the outline of larger more distant hills, including Merrick and Shalloch on Minnoch, can be seen. To the north, lower hills are covered in forestry and abutted by fields of improved farmland extending up from the valleys. To the north-west, bands of forestry enclose the lower valley landscapes, which extend to the coast where the familiar outline of Ailsa Craig is visible out in the Irish Sea.

5.8.122 The view to the south-west extends to the Foothills with Forest and Wind Farms LCT. This is characterised by low hills covered with large forestry blocks. The view in this direction is less extensive with the ridge through Glenalla Fell (425 m AOD) and Garleffin Fell (429 m AOD) marking the visual envelope. Although Hadyard Hill is shown on the wirelines to be visible as a small number of tips at a minimum distance of 11.27 km, it is not readily visible and therefore this sector of the view appears relatively undeveloped other than small scale and rural development seen on the edge of the Intimate Pastoral Valley LCT.

Sensitivity

5.8.123 The value of the view is medium to high. Hill walkers are attracted to the Colonel Hunter Blair Monument set which is set below the summit of Kildoach. While the monument is intended as a landmark feature to be viewed from the wider landscape, it also attracts walkers and so has, conversely, become a viewpoint of the wider landscape. There is a route marked on OS mapping to the monument.

5.8.124 The susceptibility of hill walkers to the proposed development is medium to high. The view for walkers is expansive in almost all directions, and the view is predominantly rural, with very little evidence of development, although the modification of the landscape through forestry practices is evident.

5.8.125 The combination of the value of the view and the susceptibility of hill walkers leads to an overall sensitivity of medium to high.

Magnitude of Effect

5.8.126 The proposed development would be seen set behind the Foothills ridge with a concentrated group seen set in the trough between Glenalla Fell (425 m AOD) and Black Hill of Knockgardner (301 m AOD) and then with tips occurring to either side of this group. The proposed turbines would be seen at a range of 7.91 km and would, in relation to the landform, appear as medium scale elements in the view.

5.8.127 The magnitude of effect is moderated by the concentrated extents of the proposed development, whereby it would occupy only a small proportion of this sector of the view and an even smaller proportion of the wider view. While tips would be visible to the left of Glenalla Fell (425 m AOD), these would not form a prominent part of the
development and this limited visibility would add to the concentrated effect. The location of the turbines in the trough moderates the magnitude of effect further by setting the turbines below the high point in the ridge and in so doing reducing their prominence in the view.

5.8.128 With visibility of existing Hadyard Hill Wind Farm being limited, the proposed development would appear as a new feature in a largely undeveloped landscape. The turbines would appear incongruous with the rural character of the view. Furthermore, while the concentration of turbines would contain the extents of development, it would also add to the density of the turbines, such that stacking would be evident and this would add to the prominence of the turbines. Both these factors would add to the magnitude of effect.

5.8.129 Taking all these factors into account, the magnitude of effect would be medium. Despite its contained extents, the absence of other large scale developments combined with the stacking effect of the turbines means that the proposed development would add a notable feature. Site infrastructure and forestry removal would not be readily evident from this viewpoint.

5.8.130 While much of the construction and decommissioning operations would take place behind the ridgeline, the erection and dismantling of the turbines using tall cranes would be the most evident part of the construction and decommissioning phases, and would also be visible in association with the turbines on the ridgeline. The magnitude of effect during these stages would be medium to high.

Significance of the Effect

5.8.131 The effect of the operational stage of the proposed development on the view from Kildoach would be significant. The viewpoint has a particular sensitivity owing to the attraction of the monument and the magnitude of effect is made notable by the proposed development appearing as a new feature with the concentration of turbines adding to its prominence in the view.

5.8.132 The effect of the construction and decommissioning stages of the proposed development would also be significant.

Viewpoint 10: River Stinchar, Minor Road

Baseline

5.8.133 This viewpoint is located on the minor road that links Barr with South Balloch, at the high point between Knockeen and Pyannot Farms. The viewpoint is representative of road-users on the minor road and the few residents who have properties in the area. The view looks north towards the proposed development, which would be located at a minimum distance of 1.13 km from the viewpoint.

5.8.134 The viewpoint is located in the Intimate Pastoral Valley LCT and looks north towards the Foothills with Forest and Wind Farms LCT. Similar to Viewpoint 8 at South Balloch, the view is characterised by the contrasting flat valley floor and steep foothills slopes. The valley is occupied by enclosed fields mostly of improved pasture, and intermittent farmsteads and cottages flank the valley sides. The steep slopes up to the ridgeline mostly comprise rough grasslands and patchy scrub. The slopes of Milton Hill appear disturbed by the process of clear felling forestry with long, geometric lines scored through the ground. Remaining blocks can be seen along the ridgeline of Milton Hill and Mull of Miljoan, as well as blocks of new planting. While the Foothills
LCT is predominantly open, evidence of forestry operations detract from the otherwise largely unmodified nature of these hills.

5.8.135 There is some limited visibility of the existing Hadyard Hill turbines from this viewpoint, seen as two blades set spaced behind the ridgeline between Milton Hill and Mull of Miljoan, and then a further group of two turbines, two blades and two tips set in the trough below Mull of Miljoan, although from the viewpoint the tips are not readily visible. Although the turbines do not form a prominent feature, they do establish wind farm development as part of the baseline character and are seen at a minimum distance of 2.55 km.

5.8.136 The ridgeline is an important component of the view as it encloses the valley landscape and forms a prominent skyline feature. The ridgeline, however, is relatively low and level without any distinct landmark features or special scenic qualities. The view generally, is characterised by the settled nature of the valley in which small scale rural development is evident.

**Sensitivity**

5.8.137 The value of the view is medium. It is not a formal viewpoint people would visit with the purpose of enjoying the view. The viewpoint is representative of incidental and transitory views experienced along this section of the minor road, and static and more focused views potentially experienced from the surrounding residential properties. While the view is unremarkable in scenic terms, it does present an attractive rural landscape of valley and uplands, which appear in good condition.

5.8.138 The susceptibility of road-users to the proposed development would be medium. This section of the Intimate Pastoral Valley LCT is relatively open making the enclosing Foothills LCT to the north a prominent feature. While the close proximity of the proposed development increases the susceptibility of road-users, the visibility of existing Hadyard Hill Wind Farm from this viewpoint and vicinity, ensures that it would not be seen as a new feature in the views and this moderates the overall effect.

5.8.139 Residential properties represented by this viewpoint typically front onto the minor road such that their orientation is mostly north or south. Where principal views are orientated north, there is the potential for visibility of the proposed development. Views may also occur from garden grounds and although wind farm development is already visible from this area, the limited extent of visibility means that the susceptibility of residents to the proposed development would still be medium to high.

5.8.140 The combination of the value of the view and the susceptibility for road-users and residents to the proposed development leads to an overall medium sensitivity for road-users and medium to high sensitivity for residents.

**Magnitude of Effect**

5.8.141 The wireline shows that 15 of the proposed turbines would be visible from this viewpoint, all seen in relative close proximity, on or behind the ridge of Foothills to the immediate north of the viewpoint. Eight of the turbines would be seen at almost full height and owing to their proximity and location on the elevated ridgeline, appear as prominent and large scale structures in the view. The remaining turbines would be seen partially screened by the ridgeline, but despite this, would still appear large in scale in relation to the scale of the landform.

5.8.142 The turbines would extend along the ridgeline from Mull of Miljoan on the left of the view, through to Daljedburgh Hill on the right, occupying a substantial portion of the
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5.8.143 Site infrastructure would be largely concealed behind the ridgeline, with the exception of the external transformers which would be seen at the base of the turbines and add to the visible content of the proposed development. The other notable change to the view would be the removal of forestry along the ridge of Mull of Miljoan, which would improve the appearance of the ridgeline by exposing the natural landform and without the scarring of the land being apparent owing to its narrow extents on the ridge.

5.8.144 Taking all these factors into account, the magnitude of effect experienced from this viewpoint would be high.

5.8.145 While much of the construction and decommissioning operations would take place behind the ridgeline, the erection and dismantling of the turbines using tall cranes would be the most evident part of these stages, and these operations would be visible, especially in association with the turbines on the ridgeline. The magnitude of effect during these stages would be high.

Significance of the Effect

5.8.146 The effect of the operational stage of the proposed development would be significant. This relates chiefly to the proximity of the turbines to the viewpoint, their position on the prominent ridgeline above the valley and their pronounced vertical and horizontal extents in relation to the landform.

5.8.147 The effect of the construction and decommissioning stages of the proposed development would also be significant.

Viewpoint 11: Brunston Castle Golf Course

Baseline

5.8.148 This viewpoint is located on the access road taken from the B741 in Dailly to the Brunston Castle Golf Course Club House and associated residential development. The viewpoint gives an elevated perspective from which the clearest views of the surrounding landscape can be gained. The view looks south-east towards the Foothills with Forest and Wind Farms LCT where the proposed development would be located. The Foothills form an enclosing ridgeline to the Middle Dale that is long and smoothly rounded over the summits. Hadyard Hill (324 m AOD) forms the highest hill to the right of the view, with the steep northern slopes characterised by the muted tones of the rough grassland cover and the incisions of the intermittent burns. To the left, the ridge steps down to Craig Hill and then the more distant and wooded ridge of Doughty Hill (380 m AOD). Hadyard Hill Wind Farm is not visible in this view owing to the screening effect of Hadyard Hill itself.

5.8.149 The viewpoint looks out across the Middle Dale LCT of the Water of Girvan towards the Foothills with Forest and Wind Farms LCT where the proposed development would be located. The Foothills form an enclosing ridgeline to the Middle Dale that is long and smoothly rounded over the summits. Hadyard Hill (324 m AOD) forms the highest hill to the right of the view, with the steep northern slopes characterised by the muted tones of the rough grassland cover and the incisions of the intermittent burns. To the left, the ridge steps down to Craig Hill and then the more distant and wooded ridge of Doughty Hill (380 m AOD). Hadyard Hill Wind Farm is not visible in this view owing to the screening effect of Hadyard Hill itself.

5.8.150 In contrast to the relatively open and exposed character of the Foothills, the Middle Dale LCT appears enclosed, with mixed woodland extending across the valley floor around Dailly, giving a ‘natural’ appearance to this landscape. In contrast, the bright green of the improved golf course grasses, presents a highly modified and intensively
managed component of this landscape, which appears as an intervention that is out of character with the ‘natural’ setting. The coniferous woodland block set below Hadyard Hill adds further to the modified appearance.

5.8.151 While the woodland cover screens much of the development present in the valley, closer to the viewpoint the modern development of the golf course club house and associated holiday accommodation denotes the settled nature of this landscape. The development affords attractive views across the valley, although, itself, detracting from the scenic quality of the view.

Sensitivity

5.8.152 The value of the view is medium to high. Although this is an informal viewpoint which people would experience incidentally from the road, golf course or holiday homes and is not a specific viewpoint people would visit to enjoy scenic views, it is representative of views that would be experienced from this access road and adjacent club house and holiday accommodation. The viewpoint is also located in the north-east corner of the Bargany designed landscape and although compromised by the intervention of the new development, the designation adds to the overall value.

5.8.153 The susceptibility of visitors to the club house and holiday accommodation would be medium to high. The principal orientation of the club house and the majority of the properties is either south or south-east, and as the proposed development would be seen to the south-west it would be unlikely to feature in views from internal spaces. It would, however, be apparent from some private garden grounds and the access road into the development.

5.8.154 The susceptibility of recreational-users would be medium. The golf course is lower-lying than the viewpoint, such that views towards the proposed development would be less extensive and often screened by intervening landform or tree cover. While their principal focus would be their game of golf, appreciation of the setting is likely to form part of the overall experience.

5.8.155 The combination of the value of the view and the susceptibility of the viewers, leads to an overall sensitivity of medium to high for both visitors and recreational-users.

Magnitude of Effect

5.8.156 The proposed development would be seen set behind the ridgeline to the left of Hadyard Hill. The proposed turbines would be seen to variable extents, with eight seen at almost full height, two to below the nacelle, three as blades and with the remaining two tips almost indiscernible. Collectively, the turbines would form a relatively well contained group, evenly spaced and without obvious overlap or outliers.

5.8.157 The magnitude of effect that the proposed development would bring to this view, would be tempered by its location offset from the prominent feature of Hadyard Hill. Furthermore, the broad scale of the upland setting and its simplistic landform and landcover, presents a context which could accommodate turbines without awkward comparison of scale from arising. As seen from the minimum distance of 4.58 km, the proposed turbines would appear smaller than the height of the hills and therefore proportionate in scale to the landscape.

5.8.158 Despite all these factors which would modify the effects of the proposed development, without visibility of other wind farm development, it would introduce a new feature which was not previously part of the baseline character. The turbines would be seen to introduce large scale development into a largely undeveloped upland landscape,
which would appear incongruous with the predominantly rural character and from a prominent feature on the ridgeline.

5.8.159 While site infrastructure would be largely concealed behind the ridgeline, a track connecting to T1 would be visible against the otherwise homogenous ground cover of the hill. Forestry removal would be evident on Craiginmoddie Hill, where clear felling of this large block would help to restore the open ridgeline and make this hill more characteristic of the upland landscape. Taking all these factors into account, the magnitude of effect on the view would be **medium**.

5.8.160 While much of the construction and decommissioning operations would take place behind the ridgeline, the erection and dismantling of the turbines using tall cranes would be the most evident part of these stages, and these operations would be visible, especially in association with the turbines on the ridgeline. The magnitude of effect during these stages would be **medium**.

**Significance of the Effect**

5.8.161 The effect of the operational stage of the proposed development on the view from Brunston Castle Golf Course would be **significant**. The proposed development would introduce a new feature in the view, and despite the relatively contained nature of the proposed turbines, owing to their relative proximity and location on the prominent ridgeline, they would redefine the character of the view.

5.8.162 The effect of the construction and decommissioning stages of the proposed development would also be **significant**.

**Viewpoint 12: Dailly**

**Baseline**

5.8.163 This viewpoint is located on the southern edge of Dailly and is representative of the views of road-users on the minor road that connects Girvan with Dailly, as well as the views of residents in the properties set along the southern edge of the settlement. The viewpoint gives an elevated perspective from which the clearest views of the surrounding landscape can be gained. The view looks south-east towards the proposed development which would be located at a minimum distance of 3.67 km from the viewpoint.

5.8.164 The viewpoint is located in the **Middle Dale** LCT of the Water of Girvan and looks out towards the **Foothills with Forest and Wind Farms** LCT where the proposed development would be located. The view is characterised by the agricultural landscape of the **Middle Dale** in which fields of improved pasture, enclosed by hedgerows and tree-belts, extend across the gently rising landform as it ascends towards the base of the **Foothills**.

5.8.165 The long and level ridge between Hadyard Hill (324 m AOD) and Maxwellston Hill (314 m AOD) can be seen on the right of the view, while the ridge between Barony Hill (319 m AOD) and Cairn Hill (326 m AOD) can be seen on the left. The hills on the right form a simple and largely featureless ridge with some coniferous forestry evident along the base, but otherwise largely unmodified. Woodland cover spreads across the slopes of the hills on the right marking a broad divide between the improved pasture on the lower slopes and unimproved grasslands along the ridge.

5.8.166 In the centre, the ridgeline falls into a trough, revealing the more distant Delamford Hill (284 m AOD) and the Hadyard Hill Wind Farm turbines which occupy it. Seven
turbines are readily visible, with a further three tips indiscernible behind the ridge to the right. The depth of the valley landscape, from the fore to middle-ground, and the intermediate wooded slopes, accentuate the distance of this hill from the viewpoint.

Sensitivity

5.8.167 The value of the view is medium. This not a formal viewpoint people would visit to enjoy scenic views. It is, however, representative of views that would be experienced from this southern and eastern edges of Dailly, including the minor road in and out of the settlement. The properties along the southern edge have been orientated to face out towards the Foothills to the south and this adds to the value of the view.

5.8.168 The susceptibility of road-users to the proposed development would be medium. This section of the Middle Dale LCT through which the minor road passes is relatively open making the enclosing Foothills LCT to the south a prominent feature. While the absence of visibility of existing wind farm developments increases the susceptibility of road-users, the views of road-users in both directions would be oblique towards the proposed development, as well as relatively short term owing to their transitory nature, and this would temper the effect.

5.8.169 Residential properties represented by this viewpoint typically front onto the minor road such that their orientation is mostly south. Where principal views are orientated south-east, there is the potential for visibility of the proposed development from the properties. Views south-east would also occur from garden grounds and public streets, and this gives rise to a medium to high susceptibility of residents to the proposed development.

5.8.170 The combination of the value of the view and the susceptibility of viewers leads to an overall medium sensitivity for road users and an overall medium to high sensitivity for residents.

Magnitude of Effect

5.8.171 The wireline shows that in total 13 of the proposed turbines would be visible, seen set on Craiginmoddie Hill to the left of Hadyard Hill. Six of the turbines would be seen at, or close to, full height, three would be seen to below the nacelle and then the remaining three as blades. They would be seen at a minimum distance of 3.67 km from the viewpoint and collectively form a relatively compact group.

5.8.172 In the absence of any other wind farm developments being visible from this viewpoint, the proposed development would add a new feature and a focus in the view. At the range of 3.67 km the proposed turbines would be seen as relatively large scale structures in relation to the underlying landform, with some awkward comparisons arising with the trees on the hill slopes. Their appearance would be at variance with the largely rural character of the view, where the development is typically small scale and traditional.

5.8.173 While the turbines would appear as a prominent addition to the view, the overall effect is moderated by factors such as the relatively small number of turbines visible and the contained horizontal extents visible in this view. While the turbines are seen to mostly sit up on Craiginmoddie Hill, their low-lying location relative to the more elevated Hadyard Hill, reduces their prominence within the view. Furthermore, they are seen contained within the distinctly upland part of the landscape, where the land is more elevated and the ground cover is typified by rough grasses and forestry. This separates it from the more intensively farmed and intimate landscape of the valley and presents a more logical association with the upland landscape.
5.8.174 While site infrastructure would be largely concealed behind the ridgeline, a track connecting to T1 would be visible against the otherwise homogenous ground cover of the hill and this would add to the magnitude of effect. Forestry removal would be evident on Craiginmoddie Hill, where clear felling of this large block would help to restore the open ridgeline, which would make this hill more characteristic of the upland landscape. Taking all these factors into account, the magnitude of effect on this view as a result of the proposed development would be **medium to high**.

5.8.175 While much of the construction and decommissioning operations would take place behind the ridgeline, the erection and dismantling of the turbines using tall cranes would be the most evident part of these stages, and these operations would be visible, especially in association with the turbines on the ridgeline. The magnitude of effect during these stages would be **medium**.

**Significance of the Effect**

5.8.176 The effect of the operational stage of the proposed development on this view would be **significant**. This relates to the relative proximity of the proposed development to the viewpoint, the extent of visibility and the prominence of the turbines on Craiginmoddie Hill, despite the largely compact nature of the group and their location set below the landmark Hadyard Hill.

5.8.177 The effect of the construction and decommissioning stages of the proposed development would also be **significant**.

**Viewpoint 13: Crosshill**

**Baseline**

5.8.178 This viewpoint is located on the minor road that links the B7045 south of Kirkmichael with Crosshill on the eastern edge of the village. The viewpoint marks the high point in the village from which the clearest views of the surrounding landscape can be gained. The view looks south towards the proposed development which would be located at a minimum distance of 7.12 km.

5.8.179 The viewpoint is located in the Middle Dale LCT of the Water of Girvan and looks out towards the Foothills with Forest and Wind Farms LCT where the proposed development would be located. The view looks obliquely along the length of the Foothills ridge, which appears low and level owing to the partial screening by the foreground landform.

5.8.180 The view is characterised principally by the urban edge of Crosshill, visible in the foreground. A collection of buildings and the enclosure of their associated grounds mark the edge of the settlement and give a visually complex appearance. Fields of improved pasture, enclosed by hedgerows and tree belts, meet the settlement edge, their relative openness and simplicity marking a contrast with the enclosure of the village.

5.8.181 The fields of pasture can be seen to extend beyond the valley landscape and onto the slopes of the Foothills behind. Here, farmland becomes interspersed with blocks of forestry and unimproved grasslands on the upper slopes to create a patchwork of colours and textures. Although low and level, the ridge forms a distinct skyline and a sense of enclosure to the view. A small number of the Hadyard Hill turbines can be seen set behind this ridge at a minimum distance of 8.67 km.
Sensitivity

5.8.182 The value of the view is medium. This is an informal viewpoint which people would experience incidentally from the road or from their homes. It is not a specific viewpoint people would visit to enjoy scenic views. It is, however, representative of views that would be experienced from this edge of Crosshill, and this minor road in and out of the village on the eastern side.

5.8.183 The susceptibility of road-users would be medium to low. The proposed development would be located at an oblique angle to west-bound road-users and would be largely behind the direction of travel for east-bound road-users. This means the proposed development would not be as prominent as if it were closely aligned with the road direction. Furthermore, wind farm development is already a feature of the baseline character, albeit limited in terms of visibility, and this reduces the effect of the proposed development as it would be seen associated with an existing development.

5.8.184 The susceptibility of residents would be medium. There are a small number of properties on the edge of the settlement with an open aspect to the south-east. While it is unlikely that they would gain direct views from their internal living spaces owing to the proposed development being located to the south, there is the likelihood that they would gain views from their private garden grounds and public streets. Their susceptibility is also reduced by the existing presence of Hadyard Hill Wind Farm.

5.8.185 The combination of the value of the view and the susceptibility of the viewers’ leads to a sensitivity for road-users and residents that would be medium.

Magnitude of Effect

5.8.186 The proposed development would be seen set behind the intervening ridgeline at a minimum distance of 9.28 km, such that all 16 of the potentially visible turbines would be partially screened, with nine seen as tips, two as blades and five to just below their nacelles. The extent to which the turbines would be screened notably reduces their prominence in the view and conceals their actual scale. At the range of 9.28 km they appear as medium scale elements, in proportion with the landform of the ridge. Furthermore, the location of the proposed turbines behind the ridge gives a sense of containment and weakens their association with the immediate landscape. These factors reduce the magnitude of effect.

5.8.187 The proposed development does, nonetheless, increase the extents of wind farm development in the view, extending around the small cluster of Hadyard Hill turbines to the right of the view, as well as introducing a further group of turbines behind Barony Hill (319 m AOD) to the left. The separation between these two groups diminishes the continuity in the overall group, and adds notably to the overall horizontal extents. Considered within the extents of this sector as well as the wider view, the proposed development still remains relatively well contained.

5.8.188 Taking all these factors into account the magnitude of effect as a result of the proposed development would be medium to low. Site infrastructure would not be visible from this viewpoint as it would be set behind the ridgeline.

5.8.189 While much of the construction and decommissioning operations would take place behind the ridgeline, the erection and dismantling of the turbines using tall cranes would be partly visible, albeit largely screened by the ridgeline. Seen at a distance beyond 7.11 km, the magnitude of effect during these stages would be medium to low.
Significance of the Effect

5.8.190 The effect of the operational stage of the proposed development on this view would be **not significant**. This relates chiefly to the extent to which the proposed development is concealed by the intervening landform, which reduces the prominence of the proposed turbines in this view. Despite the additional horizontal extents the proposed development creates, it would not redefine the character of the view, which would continue to be defined principally by the landform.

5.8.191 The effect of the construction and decommissioning stages of the proposed development would also be **not significant**.

**Viewpoint 14: B7045 near Kirkmichael**

**Baseline**

5.8.192 This viewpoint is located on the B7045 next to the cemetery to the west of Kirkmichael, which sits lower down in the valley and is largely enclosed by mature tree cover such that visibility from the settlement is limited. The viewpoint is representative of the views of road-users on the B7045 and visitors to the cemetery. The direction of the view is south towards the proposed development which would be visible at a minimum distance of 9.28 km.

5.8.193 The viewpoint is located in the Middle Dale LCT of the River Girvan, with the view extending across this landscape to the Foothills with Forest and Wind Farms LCT where the proposed development would be located. The view is characterised by the landform and land-use patterns of these two contrasting landscapes. The Middle Dale LCT is a gently undulating low-lying landscape in which the land folds down towards the course of the River Girvan. The land-use is predominantly agricultural with fields of improved pasture typically defined by mature woodland. This gives the landscape a sense of enclosure and often contains the extent of views. In this view, the more distant foothills become partially obscured by the middle range tree cover.

5.8.194 In contrast, the Foothills with Forest and Wind Farms LCT appears less complex, with a much broader patchwork of rough grasses and forestry plantations. They comprise a series of similar height hills which collectively form a long and low ridgeline. The vertical structures of the Hadyard Hill turbines can be seen extending above the skyline, albeit seen in a slight trough between the hills and appearing small in relation to the scale of the hills at a minimum distance of 10.80 km.

**Sensitivity**

5.8.195 The value of the view is medium. The viewpoint is not formal, nor does it present a specific view which would have a special value. There is no provision for stopping on the B734 other than at the entrance to the cemetery.

5.8.196 The susceptibility of road-users is medium. Road-users would experience the proposed development in transitory views for a relatively short section of the B734. The views would occur at an angle oblique to the direction of east-bound road-users and would not be readily apparent to those travelling west-bound. Hadyard Hill Wind Farm being already visible from the B734 reduces the susceptibility of road-users to the proposed development as there is already an influence of this type of development on the baseline character.

5.8.197 The combination of the value of the view and the sensitivity of road-users leads to an overall sensitivity of **medium**.
Magnitude of Effect

5.8.198 The wireline shows that owing to the screening effect of the Foothills ridgeline only eight Hadyard Hill turbines are readily visible with nacelles showing, while the remainder occur as blades or tips, and are not readily visible. The result is a relatively contained wind farm development, seen located within the shallow trough that occurs along the hill ridge.

5.8.199 The wireline shows that the proposed development would add a further 22 turbines, although again, the screening effect of the ridgeline means that few of the turbines would be seen at their full height and many would be seen as either blades or to just below the nacelle. The proposed development would be seen to increase the extents of wind farm development along the ridge to the left of the existing development. While the mature tree cover in the foreground would partially screen the turbines on the left, during the winter months visibility would be largely uninterrupted.

5.8.200 While the proposed development would be seen as an extension to the existing development already evident in the baseline view, the increased horizontal extents along the ridge and the slightly larger scale of the proposed turbines when seen next to the existing turbines, would make wind farm development a more noticeable feature in this view.

5.8.201 Those factors which would moderate the magnitude of effect include the range of the view, which at 9.28 km means that the turbines would appear as medium scale components in the view. Also the association of the proposed turbines with the more distant Foothills and their location largely behind the ridgeline disassociates them from the valley landscape and in so doing reduces their prominence in the view. The more intimate and detailed visual interest of the valley would also serve to draw attention away from the proposed development, which is seen associated with the more distant Foothills.

5.8.202 Taking all these factors into account the magnitude of effect as a result of the proposed development would be medium. Site infrastructure would not be visible from this viewpoint as it would be set behind the ridgeline.

5.8.203 While much of the construction and decommissioning operations would take place behind the ridgeline, the erection and dismantling of the turbines using tall cranes would be partly visible, albeit largely screened by the ridgeline. Seen at a distance beyond 9.28 km, the magnitude of effect during these stages would be medium to low.

Significance of the Effect

5.8.204 The effect of the operational stage of the proposed development would be not significant. This relates to a combination of the partial screening of the proposed development behind the ridgeline, the presence of the existing wind farm and the distance of the viewers from the proposed development, despite the increased horizontal extents of wind farm development it adds to the view.

5.8.205 The effect of the construction and decommissioning stages of the proposed development would also be not significant.
Viewpoint 15: War Memorial, Maybole

Baseline

5.8.206 This viewpoint is located next to the War Memorial on the southern side of Maybole. It is representative of the views of visitors to the memorial, recreational users of the adjacent golf course and also the views of certain residents in Maybole. The direction of the view is south towards the proposed development which would be visible at a minimum range of 9.77 km.

5.8.207 The viewpoint is located in the Maybole Foothills LCT and looks out across this landscape to the Foothills with Forest and Wind Farms LCT where the proposed development would be located. The Maybole Foothills make up the fore to middle ground and are characterised by the lush green of improved pasture. The landscape is predominantly open with enclosure of fields by hedgerows and occasional tree belts. Settlement is scattered intermittently along the narrow rural roads and the overall impression is of a settled and cultivated landscape.

5.8.208 The Middle Dale LCT is largely screened by the edge of the Maybole Foothills LCT such that the view carries over to the Foothills with Forest and Wind Farms LCT where the proposed development would be located. In contrast to the detail and pattern evident in the closer range and lower elevated Maybole Foothills LCT, the Foothills with Forest and Wind Farms LCT appears simpler with little detail discernible other than the broad mosaic of forestry and moorland. The skyline formed by the Foothills is seen as a distinct feature forming the low and level skyline to the wider landscape, albeit relatively distant in range.

5.8.209 The view is characterised by the strong horizontal emphasis of the landscape, whereby the low and level ridgelines mark out each tier in the landscape. Without any operational wind farms being visible, there is an absence of vertical features other than the close and middle range monuments which mark out local high points.

Sensitivity

5.8.210 The value of the view is medium to high. Although it is not a formal viewpoint and the focus of visitors would generally be the war memorial rather than the surrounding landscape, it would appear that the elevated location has been chosen with an open aspect in order to create a setting in which the surrounding landscape forms part of the overall experience.

5.8.211 The susceptibility of recreational users would be medium. Despite operational wind farms occurring in the surrounding landscapes, none are readily visible from the viewpoint at the monument and this increases the susceptibility of recreational users to the proposed development. The viewpoint is, however, located in a built-up area and surrounded by intensively farmed land and this tempers susceptibility.

5.8.212 The susceptibility of residents in Maybole would be medium to high. Maybole is built on the south-east facing slopes of the Maybole Foothills and as such many properties afford views from an elevated position out across the surrounding landscape. While the majority of properties would not align directly towards the proposed development, it would possibly be apparent from private garden grounds and public spaces.

5.8.213 The combination of the value of the view and the susceptibility of recreational users and residents leads to an overall sensitivity of medium to high.
Magnitude of Effect

5.8.214 The wireline shows that ten proposed turbines are theoretically visible, with three seen at almost their full height, two to just below the nacelle, two as blades and three as tips. They would be seen set on to the right of the Foothills ridge, and tucked in close to the closer range shoulder of the Maybole Foothills. The proposed development would introduce wind farm development into the view and, in the absence of any existing wind farm development, this would increase its prominence and add to the magnitude of effect.

5.8.215 The magnitude of effect would, however, be moderated by the following factors. The proposed development would be seen set in a largely unremarkable section of the ridgeline which is characterised by a low and level skyline. The proposed turbines would be seen as a small and contained group, located at the far right end of the visible ridgeline of the foothills. The photomontage shows, that at a range of 9.77 km, the proposed turbines would form a medium scale feature in the view, which would appear in proportion with the landscape with which it is associated. Furthermore, the comparison with the closer range ridge to the right of the view, which rises above the more distant ridgeline, would reduce the perceived scale of the turbines. The relatively simple landcover combined with the relatively low and level ridgeline, provides a setting for the turbines which avoids visual complexity.

5.8.216 Despite the fact that the proposed development would introduce wind farm development into a view where currently there are no other wind farms readily visible, its limited extents within the view, its location offset from the central draw of the view and its proportionate scale as experienced from this range, results in a magnitude of effect that would be medium to low. Site infrastructure would not be visible from this viewpoint as it would be set behind the ridgeline.

5.8.217 While much of the construction and decommissioning operations would take place behind the ridgeline, the erection and dismantling of the turbines using tall cranes would be partly visible, albeit largely screened by the ridgeline. Seen at a distance beyond 9.77 km, the magnitude of effect during these stages would be medium to low.

Significance of the Effect

5.8.218 The effect of the operational stage of the proposed development would be not significant. Despite the introduction of a new feature that the proposed development would make, its location offset to the right of the central draw of the view, coupled with its distant range and relatively compact nature, means that it would not redefine the character of this view.

5.8.219 The effect of the construction and decommissioning stages of the proposed development would also be not significant.

Viewpoint 16: B734 near Doon Hill

Baseline

5.8.220 This viewpoint is located on the B734 at the high point near Doon Hill. It is representative of the views of road-users travelling over the B734, as well as workers associated with the Hadyard Hill Wind Farm, the Penwhapple Reservoir and the surrounding farmland and forestry. The direction of the view is east and south-east towards the proposed development, with the closest turbine located at a range of 0.93 km.
5.8.221 The viewpoint is located at the core of the *Foothills with Forest and Wind Farms* LCT, set within the undulating plateau between the hill ridges to the north-west and south-east. It marks the high point on the B734 from which the clearest view of the surrounding landscape can be gained. As such, visibility is contained within the upland landscape and there is no visibility of the surrounding valleys. The viewpoint feels elevated and exposed and the extent of the view is largely contained to within the upland plateau, with some visibility of adjacent foothills.

5.8.222 The view is characterised by the presence of the Hadyard Hill Wind Farm with turbines visible in all sectors of the panoramic view seen at a minimum distance of 0.58 km. The scale of the turbines is not always apparent apart from where other close-by features provide a scale comparison. The landscape is characterised by the mix of improved and unimproved grassland which produces patches of bright green next to subtle browns, with large fields defined by fenced enclosures. The modified nature of this landscape is further denoted by the occasional presence of forestry blocks, the Penwhapple Reservoir and the B734 itself.

**Sensitivity**

5.8.223 The value of the view is medium to low. The viewpoint is not formal, nor does it present a specific view which would have a special value. While there is a layby at this point, it is not set up to encourage road-users to stop and there is no apparent scenic value to the view.

5.8.224 The susceptibility of road-users would be medium to low. The location of Hadyard Hill Wind Farm on both sides of the B734 means that it is the defining feature for road-users passing over the hills. This reduces the susceptibility of road-users to the proposed development as there is already a defining influence of this type of development on the baseline character. Road-users would experience the proposed development in transitory views whilst passing over the hills.

5.8.225 The combination of the value of the view and susceptibility of viewers leads to a sensitivity for road-users that would be **medium to low**.

**Magnitude of Effect**

5.8.226 Hadyard Hill Wind Farm is already visible in all four sectors of the view, with five turbines seen to the south and west, two to the north and 17 to the east, although of these, three blade tips are not readily discernible. The close proximity of the turbines to the viewpoint means that they appear large in scale.

5.8.227 Of the 31 proposed turbines, only five would be visible from this viewpoint. They would be seen within the eastern sector of the view, adding on to the existing 14 readily visible turbines of Hadyard Hill. They would form an obvious extension owing to their close proximity to the existing turbines and the magnitude of effect would be tempered by the proportionally small addition they would make in terms of numbers. Furthermore, the similar scale and proportioning of the turbines and their location on the same upland plateau as the existing turbines would ensure a good level of visual integration.

5.8.228 Site infrastructure would be evident mainly in the form of site tracks and external transformers at the base of each turbine, although these would be largely concealed by the undulations of the landform, and would therefore not have a notable influence on the magnitude of effect.
5.8.229 Despite the close proximity of the proposed turbines and their apparently large scale, the context of the existing development within which they would be seen ensures that the magnitude of effect would be medium to low.

5.8.230 Despite the existing presence of the existing Hadyard Hill turbines, the proximity of the viewpoint to the construction and decommissioning of the turbines using tall cranes, and the movement associated with these operations, would give rise to a medium to high magnitude of effect.

Significance of the effect

5.8.231 The effect during the operational stage of the proposed development would be not significant for road-users. The proposed development would not redefine the character of this view as it is already defined by the presence of Hadyard Hill Wind Farm.

5.8.232 The effect during the construction and decommissioning stages of the proposed development would be significant.

Viewpoint 17: Hadyard Hill

Baseline

5.8.233 The viewpoint is located at the summit of Hadyard Hill (324 m AOD). It is representative of the views of hill walkers on the ridge between Craig Hill, Hadyard Hill and Maxwellston Hill. The view looks south towards the proposed development, which would be located at a minimum distance of 2.28 km from the viewpoint. A path extends from Daily to Maxwellston Hill via Hadyard Hill, and although the path in some sections is difficult to follow, intermittent marker posts define the way. The path is offset from the summit of Hadyard Hill, from which more expansive views of the proposed development would be gained.

5.8.234 The view is expansive in all directions with contrasts in character evident. To the north the view is largely occupied by the foreground of the hill top, its rounded summit preventing a more expansive view of the Middle Dale LCT which sits below. Instead the view carries over the Foothills LCTs on the opposite side of the valley, which are seen as a narrow band of low hills with ground cover denoting farming and forestry land uses and development evident as clusters of properties masts and occasional single turbines.

5.8.235 To the west the view is more expansive and more impressive in scenic terms. It stretches across the settled, cultivated and afforested landscape of the Lower Dale LCT, to the coastal edge where the larger scale settlement of Girvan is visible, and then out across the Irish Sea to the distinctive outlines of Arran and Ailsa Craig.

5.8.236 The remaining two sectors are characterised by the three main components of the Foothills with Forest and Wind Farms LCT, with Hadyard Hill Wind Farm forming the defining characteristic. With all 51 turbines visible and only 0.74 km to the nearest turbine, Hadyard Hill Wind Farm appears large in both horizontal and vertical extents. It spans across approximately a third of the wider 360 degree and owing to their close proximity, the turbines appear large.

5.8.237 The underlying landform is gently undulating with many of the turbines set within the trough that lies between the Hadyard Hill ridge to the north and the Mull of Miljoan ridge to the south; a location which greatly reduces visibility across the surrounding landscapes. The landcover comprises a mix of forest blocks and rough grasses, the
geometric edges, single species and single age of the blocks denoting human intervention, and large swathes of clear felled areas detracting from the appearance and condition of the landscape. The context of these Foothills is put in place by the larger Rugged Uplands seen behind, which emphasis the lower and less remarkable nature of these hills. Other than the wind farm, development is scarce on the Foothills LCT and on Hadyard Hill there is still some sense of remoteness.

**Sensitivity**

5.8.238 The value of the view is medium. The presence of the way-marked path from Dailly onto the hill ridge encourages walkers to visit these hills, although the path defined on OS mapping does not extend to the summit of Hadyard Hill and from the path, the view to the south is not open owing to the broad rounded summit of the hill. Although no other walkers have been seen during site visits, these hills are likely to attract some local walkers and visitors to the fort on Maxwellston Hill.

5.8.239 The susceptibility of hill walkers to the proposed development is medium to low. This rating relates principally to the existing influence of Hadyard Hill Wind Farm which establishes this type of development as the defining characteristic of the baseline view. Walkers to the summit of Hadyard Hill would be aware that they would be in close range of this development and this would lower their expectations of experiencing undeveloped views. The existing presence of forestry operations on the hills detracts further from the sense of remoteness that hill walkers might be seeking.

5.8.240 The combination of the value of the view and the susceptibility of hill walkers leads to an overall sensitivity of medium.

**Magnitude of Effect**

5.8.241 All 31 of the proposed turbines would be visible from this viewpoint. They would mostly be seen set behind the existing Hadyard Hill turbines, with the exception of 14 proposed turbines which would increase the horizontal extents to the left of the existing wind farm. The proposed turbines would be seen as an extension to the existing wind farm owing to their close proximity, as well as comparable scale and proportioning.

5.8.242 The turbines in the right-hand 90 degree sector would appear well integrated with the existing turbines as there would be a relatively small proportion of additional turbines and they would be spaced out behind the existing turbines. The only feature that would increase the magnitude of effect would be the slightly higher elevation of three of the proposed turbines which would increase the vertical extents of the group, although their containment in the same general landform helps to moderate this effect.

5.8.243 The density of the proposed turbines increases in the left-hand 90 degree sector of the view, such that a more notable increase is evident. The turbines on the right sit behind the existing turbines and appear comparable in scale, evenly spaced and generally well contained albeit, again, slightly higher in elevation. The turbines on the left continue the general pattern of turbines scattered loosely across the hill slopes, with relatively even spacing and fairly consistent elevations, lest the turbine set on Craiginmoddie Hill. They would be seen set across the gently undulating hills to the south-east, which, from this viewpoint, appear relatively low and unremarkable. As part of the proposed development, the blanket forestry on these hills would be clear felled, creating a more homogenous cover of rough grasses across the hill group, albeit with the scarred effect this creates in the short to medium term.
5.8.244 Despite the increases to the horizontal and vertical extents, the proposed
development would keep wind farm contained within the Foothills landscape and the
180 degree sector of the view which this landscape type occupies. The proposed
development would not have a direct effect on the most scenic aspect of the view out
across the Irish Sea to Arran and Ailsa Craig.

5.8.245 In terms of site infrastructure, the close proximity and elevated perspective of the
viewpoint, means that some of the new access tracks would be visible. While the
landform would conceal many of the tracks in the right of the view, those in the left of
the view would be more readily apparent. These would be seen in the same area
where forestry removal would take place and therefore the land would already appear
disturbed. The tracks would, nonetheless, be seen as a further modification of the
landcover, and although not as prominent as the proposed turbines, would add to the
magnitude of effect.

5.8.246 Taking all these factors into account, especially the existing influence of the existing
Hadyard Hill wind Farm, the magnitude of effect as a result of the proposed
development would be medium.

5.8.247 Despite the presence of the existing Hadyard Hill turbines, the close proximity of the
viewpoint to the tall cranes that would be needed to erect and dismantle the turbines,
as well as other construction operations including the forestry removal, and the
additional movement associated with these operations, would give rise to a medium
to high magnitude of effect.

Significance of the Effect

5.8.248 The effect during the operational stage of the proposed development on the view from
Hadyard Hill would be not significant. This finding relates chiefly to the presence of
Hadyard Hill Wind Farm, which currently defines the character of the view, as well as
the generally well integrated addition of the proposed development, despite increases
to the horizontal and vertical extents.

5.8.249 The effect during the construction and decommissioning stages of the proposed
development would be significant.

Viewpoint 18: North Threave

Baseline

5.8.250 This viewpoint is located on the minor road that accesses North Threave and East
Threave Farms in a rural part of the Maybole Foothills LCT. It is representative of
views of road-users on the minor roads, and residents of rural properties in this area.
The direction of the view is south-east towards the proposed development which
would be located at a minimum range of 7.52 km.

5.8.251 While the majority of the minor roads in the Maybole Foothills LCT traverse the hill
slopes, the road to North Threave and East Threave Farms is located along the long
and gently ascending ridgeline towards Kirk Hill (249 m AOD). It follows the
predominant north-east to south-west orientation of the Maybole Foothills LCT and
the adjacent valley and foothill landscapes. As such, views from the ridge are drawn
out across the Middle Dale LCT of the Water of Girvan to the Foothills with Forest and
Wind Farms LCT where the proposed development would be located.

5.8.252 Similar views are gained from the westwards extension of the road to Pirleyhill, albeit
at a slightly lower elevation. To the south, the land falls away and mature tree cover
becomes more extensive such that views become contained, while further north the land falls away behind the ridge, thus the ridge screens visibility of the landscapes to the south-east.

5.8.253 The view shows the strong horizontal banding of the landform, whereby the hills merge to form long and low ridgelines, following the predominant north-east to south-west orientation. The foreground band is characterised by the greenness of the improved pasture which is seen to extend down into the valley. Subsequent bands show the more muted tones of unimproved pasture, with the darker colour and more textured blanket of coniferous forestry becoming evident to the right of the view and across more distant hills.

5.8.254 The ridgeline through Barony, Hadyard and Maxwellston Hills forms the defining feature of the view, along with the operational Hadyard Hill turbines which are seen behind it, in a group on the right and then in dispersed clusters stretching along its length to the left. In total 38 turbines are theoretically visible, although in actual visibility this is reduced to approximately 25, seen at a minimum distance of 6.10 km.

Sensitivity

5.8.255 The value of this view is medium to low. Within this rural area there are no formal viewpoints and therefore this viewpoint has been selected to represent the local rural area rather than this specific location. The population in this area is sparse and the roads appear to be used mainly for local access. The landscape is not part of the designated South Carrick Scenic Area and its appearance is largely unexceptional.

5.8.256 The susceptibility of road-users to the proposed development is medium to low. The proposed development would be seen at a perpendicular angle to the direction of road-users travel, thus making it less obvious than if it were in direct alignment. Furthermore, the existing presence of Hadyard Hill Wind Farm reduces the susceptibility of road-users as turbines set along this ridge already form part of the baseline character.

5.8.257 Although there are only a few properties along the ridge, the susceptibility of residents is medium. Some of the properties face out towards the proposed development, although with intervening hedgerows and trees potentially screening views especially from lower floors. Existing visibility of the Hadyard Hill Wind Farm, again, reduces susceptibility, as it already forms part of the baseline character.

5.8.258 The combination of value and susceptibility leads to the sensitivity for road-users being medium to low and the sensitivity for residents being medium.

Magnitude of Effect

5.8.259 Hadyard Hill Wind Farm is already visible in the view with 25 turbines readily visible along the skyline. The screening effect of the intervening ridge means that the wind farm is seen as three groups separated by the higher sections of the ridgeline. It is the horizontal extents of the group, rather than the vertical extents of the turbines that mark its presence in the landscape.

5.8.260 In terms of the scale of the proposed turbines, seen from this range of 7.52 km and in the context of the long and low ridgeline of the Foothills with Forest and Wind Farms, the proposed turbines would appear medium in scale and comparable with the scale of the existing turbines. It is the horizontal extents of the proposed development that would give rise to the most notable change. The angle of the view is such that the existing and proposed developments would be seen at their fullest horizontal extents.
This would be apparent with proposed turbines extending along the ridgeline to the left of the existing turbines.

5.8.261 The proposed development would be apparent as an extension owing to its proximity to the existing development and integration would occur as a result of similar scale and proportioning. The extent of overlap between the proposed and existing turbines would mean that the additional increase by the proposed development would be less, with the group on the left forming the increase. The proposed development would continue to be associated with the same ridgeline, thus preventing the spread into other landscapes or sectors of the view.

5.8.262 While the majority of the site infrastructure would be concealed by the ridgeline, tracks between the proposed turbines on the left of the view would be evident, seen as lighter lines through the darker ground cover and although not as prominent as the turbines, would add slightly to the magnitude of effect. The forest cover in the left of the view would be removed as part of the proposed development and this would reveal the natural landform of the hills. The residual effects of the clear felling operations would not be readily apparent from this range and the hills would appear more closely associated with the wider Foothills ridge and the Rugged Uplands LCT in the distance.

5.8.263 The magnitude of effect as a result of the proposed development would be medium. Despite the apparent increase in horizontal extents that the proposed development would give rise to, this would be a relatively small proportion of the existing extents formed by the existing development in the Foothills ridge.

5.8.264 While much of the construction and decommissioning would take place behind the ridgeline, operations associated with the turbines on the left of the view would be more readily visible, especially the erection and dismantling of the turbines using tall cranes. While these would add to the presence of structures in the view, the magnitude of effect would not increase above medium, principally owing to the range at which they would be seen. Forestry removal during construction would also be visible, although these operations would appear relatively small scale from this range.

Significance of the Effect

5.8.265 The effect of the operational stage of the proposed development would be not significant. This relates chiefly to the context created by the existing Hadyard Hill Wind Farm, which already defines the character of the view and which means that the addition of the proposed development would not redefine the character of the view.

5.8.266 The effect of the construction and decommissioning stages of the proposed development would also be not significant.

Viewpoint 19: Cairnsmore of Carsphairn

Baseline

5.8.267 This viewpoint is located at the summit of Cairnsmore of Carsphairn (797 m AOD) in the Southern Uplands LCT. It is representative of the views of hill walkers on this hill. The direction of the view is west towards the proposed development which would be located at a minimum distance of 26.69 km from the viewpoint.

5.8.268 Cairnsmore of Carsphairn is the highest hill in the Southern Uplands LCT and as such, it affords panoramic views in all directions. The most dramatic views occur to the south-west where the Rugged Granite Uplands LCT of the Rhinns of Kell and Merrick
occur. With the view extending from ridge to ridge of increasingly distant hills a sense of the depth of the wider upland landscape is experienced.

5.8.269 The view to the west looks across the Rugged Uplands with Lochs and Forest LCT which surround Loch Doon and Loch Braden and beyond that the Foothills with Forest and Wind Farms LCT, where the proposed development would be located. The depth of the upland landscape makes the site appear distant and much of the focus of the view rests on the closer range and more dramatic upland ridges.

5.8.270 In clear conditions many of the operational and under construction wind farms are visible. Operational Hadyard Hill is seen at a range of 29.60 km, set in the same Foothills with Forest and Wind Farms LCT as the proposed development would be. It appears as a distant group of small scale turbines, mostly set below the skyline and generally appearing as a discreet feature, especially in contrast with Windy Standard, and under construction Windy Standard Extension which are located at the minimum distances of 3.73 km and 2.87 km to the north-east.

**Sensitivity**

5.8.271 The value of the view is medium. The summit marks a natural viewpoint from which hill walkers would appreciate the panoramic view. The rating is prevented from being high by the regional, rather than national designation which applies to the landscape. While Cairnsmore of Carsphairn marks the core of the Southern Upland Hills, evidence of large scale wind farm developments detracts from the overall value of the view, especially in respect of close range Windy Standard and its extension to the north-east.

5.8.272 The susceptibility of hill walkers to the proposed development would be medium. Wind farm development is an established feature of the baseline character of the view and has a notable influence owing to the close proximity of Windy Standard. Furthermore, the proposed development would be seen as a distant feature and this would further reduce the susceptibility of hill walkers.

5.8.273 The combination of the value of the view and the susceptibility of hill walkers leads to an overall medium sensitivity.

**Magnitude of Effect**

5.8.274 The magnitude of effect that the proposed development would have on the view would be low. This relates principally to the distance of 26.69 km from which the proposed development would be seen and which would make the proposed turbines appear as small scale features. Collectively they would occupy only a small proportion of this westerly sector of the view and an even smaller proportion of the wider 360 degree view.

5.8.275 The proposed development would be seen as an apparent extension to the existing Hadyard Hill Wind Farm and therefore would not be seen to introduce development into a previously undeveloped sector of the view. It would be seen associated with the upland landscape, which would follow the pattern established by other wind farm developments in the wider view.

**Significance of the Effect**

5.8.276 The effect of the proposed development during construction and operation would be not significant. This relates chiefly to the long range of the viewpoint, which means that the proposed development would be seen as a small and distant feature in the
view. It would also be seen in the context of the existing Hadyard Hill Wind Farm and while it would increase the extents of wind farm development, this increase would be proportionally small and within a sector already characterised by wind farm development, and would not redefine the character of the view.

**Viewpoint 20: NCR7 near Doughty Hill**

**Baseline**

5.8.277 This viewpoint is located on the minor road between Glenn Trool and Crosshill, in the section north of South Balloch, near Doughty Hill. This minor road forms part of NCR7 and core path SA1. The view towards the proposed development is orientated west and the closest turbine would be located at a distance of 0.35 km from the viewpoint.

5.8.278 The viewpoint is located in the Foothills with Forest and Wind Farms LCT, with foothills and forest readily evident from the viewpoint, but not wind farms. The foothills are modest in scale and characterised by their gently rounded landform and mix of rough grassland and forestry landcover. While evidence of farming and forestry denotes the modified nature of this landscape, and the minor road and occasional farmstead denotes the settled nature, there is some sense of remoteness also evident, largely relating to the low levels of human intervention in this landscape.

5.8.279 The view from this viewpoint is largely contained by a combination of landform and forestry. Set within an upland valley, the land rises to the west and east, as well as to the north. To the west of the minor road, the forestry is recessed up the hill slope, such that there is some open moorland in the foreground to the afforested skyline. The view channelled south through the valley landform is more expansive, extending across the Stinchar Valley to the elevated outline of the Rugged Uplands LCT.

**Sensitivity**

5.8.280 The value of this view is medium. This is an informal viewpoint which people would experience incidentally from the road. It is not a specific viewpoint people would visit to enjoy scenic views and there are no lay-bys or car parks along this road to encourage road-users to stop. It is, however, part of NCR7 and this raises the value of the view.

5.8.281 The susceptibility of road-users would be medium to high. The proposed development would be located in close proximity to the viewpoint and this raises the susceptibility of road-users. Furthermore, wind farm development is not a feature of the baseline character, such that the view currently appears undeveloped and the addition of the proposed development would introduce this type of development into the view.

5.8.282 The combination of the value of the view and the susceptibility of road-users to the proposed development leads to an overall medium to high sensitivity.

**Magnitude of Effect**

5.8.283 The magnitude of effect as a result of the proposed development would be high. The proposed development would introduce wind farm development into a view where currently there is no large scale development. Eleven of the 31 turbines would be potentially visible and at the minimum distance of 0.35 km would appear large in scale in comparison to the scale of the landform, despite some being partially screened by the intervening landform.
5.8.284 While much of the infrastructure would be concealed by the intervening landform, the access tracks to the few close range turbines, as well as the transformers located at the base of each, would be readily apparent and would add to the extent of development and the magnitude of effect.

5.8.285 During construction and decommissioning, visibility of the turbines combined with visibility of the tall cranes used in the erection and dismantling would give rise to a high magnitude of effect from this viewpoint. Forestry removal of all on-site forestry would also be evident from this viewpoint, although as a baseline characteristic of the surrounding landscape this would not have such a notable effect on the view. While in the short term the residual effects of forest clearance would be visible, the wider benefit would be the removal of a modified feature and the return of the Foothills to a broader extent of open moorland.

**Significance of the Effect**

5.8.286 The effect of the proposed development on the view would be significant. This finding relates chiefly to the close proximity of the proposed development to the viewpoint which means that the proposed turbines would appear as large scale structures, at variance with the baseline character, which currently does not feature wind farm development.

5.8.287 The effect of the construction and decommissioning stages of the proposed development would be significant.

**Viewpoint 21: Shalloch on Minnoch**

**Baseline**

5.8.288 This viewpoint is located at the summit of Shalloch on Minnoch in the south Carrick Hills. It is representative of the views of hill walkers on this hill and in the WLA. The direction of the view is north-west towards the proposed development which would be located at a minimum distance of 10.59 km from the viewpoint.

5.8.289 The route, starting at Bells Memorial on the Bargrennan to Crosshill minor road, follows forest tracks to the abandoned cottages also named Shalloch on Minnoch. From here the route follows Shalloch Burn through forestry and over marshy and uneven terrain. After two burn crossings, and once out onto the open hillside, there is no clear route through the heather and rough grasses to the summit. While this hill does not appear to attract large numbers of hill walkers, it is part of a circular route from the Merrick and so walkers typically approach from the south and descend down off Shalloch on Minnoch back to the minor road.

5.8.290 The viewpoint is located in the Rugged Uplands LCT looking out to the Foothills with Forest and Wind Farm LCT, where Auchensoul Hill (314 m AOD), Mull of Miljoan (356m AOD) and Daljedburgh Hill (374 m AOD), form a distinct ridgeline. The hills are relatively low and smoothly rounded, and are interlocked to form a level ridgeline marked only by the incisions through the hill slopes of where they join. Their cover comprises a mosaic of forestry and moorland, a characteristic feature of the foothills in this area.

5.8.291 Set behind the ridge of the ridgeline of hills is the operational Hadyard Hill Wind Farm which at a range of 13.07 km appears relatively small in scale. It is seen at its fullest horizontal extents, following the alignment of the foothills ridge, which partially screens some of the turbines. More distant operational wind farms are also visible, with Mark Hill and Arecleoch forming a cluster to the south-west, and Windy Standard and Hare...
Hill, as well as under construction Windy Standard Extension theoretically visible to the north-east, although difficult to make out except in very clear conditions.

5.8.292 The foothills which lie to the north and north-west appear comparatively lower, more uniform and more extensively afforested than the more elevated and rugged uplands where the viewpoint is located, as well as to the south and east. The foothills lack the same scenic interest evident in the uplands and this reduces their attraction within the wider view. The character is principally influenced by the Rugged Uplands with the Foothills appearing as more of a background feature. The Merrick ridge dominates the view to the south, while the view to the east and north is characterised by expansive views across the Rugged Uplands LCTs where the more rugged middle-ground hills and lochs add to the scenic interest. There is little visible development in these sectors and the scenic interest tends to draw viewers’ attention more than the other sectors.

Sensitivity

5.8.293 The value of the view is medium to high. Although it does not appear to attract the same volume of walkers as Merrick or Cairnsmore of Carsphairn, it is visited by hill walkers, including those who undertake the ridgeline walk from Merrick to Shalloch on Minnoch. The summit marks a natural viewpoint from which hill walkers would appreciate the panoramic view and although wind farms and forestry are evident from the viewpoint, the closer range landscape has less evidence of human intervention.

5.8.294 The susceptibility of hill walkers to the proposed development would be medium. The rating is moderated by the presence of existing wind farm development in the same sector of the view, and on the same range of Foothills, as where the proposed development would be located. This means it would not be seen to introduce wind farm development into a sector where it was not previously present. It would also be seen associated with the Foothills LCT, and not impinge on the Rugged Uplands LCT which primarily characterises this view.

5.8.295 The combination of the value of the view and the susceptibility of hill walkers leads to an overall medium to high sensitivity.

Magnitude of Effect

5.8.296 All 31 of the proposed turbines would be seen from this viewpoint. 14 of these would be seen to the fore of the existing Hadyard Hill turbines, while the remaining 17 would be seen offset to the right. The location of the proposed development on the same foothill ridge and the extent of overlap with the existing turbines ensures that it would appear as an extension to the existing development. The scale of the proposed turbines would be comparable to that of the existing turbines and with the closest seen at a range of 10.59 km they would appear as medium to small scale elements within the wider landscape and wider view. Their prominence would also be reduced by the back-clothing effect of the more distant landform and their relatively even spacing.

5.8.297 It is the additional horizontal extents of the proposed development that would give rise to the most notable magnitude of effect. The existing development already spans a considerable extent of the foothills ridge and while there is some overlap between the two, there would also be some extension of proposed turbines to the right. There would be less screening of the proposed turbines by intervening landform such that more would be seen at their full height and owing to their slightly closer range and more elevated positions, they would appear more prominent. In clear conditions the turbines on the right would be seen to extend to the fore of the distant outline of North Arran.
5.8.298 Despite this increase to the horizontal and vertical extents, the proposed development would be seen as an extension to the existing development, and within the wider view, associated with the less remarkable Foothills LCT in contrast to the more remarkable Rugged Uplands LCT within which the viewpoint is located and which would continue to characterise the view. Taking this into account the magnitude of effect would be medium to low.

5.8.299 Site infrastructure, including tracks, would not be readily evident from the minimum distance of 10.59 km, although the removal of forestry across the site would be visible. This would give the Foothills a more upland character and provide continuity in the appearance of the wider Foothills ridge.

5.8.300 The erection and dismantling of the turbines using tall cranes would be the most evident part of the construction and decommissioning work, and although visible from this viewpoint, at the minimum distance of 10.59 km and in the context of operational Hadyard Hill, the magnitude of this effect would be medium to low.

**Significance of the Effect**

5.8.301 The effect of the operational stage of the proposed development on hill walkers experiencing this view would be not significant. Despite the increase in horizontal extents as a result of the proposed development, this addition would not redefine the character of the view, which would continue to be defined by the Rugged Uplands LCT evident at closer range to the south and east. The nature of the effect would be adverse.

5.8.302 The effect of the construction and decommissioning stages of the proposed development would also be not significant.

**Viewpoint 22: Cornish Hill**

*Baseline*

5.8.303 This viewpoint is located at the summit of Cornish Hill in the south Carrick Hills. It is representative of the views of hill walkers on this hill and is on the northern boundary of the WLA. The direction of the view is north-west towards the proposed development, which would be located at a minimum distance of 9.02 km from the viewpoint. Cornish Hill is accessed following a formal path, sign-posted from Stinchar Bridge on the Bargrennan to Crosshill minor road. It is a short walk, through forestry and then over gentle hill slopes to the summit.

5.8.304 Cornish Hill is situated in the Rugged Uplands LCT with the view looking north towards the Foothills with Forest and Wind Farms LCT where the proposed development would be located. The Rugged Uplands LCT which surrounds the viewpoint is made distinct from the Foothills LCT by the extent of exposed rock and the cragginess of the landform. This gives the impression that the hills are more mountainous than they actually are and adds to the overall scenic value. While the forestry also adds to the character of the landscape, the large blanket coverings with geometric edges and single species denote the extent to which human modification has taken place in this landscape.

5.8.305 Cornish Hill is set on the same hill ridge as Shalloch on Minnoch, albeit at a lower elevation and at a slightly closer range to the proposed development. The lower elevation means that lesser extents of the operational wind farms are visible, with Hadyard Hill Wind Farm being visible only as tips set behind the Foothills ridge at a
minimum distance of 11.48 km and the other operational wind farms being screened completely.

5.8.306 The principal draw for viewers is channelled to the north where the elevation of the land falls away and as a result the view is most expansive. Here, the gently undulating foothills are characterised by the forest and moor mosaic typical of this type. To the east the forestry subsides to reveal the more rugged hills and occasional lochs, which combine to create scenic interest. To the south, the elevation of the hills mounts towards the high point of the Merrick and the undeveloped nature of this view adds to its sense of remoteness and wildness. In contrast, the view to the west, where the proposed development would be located, is less expansive and relatively unremarkable in terms of scenic value.

Sensitivity

5.8.307 The value of the view is medium to high. The provision for walkers encourages use of this route to Cornish Hill and marks it as a visitor attraction. The summit marks a natural viewpoint from which hill walkers would appreciate the wider view. The rating is prevented from being high by the regional, rather than national designation of the landscape and the extent of large scale forestry evident within local parts of the view.

5.8.308 The susceptibility of hill walkers to the proposed development would be medium. Although the summit is not a formal viewpoint, a large part of the hill walking experience involves the enjoyment of panoramic views from the summit and this raises the value of the view. The rating is prevented from being medium to high by the presence of existing wind farm development in the same sector as the proposed development and which would reduce the susceptibility of hill walkers.

5.8.309 The combination of the value of the view and the susceptibility of hill walkers leads to an overall medium to high sensitivity.

Magnitude of Effect

5.8.310 All 31 turbines would be theoretically visible, seen at a minimum distance of 9.02 km, although actual visibility would comprise 26, as five would occur as tips and therefore not be readily visible. They would form a distinct group set on the ridge of the foothills and seen against the open skyline. Although they would be seen as an extension to the operational Hadyard Hill, their location to the fore of the existing turbines and closer to the viewpoint, as well as more elevated in terms of position on the ridgeline, means they would appear larger in scale. They would also increase the horizontal extents and being seen against the open skyline would form a prominent feature.

5.8.311 While the factors above add to the magnitude of effect, there are also a number of factors which moderate it. Firstly, there is the issue of scale, whereby at a minimum distance of 9.02km the turbines would appear as medium to small scale elements and would appear to fit with the broad horizontal scale of the foothills on which they sit. Secondly, there is the association of the proposed development with the existing development such that it is not introducing wind farm development into a view where previously this was not evident. Thirdly, there is the association of the proposed development with the sector of the view which is the least remarkable in comparison with the other sectors of the view. This means it would not impinge on the more scenic sectors to the south and east or the more expansive sector to the north.

5.8.312 Taking all these factors into account the magnitude of effect on this view as a result of the proposed development would be medium. Site infrastructure would be screened by the intervening ridgeline. Forestry removal would, however, be evident
where seen in association with the proposed turbines on the right of the group. As there is already a mosaic of forestry and rough grassland evident along the Foothills ridge, this change would not give rise to a notable effect.

5.8.313 While much of the construction and decommissioning operations would take place behind the ridgeline, the erection and dismantling of the turbines using tall cranes would be visible, especially in association with the turbines set along the ridgeline. The magnitude of effect would be medium.

Significance of the Effect

5.8.314 The effect of the proposed development would be significant. The additional horizontal extents formed by the proposed development, and its prominence along the skyline would redefine the character of this view, despite the existing presence of Hadyard Hill Wind Farm.

5.8.315 The effect of the construction and decommissioning stages of the proposed development would also be significant.

Principal Visual Receptors

5.8.316 The second part of the assessment of effects on views is the assessment of effects on principal visual receptors. The principal visual receptors considered in the assessment include settlements and route corridors (including roads, railways, national cycle routes, long distance footpaths and core paths). These are shown on Figure 5.6, and in conjunction with the ZTV on Figure 5.12. The criteria used to select the principal visual receptors are described in the baseline section of this chapter.

5.8.317 The first step in the assessment of effects on principal visual receptors is an initial assessment to ascertain which of the receptors have potential to be significantly affected by visibility of the proposed development. This process is carried out through a desk study and site survey which examines the visibility of the proposed development from the principal visual receptors, using the ZTV and wirelines. Those receptors which have the potential to be significantly affected are identified in Technical Appendix 5.2.

5.8.318 This filtering process has indicated that of the principal visual receptors, two settlements, four roads, one of which incorporates a long distance footpath and National Cycle Route, require detailed assessment;

- Barr (Viewpoint 6);
- Dailly (Viewpoint 12);
- B734 (Viewpoints 4 and 16);
- B741;
- Bargrennan to Crosshill minor road / NCR7 / SA1 (Viewpoint 8 and 20); and
- Barr to Balloch minor road (Viewpoint 10).

5.8.319 Reference is made to the viewpoints which have been selected to represent these principal visual receptors and which have been assessed in detail in the previous section. The effects on the principal visual receptors are described below.
**Barr**

**Baseline**

5.8.320 Barr is a small village which lies in the *Intimate Pastoral Valley* LCT of the River Stinchar with the proposed development located to the north and north-east. Its position marks the confluence between the Water of Gregg and the Water of Girvan, with the core of the settlement centred on the Water of Gregg. As such, the majority of the properties are located in the lowest lying part of the valley where mature tree cover adds to the enclosure of the landform and buildings. The village is well contained within the valley with the exception of the northern part of Glengennit Road which extends onto the brow of the valley side.

5.8.321 Despite the containment of the landform, buildings and mature tree cover, there are localised areas where views extend out to the surrounding hills, most notably Auchensoul Hill (314 m AOD) which lies to the north-west of the village. These more open views occur from the centre of the village where the Adult Education Centre, putting green and cemetery are located as well as from the modern development on the south side of the river. Glimpsed views occur from other parts of the village, whereby the hills to the north are seen between buildings and trees.

5.8.322 Properties aligning the Glengennit Road, which rises up out of the valley to the north-east of the village centre, face in towards the road, such that views remain largely contained. It is only on the upper part of Glengennit Road, at the northern end of the village, that a row of properties are afforded open views to the north-west and visibility of the existing Hadyard Hill Wind Farm becomes readily apparent. It is seen as one turbine and four blades set to the right of Mull of Miljoan.

5.8.323 The village is small in scale and rural in character, with many of the buildings following the local vernacular style and with little modern development having occurred except from on the south side of the river. The majority of the settlement is covered by a Conservation Area designation with the exception of the area south of the river. The settlement is largely introverted owing to the valley landform, and although not always readily visible, the foothills to the north and north-west play an important part in the setting of the village.

**Sensitivity**

5.8.324 The value of the visual amenity in Barr is medium to high. This reflects the Conservation Area status of the village and its location in the South Carrick SA. It also reflects the importance of the Foothills to the character of the village setting.

5.8.325 The susceptibility of residents would also medium to high. There is the potential that they could experience views from within their properties, private garden grounds and public open spaces, including streets. The foothills to the north and north-west provide an important part of the setting to the village, although visibility from the village of the proposed development would be largely precluded by the screening effect of landform, buildings and trees, with the exception of the central area and the northern edge.

5.8.326 The combination of the value of the visual amenity and the susceptibility of residents to the proposed development leads to an overall medium to high sensitivity.
Magnitude of Effect

5.8.327 The ZTV shows that theoretical visibility would extend across the village with potentially 1-7 turbines visible from those parts situated close to the village centre and potentially 29-31 visible from the more elevated outer edge to the north. Actual visibility from the settlement would be greatly reduced by the screening effect of built form and tree cover, such that the potential for clear visibility would occur only from localised areas around the village centre, in the housing development to the south of the river and along the northern extent of Glengennit Road.

5.8.328 The magnitude of effect from the majority of the village would be low as a result of visibility being limited to occasional glimpses of a small number of partially screened turbines. In the central part of the village, around the Adult Education Centre, putting green and cemetery the magnitude of effect would be medium to high. Despite the relatively small number of turbines that would be visible on Mull of Miljoan (356m AOD), the prominence of this elevated hill in views from this lower lying settlement would accentuate the presence of the turbines, making them a notable feature in the views. Similar views may also be glimpsed from the properties, gardens and streets in the modern housing on the southern side of the river and here also the magnitude of effect would be medium to high.

5.8.329 The proposed development would also be seen from Glengennit Road on the northern edge, as Viewpoint 6 illustrates. The viewpoint assessment identifies a medium to high magnitude of effect and a significant effect as a result of the proposed development.

5.8.330 Site infrastructure would generally not be visible from Barr owing to the screening effect of the ridgeline, in combination with the trees and buildings in and around the settlement. An exception to this occurs along the northern edge where views extend to the group of turbines set to the east. In terms of site infrastructure, some site tracks may be evident from the northern edge of the settlement, in the view towards the east, where the turbines are seen set along Milton Hill and Daljedburgh Hill at a range beyond 3.4 km. These would add to the magnitude of effect by adding a further modification to the otherwise homogenous ground cover.

5.8.331 The narrow band of forestry around the rim of these hills would also be removed, although this change would not detract so noticeably from the character of the view. The same medium to high rating would apply to the magnitude of effect experienced across this northern edge and would relate to the relatively close proximity of the proposed turbines and their prominence within views from this part of the settlement.

Significance of the Effect

5.8.332 The effect during the operational stage of the proposed development on the residents of Barr would be significant along the northern edge, in the centre and along the southern edge. Despite the low levels of visibility occurring from within the village, and the often glimpsed nature of these views, the association of the proposed turbines with the prominent skyline of Mull of Miljoan increases the potential effect. The effect on the remaining parts of the village would be not significant, largely owing to no or limited visibility of the proposed development.

5.8.333 The effect during the construction and decommissioning stages of the proposed development would also be significant, although only on the northern edge, from where operations would be more readily visible. Tall cranes used to erect and dismantle the proposed turbines would be visible behind the ridgeline, as well as on
the more exposed section of the site on Milton Hill and Daljedburgh Hill to the east. The magnitude of effect as a result of the construction and decommissioning operations would be medium to high.

**Dailly**

**Baseline**

5.8.334 The village of Dailly lies in the *Middle Dale* LCT of the Water of Girvan to the north of the *Foothills with Forest and Wind Farms* LCT. The village has evolved in relation to the Water of Girvan, with the Main Street running parallel to its course and the village centre close to the riverside. As such, much of the village is set low within the valley or on the southern valley slopes leading towards the river. Views are typically contained by the buildings arranged in traditional street patterns and by mature tree cover especially along the edges abutting the Water of Girvan and Bargany Estate.

5.8.335 The development of the village has been contained on the southern side of the river, with more modern housing extending up the valley side. The B741 follows Linfern Road and Main Street around the northern edge of the village to the bridging point over the Water of Girvan beyond which the B741 remains on the northern side of the river. The road that marks the southern edge of the village forms the minor road to Old Dailly, where it connects with the B734.

5.8.336 Properties along the southern and eastern edges of the village face out towards the *Foothills with Forest and Wind Farms* LCT in which Hadyard Hill (324 m AOD) forms the highest point in the long and gently undulating ridgeline of hills. The hills form a prominent feature owing to their close proximity and despite not being especially high. There is no visibility of the existing Hadyard Hill Wind Farm from Dailly and the open outlook forms an important aspect of this village edge.

**Sensitivity**

5.8.337 The value of the visual amenity in Dailly is medium to high. Although covered by the South Carrick Scenic Area, Dailly is not designated as a conservation area and although it does not attract visitors like Barr does, the nearby Bargany Estate and Brunston Castle Golf Course do. Views from the majority of the residential properties are inward looking within the village and therefore do not have a strong association with the surrounding landscapes, with the exception occurring in the localised area on the southern and eastern edges.

5.8.338 The susceptibility of residents in the village is medium. For the majority of residents, views from properties are contained in extents by the confines of other built form in the village or by mature tree cover. It is only along the southern edge of the settlement that views open up, and it is the *Foothills* which form the main feature in these views.

5.8.339 The combination of the value of the visual amenity and the susceptibility of residents to the proposed development results in an overall medium to high sensitivity.

**Magnitude of Effect**

5.8.340 The ZTV shows that levels of visibility occur in bands, with the south-western section shown to gain visibility of 8-14 turbines and the north-eastern section to gain visibility of 15-21 turbines with some small intermediate patches of 1-7 turbines or no visibility. Site visits have shown that actual visibility would be greatly reduced by the screening effect of the buildings in the village, such that only glimpsed views along streets aligned towards the proposed development would be available and showing only a
very small number of partially concealed turbines at ranges beyond approximately 3.2 km. For the majority of residents, the magnitude of effect would be low.

5.8.341 Actual visibility would be largely limited to the southern and eastern edges of the village where there is no built form to screen views, albeit some screening occurs from localised landform where Dailly Cemetery is located. Visibility would typically comprise 8-14 turbines that would be seen across the lower hills, from Hadyard Hill (324 m AOD) to the south, and Barony Hill (319 m AOD) to the east. As the properties on the southern edge are mostly orientated southwards and the proposed turbines are located to the south-east, only a few properties would gain direct views of the proposed development. Views would however be apparent from private garden grounds and public streets on this side of the village.

5.8.342 The magnitude of effect from the southern and eastern part of the village would be medium to high. There is currently no visibility of wind farm development from the village so the proposed development would appear as a new feature, as well as a new focus in views, and this adds to the magnitude of effect. The relatively contained extents of the turbines, their location in the trough between the higher hills on either side and their distance beyond 3.2 km from the settlement edge ensures that the magnitude of effect would not exceed medium.

5.8.343 While site infrastructure would be largely concealed behind the ridgeline, a track connecting to T1 would be visible against the otherwise homogenous ground cover of the hill and this would add to the magnitude of effect. Forestry removal would be evident on Craiginmoddie Hill, where clear felling of this large block would help to restore the open ridgeline, which would make this hill more characteristic of the upland landscape. Taking all these factors into account, the magnitude of effect on the southern and eastern edges of the settlement, as a result of the proposed development would be medium.

Significance of the Effect

5.8.344 The effect during the operational stage of the proposed development on the visual amenity of most of Dailly would be not significant owing to the limited visibility experienced across the majority of the settlement. Although the proposed development would not be directly visible from most of the properties on the southern edge of the village, it would be visible from some on the eastern edge, as well as garden grounds and public streets. Owing to the sensitivity of residents and the proximity of the turbines, the effect would be significant during the operational stage. The nature of the effect would be adverse.

5.8.345 The effect of the construction and decommissioning stages of the proposed development would be not significant, owing to the limited visibility experienced across the majority of the settlement. The exception to this would occur along the southern edge of the settlement, and while much of the construction and decommissioning operations would be concealed by the ridgeline, the erection and dismantling of the turbines using tall cranes would be visible, especially in association with the turbines on the ridgeline. Forestry removal during construction would also be evident from the southern edge of the settlement, although this is a more typical feature of this area, and therefore would not give rise to such a notable effect. The magnitude of effect on the southern and eastern edges of the village during construction and decommissioning would be medium and the effect would be significant.
B734

Baseline

5.8.346 The B734 is the minor road that forms a loop from the A77 at Girvan to the A714 south of Pinmore, via the village of Barr. From the A77 just north of Girvan it passes eastwards through the Lower Dale LCT of the Water of Girvan, then south across the Foothills with Forest and Wind Farms LCT where Hadyard Hill Wind Farm is located, down to Barr and then through the Intimate Pastoral Valley LCT of the Stinchar valley to lead back to where it connects with the A714, south of Pinmore.

5.8.347 The road appears to be used primarily for local access to farms and properties, although used also by visitors to Barr and the surrounding countryside. There are no formal viewpoints or laybys along the route, although Barr appears to be a popular place to attract visitors and from where countryside walks can be enjoyed.

5.8.348 The landscape experienced by road-users on this route varies in respect of the different LCTs it passes through. In the southern section it passes through the Intimate Pastoral Valley LCT of the Stinchar where the narrow valley is channelled between the enclosing foothills and the sense of enclosure is accentuated by the mature tree cover which occurs intermittently along the road-side. This has the effect of visibility of the surrounding landscape being contained in extents and often screened from the views of road-users.

5.8.349 The road dips down into the village of Barr where the enclosure of the landform, built form and trees, largely screens views of the surrounding landscape. The village is covered by a Conservation Area designation and is small in scale and traditional in character. Beyond Barr the road climbs up into the Foothills with Forest and Wind Farms LCT where, beyond enclosure by trees and landform, the landscape opens up into a moorland of rough grasses and scrub. Here the character becomes more notably influenced by the presence of the existing Hadyard Hill Wind Farm, whereby large scale turbines appear in close proximity on both sides of the road.

5.8.350 Beyond the Foothills the road then descends down to Penkill and Old Dailly which lie in the Lower Dale LCT of the Water of Girvan, characterised by fields of improved pasture and the more intimate enclosure of mature hedgerows and tree cover. Views again become more contained in extents and the landscape appears more settled and extensively cultivated by farming and forestry.

Sensitivity

5.8.351 The value of the views of road-users on the B734 is medium. There are no formal viewpoints along the route which would denote a special value, nor are there any laybys which would otherwise encourage road-users to stop. There are no special tourist route designations although the route is marked as a local cycle route.

5.8.352 The susceptibility of road-users to the proposed development varies depending on which section of the road they are travelling along. The susceptibility of road-users in the Stinchar valley and through Barr is medium, as wind farm development is currently not a prominent feature from these sections of the road, although the landscape is settled and modified through farming and forestry. From Barr through to Penkill the susceptibility is low as the close range Hadyard Hill Wind Farm already has a strong influence on the character of the views. Then again, visibility of Hadyard Hill Wind Farm from Penkill to Girvan is limited, although settlement, farming and forestry are all evident, leading to an overall medium susceptibility in this section.
5.8.353 The combination of the value of the B734 and the susceptibility of road-users to the proposed development gives rise to an overall sensitivity of medium for the majority of the route, with the exception of the section between Barr and Penkill where the sensitivity would be medium to low owing to the existing influence of Hadyard Hill Wind Farm.

Magnitude of Effect

5.8.354 The assessment considers the effects of east-bound road-users on the section through the Stinchar Valley, and the section through the Water of Girvan Valley and then both north and south-bound road-users passing over the foothills between these two valleys. This is because road-users travelling in the opposite directions to those stated above would be unlikely to experience a significant effect as they would be travelling in the opposite direction to where the proposed development would be situated. Site infrastructure would not be visible from the B734, with the exception of a short section where the road comes into close proximity near Doon Hill, and new access tracks would be visible in part.

5.8.355 The ZTV on Figure 5.7 shows that theoretical visibility occurs almost continuously along the section through the Stinchar Valley albeit with some patches where no visibility occurs. The levels of visibility increase from west to east with patches of no visibility and 1-7 turbines interspersed between the A714 and Pinclanty and then patches of 8-14 and 15-21 turbines shown to be visible between Pinclanty and the high point at 95 m west of Doularg. From here, visibility to Alton Albany increases to 22-28 turbines before decreasing to 15-21 turbines on the approach into Barr.

5.8.356 Actual visibility is notably less owing to the screening effect of close and medium range tree cover such that only from certain sections would east-bound road-users be able to gain visibility. The most notable section would be the approach into Barr from Alton Albany from where turbines would be visible to the left of the summit of Auchensoul Hill 314 m AOD. Five or six turbines would be visible, three potentially at almost full height, and at a minimum range of 2.5 – 3 km would form a prominent feature on the skyline. The group of turbines to the right would be largely screened by intervening tree cover. The magnitude of effect on east-bound road-users on this section of the road would be medium to high.

5.8.357 In the section between the wooded enclosures around Doularg and Alton Albany filtered views through intermediate trees would occur to east-bound travellers at a slightly oblique angle to the north. Typically one turbine and two blades would be seen as prominent features at a minimum range of 3-4 km and associated with Auchensoul Hill, while again the larger group of turbines to the right would be largely obscured by intervening tree cover, as are the existing Hadyard Hill turbines. The magnitude of effect on east-bound road-users on this section of the road would be medium.

5.8.358 Further west from Doularg visibility becomes intermittent with road-side trees either fully or partially screening views towards the proposed development in all but a few sections. Where open views do occur over roadside hedgerows to the Foothills ridge, the proposed development would still form a readily apparent feature and seen in a context where other wind farm developments are not obviously visible, the magnitude of effect would be medium. These open sections are limited in extents, occurring for an approximate 300 m section west of Doularg, and an approximate 150 m section east of Merkland.
5.8.359 For east-bound road-users travelling between the A714 and Pinclanty, the magnitude of effect would be medium to low or low, owing to the more limited extents to which the proposed development would be visible and the greater range at which the proposed turbines would be seen. Again visibility would be very intermittent owing to close and middle range tree cover.

5.8.360 As the B734 passes through Barr, visibility becomes reduced by the enclosure of the built form and tree cover, and it is only once the road has bridged over the River Stinchar that visibility resumes, albeit of the turbines associated with Mull of Miljoan (356 m AOD) rather than Auchensoul Hill (314 m AOD) which are largely obscured by tree cover. While visibility of some Hadyard Hill turbines already exists along this section of the B734, the proposed turbines would have more of a presence owing to their larger numbers and more prominent position in relation to the landform. Tree cover is intermittent and visibility would largely persist until the turn into the valley of the Pingerrach Burn. For this section the magnitude of effect for north-bound road-users would be medium.

5.8.361 The cumulative ZTV shows that levels of visibility from the B734 would be consistently low across the foothills, with only 1-7 of the proposed turbines theoretically visible. This is as a result of the screening effect of the Mull of Miljoan which essentially screens the remainder of the proposed development in views from the B734. Typically 4 to 6 of the closest range turbines would be visible and although seen as large scale elements owing to the proximity of the road, they would appear comparable in scale and well integrated with the existing Hadyard Hill turbines. This is the only section of the B734 from which site infrastructure would be readily visible, albeit only with short sections of new access tracks and an operations / welfare building close to the road, these components would not make a notable addition to the effect. Viewpoint 16: B734 Doon Hill has been assessed as having a medium to low sensitivity and would undergo a medium to low magnitude of effect and a not significant effect as a result of the proposed development. Similarly, the magnitude of effect would be medium to low for both north and south-bound road-users across this section of the B734.

5.8.362 From south of Penkill to Girvan the ZTV shows there would be practically no visibility of the proposed development and therefore there would be no effect.

Significance of the Effect

5.8.363 The effect during the operational stage of the proposed development on the views of road-users on the B734 would be not significant along the majority of the route with the exception of the section east of Merkland, the section west of Doularg, then the section between east of Doularg and Barr for east-bound road-users and the section north of Barr for north-bound road-users, where the effects would be significant. This finding relates chiefly to the prominence of the turbines associated with the elevated and enclosing skyline to the lower lying valley landscapes, as well as the limited or absent visibility of existing Hadyard Hill Wind Farm. The nature of the effects would be adverse.

5.8.364 The effect during the construction and decommissioning stage of the proposed development would be not significant for the majority of the B734 owing to the screening effect of the operations by the Foothills ridgeline. The exception to this would occur between Alton Albany and Doon Hill, where the turbines and tall cranes used during construction and decommissioning would form a large scale and prominent feature, especially owing to the activity associated with these operations. Furthermore, the operations building would be constructed next to the B734 at Doon...
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Hill and this would add to the magnitude of effect. The effect in this section would be significant during construction and decommissioning.

**B741**

**Baseline**

5.8.365 The B741 is the minor road that connects New Cumnock in the east and Girvan in the west. The section which is most relevant to this assessment follows the Middle Dale and Lower Dale LCT of the Water of Girvan between Cloyntie and Girvan, as this section is closest in range and the ZTV shows theoretical visibility occurring almost continuously along this section.

5.8.366 Mature woodland is one of the main characterising features of the Middle Dale LCT. This means that sections of the B741 are enclosed by tree cover and views are often confined to the road corridor. While visibility is generally restricted, notable open sections occur between Ruglen and the bridging point over the River Girvan to the south-east, then between the junction with the Hadyard Hill minor road to the western edge of Dailly, and then from Low Craighead to the A77. Where open sections occur, views typically extend out across the farm fields of the valley landscape and when orientated southwards, feature the ridgeline of the Foothills with Forest and Wind Farms LCT where the proposed development would be located.

5.8.367 The existing Hadyard Hill Wind Farm is already apparent to road-users from sections of the B741, albeit from localised sections and with visibility that is limited in extents. From the open section to the south-east of Ruglen, Hadyard Hill is seen as a small group of blades seen set behind the Foothills ridge, while in the section between Low Craighead and the A77, a small group of blades is also visible, albeit set to the right of Hadyard Hill. In the central section around Dailly, there is either no or low visibility.

**Sensitivity**

5.8.368 The value of the visual amenity associated with the B741 is medium. It is not recognised as a tourist route and there are no formal lay-bys or stopping points that would otherwise encourage road-users to stop and enjoy the views. The road passes through a settled landscape which has been modified by farming and forestry practices and which generally appears unremarkable in scenic terms.

5.8.369 The susceptibility of road-users on the B741 is medium. The landscape is characterised by the enclosure of tree cover such that views towards the proposed development would be limited in extents. Furthermore, wind farm development is already a visible feature in views from localised sections, with intermittent and limited visibility occurring of operational Hadyard Hill seen set on the Foothills to the south of the road.

5.8.370 The combination of the value of the view and the susceptibility of road-users to the proposed development leads to an overall medium sensitivity.

**Magnitude of Effect**

5.8.371 The magnitude of effect is largely determined by the extent to which the views of road-users are screened by tree cover, such that the almost continuous theoretical visibility shown to occur on the ZTV, is greatly reduced by tree cover. Site infrastructure would generally not be visible from the B741, owing to the screening effect of the Foothills ridgeline. The exception to this would occur where a short section of new access
track may be seen to extend over the ridgeline, but this would not be a readily apparent feature and would have a limited influence on the magnitude of effect.

5.8.372 For road-users travelling south-bound, there would be visibility of the proposed development in sections between Cloyntie and Dailly, but beyond Dailly tree cover would screen views and then where views open up beyond Bargany, the proposed development would lie to the rear of the direction of road-users and therefore not be readily apparent. Visibility between Cloyntie and Ruglen would give rise to a low magnitude of effect. The ZTV shows that typically 1-7 turbines would be visible and wirelines show that this would comprise blades and tips seen behind Barony Hill at a range beyond 6 km. The perpendicular angle of the views towards the proposed development, along with the existing visibility of operational Hadyard Hill Wind Farm in the same sector of the view, have also been taken into account.

5.8.373 Visibility would continue along the open section until the B741 bridges to the south side of the river. In this section the magnitude of effect would be low. The low-lying location of the road means that only 1-7 of the proposed turbines would be visible and wirelines again show that these would be seen as blades and tips behind the landform of the foothills. While the alignment of the road is mostly perpendicular to the position of the proposed development, the section before the bridge aligns towards it and this would make it a more prominent feature in the views of road-users, albeit still of only a small number of blades and tips at a minimum distance of 4.5 km. Here the magnitude of effect would be medium to low.

5.8.374 The section beyond the bridge is enclosed by Glengee Wood and localised landform, after which views open up in the section to Dailly, albeit partially screened by road-side hedgerows. Existing Hadyard Hill is visible from this section. The ZTV shows visibility in this section would comprise 15-21 proposed turbines and wirelines show that these would be seen set along and over the ridge some partially screened and some at full height and, at a minimum distance of 3.5-4 km, would give rise to a medium magnitude of effect. Beyond Dailly there would be no effect on south-bound road-users owing to the reasons stated above.

5.8.375 For road-users travelling north-bound, there would be visibility of the proposed development in sections between Girvan and the junction with the Hadyard Hill minor road east of Dailly. The section of the B741 between Girvan and Low Craighead is the most open section and while there is intermittent enclosure from tree cover and built form, there are sufficient open sections to allow views east towards the proposed development. The ZTV shows that visibility would comprise 1-7 turbines between the A77 and Macrindleston and then 8-14 turbines to Low Craighead. Wirelines show that the proposed turbines would form a relatively compact group seen set below the shoulder of Hadyard Hill and integrated with the existing Hadyard Hill turbines. These would be seen at a minimum distance of 6-9 km and the magnitude of effect would be medium to low.

5.8.376 From Low Craighead to Dailly, the views of north-bound road-users are almost continuously enclosed by road-side trees such that there would be no change as a result of the proposed development. From the eastern edge of Dailly to the junction with the Hadyard Hill minor road, visibility would occur for north-bound road-users, similar to that experienced by south-bound road-users as described above, with the views occurring at a similar perpendicular angle. The magnitude of effect in this section would also be medium. Where the next open section occurs, beyond the bridging of the Water of Girvan, the proposed development would lie largely to the rear of north-bound road-users and therefore their views would not be notably affected.
Significance of the Effect

5.8.377 During the operational stage of the proposed development, the combination of the medium sensitivity and the medium magnitude of effect would give rise to a significant effect for both north-bound and south-bound road-users in the section between Dailly and the junction with Hadyard Hill minor road. Despite there being some existing visibility of Hadyard Hill Wind Farm from this section of the B741 and the fact that the proposed development would be seen at an angle perpendicular to road-users, the prominence of the proposed turbines on and over the ridge, combined with their relative proximity to this open section of the road, means that they have the potential to redefine the character of these views.

5.8.378 The significant effect would occur along an approximate 1.7 km section of the B741. The remainder of the much longer road would either undergo a not significant effect or no effect. Both significant and not significant effects would be adverse in respect of the nature of the effect.

5.8.379 During the construction and decommissioning stages the proposed development would give rise to significant effects across the same extents described above. While the majority of the operations would be concealed by the intervening ridge, the tall cranes required in the erection and dismantling of the turbines would be visible and seen clearly in association with the turbines on the ridgeline, and this would give rise to a medium magnitude of effect. The effect on the remainder of the route during construction and decommissioning would be not significant owing to limited visibility of the cranes and turbines.

NCR 7 / Minor Road Between Bargrennan and Crosshill

Baseline

5.8.380 NCR7 is the only national cycle route in the study area. It connects Sunderland to Inverness, with the section through the study area extending from Newton Stewart to Troon via Maybole and Ayr. At its closest it comes within less than 1 km of the proposed development. NCR7 follows the minor road between Bargrennan and Crosshill and then after a short section on the B7023, follows another minor road to Maybole.

5.8.381 The section of NCR7 to the south of Crosshill is mostly on single track roads with passing places. It passes through relatively remote and typically upland landscapes, characterised by the broad mosaic of open moorland and enclosed forestry. The road winds through the undulating landscape, such that the focus of views is constantly shifting across the surrounding hills and becoming intermittently enclosed by landform and forestry.

5.8.382 From Bargrennan to Nick of the Balloch, the road is largely enclosed by forestry with occasional open sections where clear-felling has occurred. There is very little development in this section other than intermittent and isolated properties. Nick of the Balloch provides a short section through open moorland. While there is no development in this area, views for north-bound road-users extend over the intervening forestry to reveal parts of the existing Hadyard Hill Wind Farm. Typically 20-25 of the turbines are visible to the north-east and therefore apparent to north-bound, but not south-bound road-users. They are seen at a range of 4-5 km, set in a linear pattern extending along the Foothills ridge with those to the right seen at full height and those to the left largely concealed by the intervening landform.
5.8.383 Forestry encloses the route to the north of Nick of the Balloch, until it passes into the *Intimate Pastoral Valley* LCT of the Water of Girvan, where views open up, and farmsteads and farm fields denote a more settled character than experienced in the upland landscape. There is some limited visibility of Hadyard Hill Wind Farm seen further west behind the ridgeline of the *Foothills with Forest and Wind Farms* LCT. Further north again, the route passes in and out of forestry with the longest open section occurring around Doughty Hill. Intervening landform and forestry mean that Hadyard Hill Wind Farm is not readily apparent from this section.

5.8.384 Beyond Glenalla, the level of the road falls away as it winds down from the uplands and into the *Middle Dale* LCT of the Water of Girvan. This section is largely enclosed by either forest blocks or deciduous tree cover and rural properties appear more frequently along the roadside. Open rough grassland is replaced by enclosed fields of improved pasture and the character generally becomes increasingly settled.

**Sensitivity**

5.8.385 The value of the visual amenity associated with the Bargrennan to Crosshill minor road / NCR7 is medium. Although it is a cycle route of national importance, the classification of this route does not relate to any scenic value that may be experienced from it. There are no formal stopping points to encourage road-users to appreciate the views. The value of the views from the minor road / NCR7, vary along its length, with many views enclosed by forestry. Where more open views occur, typically they are characterised by the upland landscape, and although the hills are generally low and unremarkable in scenic terms, they do generally present an attractive rural character.

5.8.386 The susceptibility of road-users to the proposed development would be medium to high. The minor road / NCR7 passes close to the proposed development in the section close to Doughty Hill and both north-bound and south-bound road-users would gain close range views. The susceptibility is moderated by visibility of Hadyard Hill Wind Farm occurring from Nick of the Balloch and from the River Stinchar valley, as this influence would prevent the proposed development from appearing as a new feature.

5.8.387 The combination of the value of the views from the road and the susceptibility of road-users to the proposed development leads to an overall medium to high sensitivity.

**Magnitude of Effect**

5.8.388 The ZTV shows that continuous theoretical visibility of the proposed development extends along NCR7 from Nick of the Balloch in the south, to Glenalla Fell in the north. Levels of visibility are highest to the south where patches of 22-28 and 29-31 turbines are theoretically visible. Actual visibility would occur only in the open section of Nick of the Balloch before the road becomes enclosed by forest blocks around Balloch Hill to the north. While existing Hadyard Hill turbines are already visible to north-bound road-users travelling along this section, the larger number and increased prominence of the proposed turbines makes them more of notable feature. Almost all of the proposed turbines would be visible, seen extending wind farm development closer to this section of the road, although from the minimum distance of 4-5 km the turbines would not appear large in scale and their location on the opposite foothills behind intervening forestry further accentuates their separation. The magnitude of effect on north-bound road-users of this section of the road would be medium.

5.8.389 The next open section for north-bound road-users occurs around the valley of the Water of Girvan where views are drawn towards the proposed development at an
oblique angle to the west of the road. The ZTV shows that visibility of 15-21 turbines would occur reducing to 8-14 turbines to the north of the river. The proposed turbines would be seen at a minimum distance of 1-2 km and appear as large scale elements associated with the Foothills ridge. The magnitude of effect on north-bound road–users would be medium to high.

5.8.390 For a short section, where the road passes through the steep sided valley of Auchengairn Burn, visibility becomes screened by intervening landform and forestry such that there would either be no effect or a low magnitude of effect. Where the road re-emerges into the open moorland landscape, levels of visibility would occur as 15-21 turbines and then 8-14 turbines. The especially close range of the road to the closest of these turbines would give rise to either a high or medium to high magnitude of effect. Without existing wind farm development in the baseline of these views, the proposed development would give rise to a greater magnitude of effect and the large scale turbines would appear at variance with the rural character.

5.8.391 Site infrastructure would not be a readily visible feature from the minor road other than from the section next to Doughty Hill, where the close proximity of the road to the turbines means that sections of the new access tracks would be visible. These would be seen in an area where forest tracks and clear felled forests are a common feature, and furthermore, where extensive clear felling would have taken place on the site prior to construction of the proposed development. In this context, the tracks would not make a notable change.

Significance of the Effect

5.8.392 During the operational phase, the effect of the proposed development on the Bargrennan to Crosshill minor road / NCR7 would be not significant for both northbound and southbound road-users for the majority of the route. Significant effects would, however, occur for north-bound road-users across the open section of Nick of the Balloch and then from South Balloch up to Knockinculloch Hill, with the exception of a small patch enclosed by forestry and landform in the Auchengairn valley. Significant effects would also occur for south-bound road-users between Knockinculloch Hill and South Balloch. The significant effects relate chiefly to the proximity of the proposed development to the road and its association with the prominent ridgeline, despite the existing presence of Hadyard Hill turbines in views from the south. The nature of these effects would be significant.

5.8.393 During the construction and decommissioning stages of the proposed development, again the majority of the road would undergo not significant effects, largely owing to limited visibility. Significant effects would however arise along the same extents as described above and would relate principally to the erection and dismantling of the turbines and the use of tall cranes during these operations. The scale of the turbines and the cranes, combined with their movement and the variance of their appearance with the rural landscape, would give rise to a medium magnitude of effect from Nick of the Balloch, a medium to high effect from the Stinchar Valley and a high effect from Doughty Hill, where the operations would be visible at especially close ranges.

5.8.394 In addition to the effect of the turbines and cranes would be the effect of forestry removal which would be most evident along the section next to Daljedburgh and Doughty Hill. While the clear felling operations would leave forest debris and scars across the landform, these are common features of the baseline character seen in views from this road and the effect would not be notable. In some views the forestry removal would remove poorly designed blocks and create better continuity in the appearance of the Foothills landscape.
5.8.395 The minor road between the village of Barr and the farmsteads at Balloch passes along the Intimate Pastoral Valley LCT of the River Stinchar to connect with the B734 in the west and the Bargrennan to Crosshill minor road (NCR7) in the east. The road lies between the Foothills with Forest and Wind Farms LCT to the north and the Rugged Uplands LCT to the south.

5.8.396 The road is approximately 6.2 km in length and is relatively narrow, although can take two-way traffic in most sections. The section between Barr and Milton Bridge is aligned north-east to south-west, while the section beyond to Balloch is aligned west to east. The road follows the course of the River Stinchar, mostly lying close to the river with a few elevated sections where the river deviates to the north.

5.8.397 The views of road-users travelling in both directions are largely characterised by the contrast between the open and flat valley floor in contrast with the elevated and imposing ridgeline of the foothills to both the north and south. Although these hills are not big, the steepness of the slopes combined with the narrowness of the valley gives a strong sense of enclosure. The valley is settled with farmland the primary land use and farmsteads a common feature. The hill slopes are mostly covered in open moorland or scrub although with blocks of forestry and clear felled areas evident around Milton Hill and Mull of Miljoan.

5.8.398 As the cumulative ZTV in Figure 5.14 shows, operational Hadyard Hill Wind Farm is already visible from this road. Wirelines and site work show that this visibility typically comprises a small proportion of the 51 turbines and that these are seen as either 1-4 blades or tips set behind the foothills ridgeline, or a small group of 3-5 turbine seen set in the trough between Mull of Miljoan and Auchensoul Hill at the western end of the valley. Although they do not form a prominent feature, they are visible and do establish wind farm development as a feature of the baseline views of road-users.

5.8.399 The value of the visual amenity associated with the Barr to Balloch minor road is medium. It is not recognised as a tourist route and there are no formal lay-bys or stopping points that would otherwise encourage road-users to stop and enjoy the views. The road passes through a settled landscape which has been modified by farming and forestry practices and which generally appears unremarkable in scenic terms.

5.8.400 The susceptibility of road-users to the proposed development would be medium. While the openness of the landscape around the road means that views are generally open and the road passes close to where the proposed turbines would be located, wind farm development is already a visible feature in views of road-users, with almost continuous, albeit low level visibility, occurring of operational Hadyard Hill seen set on the foothills to the north of the road.

5.8.401 The combination of the value of the view and the susceptibility of road-users to the proposed development leads to an overall medium sensitivity.

5.8.402 The ZTV shows continuous theoretical visibility extending along the minor road with 8-14 turbines visible with the exception of the section between Knockeen and west of...
South Balloch where 1-7 turbines would be visible. Actual visibility largely reflects theoretical visibility with the exception of the following sections where tree cover screens the views of road-users; around Clashgalloch to the west of South Balloch, between Bealach and east of Knockeen for an approximate 0.5 km section, and around Pyannot and to the east for an approximate 0.7 km section. In these sections there would be no effect.

5.8.403 In the remaining sections where visibility does occur, the magnitude of effect would be medium to high on account of the proximity of the turbines to the road, their prominent position on the foothills ridge and their large scale in relation to the foothills with which they would be associated. The turbines would appear at variance with the scale and character of the landscape as seen from the road and would form a new focus to road-users in both directions.

5.8.404 While the proposed development would redefine the character of views from the minor road, the magnitude of effect is prevented from being rated high by the existing presence of Hadyard Hill Wind Farm, despite its limited levels of visibility. Its presence establishes wind farm development as part of the baseline experience from the road and prevents the proposed development from appearing as a new feature. Site infrastructure would not be readily visible from this road.

Significance of the Effect

5.8.405 During the operational stage, the effect on the views of road-users on the minor Barr to Balloch road would be significant. This relates chiefly to the close proximity of the turbines to the road and their prominent position on the foothills ridge. While there are sections where the proposed development would not be visible, these are sufficiently short and the influence of the proposed development is sufficiently strong, that the effect would be continuous along the length of the road. The nature of these effects would be adverse.

5.8.406 During the construction and decommissioning stages, the effect on the views of road-users would also be significant. Although the majority of the construction and decommissioning operations would be concealed behind the ridge, the tall cranes used to erect and dismantle the turbines would be visible in association with the turbines located along and behind the ridge, and together these structures would form a prominent focal feature that would redefine the baseline views. The magnitude of the effects would be medium to high.

5.8.407 Forestry operations would take place during construction to remove the forest cover seen along the ridge of Daljedburgh Hill and across the slopes of Corphin Hill and Mull of Miljoan. These operations would be relatively small scale compared to the operations associated with the turbines, and would be seen as a common feature evident in the baseline character of views from this road. As a result, the forest removals would not make a notable change to the character of the views.

Summary of the Effects on Views

5.8.408 Table 5.10 below summarises the findings of the assessment of effects on viewpoints and principal visual receptors. The findings show that significant effects would be experienced during operation from nine of the 22 viewpoints, and from one principal visual receptor and parts of a further five principal visual receptors.
### Table 5.10: Summary of Assessment of Effects on Views

<table>
<thead>
<tr>
<th>Viewpoints / Principal Visual Receptors</th>
<th>Sensitivity</th>
<th>Magnitude of Effect</th>
<th>Significance of the Effect*</th>
</tr>
</thead>
</table>
| 1: A77 North of Girvan                  | Road-users: medium to low  
Residents: medium | Low          | Not significant     |
| 2: Grey Hill                           | Hill walkers: medium      | Medium to low       | Not significant             |
| 3: A714, Laigh Letterpin               | Road-users: medium  
Residents: medium to high | Low          | Not significant     |
| 4: B734, Merkland                      | Road-users: medium  
Residents: medium to high | Medium | Significant       |
| 5: Girvan – Barr Hill Path             | Hill walkers: medium      | Medium to low       | Not significant             |
| 6: Barr Village                        | Road-users: medium to high  
Residents: medium to high | High | Significant       |
| 7: Merrick Summit                      | Hill walkers: medium to high | Medium to low | Not significant             |
| 8: South Balloch                       | Road-users: medium to high  
Residents: medium to high | High | Significant       |
| 9: Colonel Hunter Blair Monument, Kildoach Hill | Hill walkers: medium to high | Medium | Significant       |
| 10: River Stinchar - Minor road        | Road-users: medium  
Residents: medium to high | High | Significant       |
| 11: Brunston Castle Golf Course        | Visitors: medium to high  
Recreational-users: medium to high | Medium | Significant       |
| 12: Dailly                              | Road-users: medium  
Residents: medium to high | Medium to high | Significant       |
| 13: Crosshill                          | Road-users: medium  
Residents: medium | Medium to low | Not significant |
| 14: B7045, Kirkmichael                 | Road-users: medium      | Medium | Not significant |
| 15: Monument, Maybole                  | Recreational-users: medium to high  
Residents: medium to high | Medium to low | Not significant |
Table 5.10: Summary of Assessment of Effects on Views

<table>
<thead>
<tr>
<th>Viewpoints / Principal Visual Receptors</th>
<th>Sensitivity</th>
<th>Magnitude of Effect</th>
<th>Significance of the Effect*</th>
</tr>
</thead>
<tbody>
<tr>
<td>16: B734 near Doon Hill</td>
<td>Road-users: medium to low</td>
<td>Medium to low</td>
<td>Not significant during operation. Significant during construction and decommissioning.</td>
</tr>
<tr>
<td>17: Hadyard Hill</td>
<td>Walkers: medium</td>
<td>Medium</td>
<td>Not significant</td>
</tr>
<tr>
<td>18: North Threave</td>
<td>Road-users: medium to low, Residents: medium</td>
<td>Medium</td>
<td>Not significant</td>
</tr>
<tr>
<td>19: Cairnsmore of Carsphairn</td>
<td>Walkers: medium</td>
<td>Low</td>
<td>Not significant</td>
</tr>
<tr>
<td>20: NCR7 near Doughty Hill</td>
<td>Road-users: medium to high</td>
<td>High</td>
<td>Significant</td>
</tr>
<tr>
<td>21: Shalloch on Minnoch</td>
<td>Hill walkers: medium to high</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>22: Cornish Hill</td>
<td>Hill walkers: medium to high</td>
<td>Medium</td>
<td>Significant</td>
</tr>
<tr>
<td>Barr</td>
<td>Medium to high</td>
<td>Medium to high on northern edge.</td>
<td>Significant on the northern edge, southern edge and in centre during operation. Significant on northern edge during construction and decommissioning.</td>
</tr>
<tr>
<td>Dailly</td>
<td>Medium to high</td>
<td>Medium to high on southern edge. Medium in centre and on southern edge.</td>
<td>Significant on the southern edge.</td>
</tr>
<tr>
<td>B734</td>
<td>Medium to low across Foothills, Medium in remaining sections</td>
<td>Medium to high between Barr and Alton Albany. Medium between Alton Albany and Merkland.</td>
<td>Significant in sections between Merkland and north of Barr.</td>
</tr>
</tbody>
</table>
Table 5.10: Summary of Assessment of Effects on Views

<table>
<thead>
<tr>
<th>Viewpoints / Principal Visual Receptors</th>
<th>Sensitivity</th>
<th>Magnitude of Effect</th>
<th>Significance of the Effect*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Medium to low, low or no effect for remaining sections.</td>
<td>Not significant in remaining sections.</td>
</tr>
<tr>
<td>B741</td>
<td>Medium</td>
<td>Medium between the junction with Hadyard Hill minor road and Dailly.</td>
<td>Significant in section between the junction with Hadyard Hill minor road and Dailly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium to low, low or no effect for remaining sections.</td>
<td>Not significant in remaining sections.</td>
</tr>
<tr>
<td>Bargrennan to Crosshill minor road / NCR7</td>
<td>Medium</td>
<td>High and medium to high at Doughty Hill. Medium to high at Stinchar Valley. Medium at Nick of the Balloch.</td>
<td>Significant for north and south-bound road-users at Doughty Hill and Stinchar Valley. Significant for north-bound road-users at Nick of the Balloch.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low or no effect for remaining sections.</td>
<td>Not significant in remaining sections.</td>
</tr>
<tr>
<td>Barr to South Balloch minor road</td>
<td>Medium</td>
<td>Medium to high</td>
<td>Significant</td>
</tr>
</tbody>
</table>

*Refers to construction, operation and decommissioning stage effects unless specified otherwise.

5.9 Assessment of Cumulative Effects

Introduction

5.9.1 Cumulative effects are defined in the SNH guidance ‘Assessing the Cumulative Impact of Onshore Wind Energy Developments’ (page 4, SNH, 2012) as ‘the additional changes caused by a proposed development in conjunction with other similar developments’ and may arise where a landscape or visual receptor is affected by more than one wind farm development.

5.9.2 The cumulative assessment covers the potential cumulative effects on landscape and visual receptors. A significant cumulative effect would occur where the combined effect of the proposed development with other existing and/or proposed wind farms would result in a landscape character or view that is defined by the presence of more than one wind farm and is characterised primarily by wind farms. It should be noted that even if the proposed development itself is assessed to have a significant effect on a landscape or visual receptor, it does not necessarily follow that the cumulative effect would also be significant.
5.9.3 In GLVIA3 (Landscape Institute and IEMA, 2013, p120) the guidelines defined cumulative landscape and visual effects as those that ‘result from additional changes to the landscape and visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future.’

5.9.4 The assessment of the effects of the proposed development in conjunction with all consented and application wind farms, as well as operational and under construction wind farms, is presented in this Section 5.9: Assessment of Cumulative Effects.

5.9.5 Technical Appendices 5.2 and 5.3 present the filtering process used to ascertain which of the landscape and visual receptors have the potential to undergo significant cumulative effects in conjunction would consented, application and baseline wind farms and, therefore, require a more detailed assessment.

**Cumulative Effects on Landscape Character**

5.9.6 The assessment of cumulative effects on landscape character uses the same receptors as the assessment of effects on landscape character carried out previously in this chapter; namely landscape character units, landscape designations and WLAs.

5.9.7 The filtering process presented in Technical Appendix 5.2 has indicated that four of the LCTs and two of the landscape designations have the potential to undergo significant cumulative effects as a result of the addition of the proposed development to scenarios which include all consented wind farms and application wind farms, as well as operational and under construction wind farms. The landscape receptors to be assessed in respect of potential cumulative effects includes;

- Foothills with Forest and Wind Farms;
- Middle Dale;
- Intimate Pastoral Valley;
- Rugged Uplands;
- South Carrick Scenic Area; and
- Bargany Garden and Designed Landscape.

**Foothills with Forest and Wind Farms**

**Baseline**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hadyard Hill Wind</td>
<td>Foothills with Forest and</td>
<td>Wind Farm located in</td>
<td>The ZTV shows visibility is almost continuous across this LCT with the</td>
</tr>
<tr>
<td>Farm</td>
<td>Wind Farms</td>
<td>this LCT</td>
<td>exception of the eastern and north-eastern parts.</td>
</tr>
<tr>
<td>Mark Hill</td>
<td>Plateau Moorland</td>
<td>Approx. 8 km SW</td>
<td>Visibility occurring as patches across the elevated hills and south-facing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>slopes.</td>
</tr>
</tbody>
</table>
5.9.8 In the baseline situation, Hadyard Hill Wind Farm characterises this LCT, as reflected in the name *Foothills with Forest and Wind Farms*. The turbines are located across the elevated parts of the foothills and present a strong influence on the character of the landscape. While cumulative wirelines form the LCT (Viewpoints 16 and 17) show that a number of other operational and under construction wind farms are visible from this LCT, their distant location in comparison to that of Hadyard Hill Wind Farm limits their influence on the character of the LCT.

5.9.9 Mark Hill and Arecleoch Wind Farms appear smaller in scale than they otherwise might, owing to the comparison with the much closer range Hadyard Hill turbines which they sit behind. This difference in scale, however, makes it apparent that they are separate wind farm developments and, as such, they add to the depth of development in this southern sector.

5.9.10 The baseline assessment presented in Section 5.7 assessed that the effect of the proposed development would be significant within the central to eastern parts of the LCT where the proposed development would have direct effects on landscape character where it would be located, and indirect effects where it would be in close proximity. This finding related largely to the presence of the proposed turbines in combination with the comparatively reduced influence of Hadyard Hill Wind Farm. The effect on all remaining parts of the LCT would be not significant.

### Scenario 1

#### Table 5.12: Scenario 1 Relevant Consented Cumulative Wind Farm Developments

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tralorg Coastal</td>
<td>Foothills</td>
<td>Approx. 1 km W</td>
<td>The ZTV shows a concentration of visibility across the western part of the LCT, extending over the elevated parts in the centre and becoming patchy to the east.</td>
</tr>
<tr>
<td>Assel Valley</td>
<td>Foothills</td>
<td>Approx. 1 km W</td>
<td>The ZTV shows a concentration of visibility across the western part of the LCT, extending over the elevated parts in the centre and becoming patchy to the east.</td>
</tr>
<tr>
<td>Dersalloch</td>
<td>Foothills with Forest</td>
<td>Approx. 5 km ENE</td>
<td>The ZTV shows very limited visibility apart from the eastern and north-eastern parts with little inter-visibility with the proposed development or Hadyard Hill.</td>
</tr>
</tbody>
</table>
5.9.11 In Scenario 1, consented Assel Valley and Tralorg Wind Farms are especially close range, both located in the adjacent Coastal Foothills LCT, less than 1 km from the Foothills with Forest and Wind Farms LCT and adjacent to the existing Hadyard Hill Wind Farm. While these developments would add to the influence of wind farm developments on the character of the LCT, their influence would be notably less than that of the existing Hadyard Hill Wind Farm, owing to their location outwith the LCT and the location of Hadyard Hill Wind Farm within the LCT.

5.9.12 The addition of the consented wind farms in Scenario 1 does not change the sensitivity rating from medium to low, because this is largely based on the strong influence of Hadyard Hill Wind Farm, in contrast to which, the additional wind farms have a weaker influence on the value of the LCT and its susceptibility to the proposed development.

5.9.13 In considering how the addition of the proposed development would affect the character of the LCT in respect of these consented developments, the effect would relate to the influence of the proposed development both on its own, and in combination with Hadyard Hill Wind Farm, more so than in combination with the consented developments. This is because both the existing and proposed developments are located in this LCT and therefore have a stronger influence on its character. Furthermore, the proposed development and consented developments are separated by the location of Hadyard Hill Wind Farm between them.

5.9.14 Consented Dersalloch Wind Farm has a very limited influence on the LCT owing to the intervening landform around Glenalla Fell. This limits inter-visibility with the proposed development as can be seen on the cumulative ZTV in Figure 5.21. For the same reasons cited in relation to Tralorg and Assel Valley above, the influence of Dersalloch on the cumulative situation would be comparatively weak in comparison to that of the existing and proposed developments located within the LCT.

5.9.15 The cumulative magnitude of effect of the proposed development on the Foothills with Forest and Wind Farms LCT in conjunction with the consented wind farms would be medium to low and the effect would be not significant. This is chiefly due to the comparatively limited influence of the consented wind farms on the character of the LCT in contrast to the influence of both operational Hadyard Hill and the proposed development which are located in this LCT.

**Scenario 2**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linfairn Farm</td>
<td>Foothills with Forest and Wind Farms</td>
<td>Located in this LCT.</td>
<td>The ZTV shows a concentration of visibility in the eastern part of this LCT where this wind farm is located.</td>
</tr>
<tr>
<td>Millenderdale</td>
<td>Coastal Foothills</td>
<td>Approx. 2 km SW</td>
<td>The ZTV shows visibility occurs as patches across elevated parts and south-west facing slopes.</td>
</tr>
<tr>
<td>Breaker Hill</td>
<td>Coastal Foothills</td>
<td>Approx. 3.5 km SW</td>
<td>The ZTV shows visibility occurs as patches across elevated parts and south-west facing slopes.</td>
</tr>
</tbody>
</table>
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### Table 5.13: Scenario 2 Relevant Application Cumulative Wind Farm Developments

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straid Farm</td>
<td>Coastal Foothills / Raised Beach Coast</td>
<td>Approx. 5.5 km SW</td>
<td>The ZTV shows visibility occurs as patches across elevated parts and south-west facing slopes.</td>
</tr>
<tr>
<td>Kirk Hill</td>
<td>Maybole Foothills</td>
<td>Approx. 4 km N</td>
<td>The ZTV shows the extents of visibility is limited across the LCT to the north facing slopes.</td>
</tr>
<tr>
<td>Keirs Hill</td>
<td>Foothills with Forest</td>
<td>Approx. 6.5 km NE</td>
<td>The ZTV shows patches of visibility across east facing slopes in the eastern part of this LCT.</td>
</tr>
<tr>
<td>Glenmount</td>
<td>Rugged Uplands with Lochs and Forests</td>
<td>Approx. 3.5 km ENE</td>
<td>The ZTV shows patches of visibility across east facing slopes in the eastern part of this LCT.</td>
</tr>
</tbody>
</table>

5.9.16 In Scenario 2, the inclusion of the application wind farms, to the operational and consented wind farms, gives rise to an increased extent of wind farm development around the LCT. There are a number of application wind farms within the first 15 km radius of the proposed development. Penwhapple and High Troweir are single turbines well integrated into the existing Hadyard Hill Wind Farm and would therefore not make a notable addition to the cumulative baseline. Keirs Hill, to the north-east, forms a cluster with Dersalloch and in so doing adds to the concentration of turbines at this end of the wider Foothills ridge. Glenmount introduces wind farm development into the previously undeveloped Rugged Granite Uplands LCT and so although not associated with the Foothills ridge, does add to the presence of development within the medium range context. And while Linfairn Farm sits on the edge of the Foothills with Forest and Wind Farms LCT, it occupies a position to the north-east which closes down the gap between consented Dersalloch to the north-east and existing Hadyard Hill Wind Farm.

5.9.17 The addition of the consented wind farms in Scenario 1 does not change the sensitivity rating from medium to low, because this is largely based on the strong influence of Hadyard Hill Wind Farm, in contrast to which, the additional wind farms have a weaker influence on the value of the LCT and its susceptibility to the proposed development.

5.9.18 The addition of the proposed development to Scenario 2 would give rise to a medium cumulative magnitude of effect. While wind farm development would already be the defining characteristic of this landscape, the addition of the proposed development in relation to Linfairn Farm, located in the north-east of the LCT, would give rise to a cumulative effect. Although the extents to which these two developments would be inter-visible would be limited, and that much of this area is afforested, their presence in the same LCT and at close range would increase the influence of wind farm development. The effect would, however, be not significant, owing to the combination of the medium to low sensitivity and medium cumulative magnitude of effect.
Middle Dale

Baseline

<table>
<thead>
<tr>
<th>Wind Farm Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hadyard Hill Wind Farm Foothills with Forest and Wind Farms</td>
<td>1 km S</td>
<td>ZTV shows visibility would occur on the northern slopes of the LCT but would not occur on the closer range southern slopes or across parts of the valley floor.</td>
</tr>
</tbody>
</table>

5.9.19 Hadyard Hill Wind Farm is the only operational wind farm readily visible from the Middle Dale LCT. It is typically seen set behind the ridge of the Foothills with Forest and Wind Farms LCT that lies to the south, such that the turbines appear as blades or tips in a contained group, albeit with wider horizontal and vertical extents evident from the more elevated northern slopes.

5.9.20 The baseline assessment presented in Section 5.7 concluded that the effect of the proposed development on the Middle Dale LCT would be not significant across the majority of the LCT, with the exception of the area that extends from the southern boundary of the LCT where Dobbingstone Burn is located to the northern boundary south of Kirk Hill, and to the west as far as Dailly and Quarrel Hill and to the east as far as Ruglen.

Scenario 1

<table>
<thead>
<tr>
<th>Wind Farm Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assel Valley Coastal Foothills</td>
<td>Approx. 1.5 km S</td>
<td>ZTV shows visibility extends across much of the LCT, with closest range part being in the south of the LCT.</td>
</tr>
<tr>
<td>Tralorg Coastal Foothills</td>
<td>Approx. 1 km S</td>
<td>ZTV shows visibility extends across much of the LCT, with closest range part being in the south of the LCT.</td>
</tr>
<tr>
<td>Dersalloch Foothills with Forest</td>
<td>Approx. 2 km NE</td>
<td>ZTV shows visibility extends across much of the LCT, with closest range part being in the north of the LCT.</td>
</tr>
</tbody>
</table>

5.9.21 The consented Tralorg Wind Farm would have a notable influence on the Scenario 1 cumulative situation, largely owing to its close proximity to the southern part of the Middle Dale LCT and prominent position in association with Saugh Hill. Assel Valley would have a lesser influence owing to its location behind the ridgeline, although partially screened turbines would be visible. The influence of Dersalloch on this LCT, especially the southern part where there is greater potential for a cumulative effect to arise, is also limited. Dersalloch would have a greater influence across the closer range northern parts of the LCT, while visibility from the southern parts would be greatly reduced by intervening landform and tree cover.
5.9.22 The presence of Tralorg and Assel Valley Wind Farms would reduce the sensitivity of the southern part of the LCT to the proposed development by making wind farm development a prominent feature that would reduce the value and susceptibility of the LCT. The sensitivity of the southern part of the LCT would be medium in respect of Scenario 1 and medium to high in the northern part, where the influence of Dersalloch Wind Farm would be limited.

5.9.23 The addition of the proposed development would give rise to a cumulative effect by introducing a further wind farm development into the context of the foothills ridge. The cumulative magnitude of effect would be medium to low. The proposed development would be seen as a separate development, set on the opposite side of Hadyard Hill and seen at a similar range and scale, albeit not located in such a prominent position as Tralorg Wind Farm.

5.9.24 While the proposed development would add another close range wind farm that would increase the extents of development along the prominent foothills ridge there are a number of factors that prevent this effect from being significant in cumulative terms. Firstly, there is the relationship between the developments and the foothills ridge, in which they would both be seen as contained groups with sufficient separation by the landform of Hadyard Hill. This would mean that they would not appear to overwhelm the horizontal extents of the ridge. Secondly, there is the containment of the developments on the foothills ridge and in the southern aspect of the Middle Dale LCT. This would mean that the other LCTs and aspects of the LCT would remain unaffected. Thirdly, there is the intimate character of parts of the LCT, whereby close and middle range tree cover screens views and would reduce the influence of both wind farm developments. In respect of Scenario 1, the cumulative effect of the proposed development would be not significant.

Scenario 2

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kirk Hill</td>
<td>Maybole Foothills</td>
<td>Approx. 1 km NW N NE</td>
<td>ZTV shows visibility to extend across LCT with patchier visibility occurring in the north-east part of the LCT.</td>
</tr>
<tr>
<td>Keirs Hill</td>
<td>Foothills with Forest</td>
<td>Approx. 2.5 km NE</td>
<td>ZTV shows band of visibility extending down centre of valley and across northern slopes.</td>
</tr>
<tr>
<td>Millenderdale</td>
<td>Coastal Foothills</td>
<td>Approx. 2 km SW</td>
<td>ZTV shows visibility occurring as a single patch across elevated slopes to north of Dailly.</td>
</tr>
<tr>
<td>Breaker Hill</td>
<td>Coastal Foothills</td>
<td>Approx. 3.5 km SW</td>
<td>ZTV shows visibility occurring as a single patch across elevated slopes to north of Dailly.</td>
</tr>
</tbody>
</table>

5.9.25 In Scenario 2, the cluster of wind farms comprising Millenderdale and Breaker Hill would have a limited influence owing to the limited extents of the LCT over which they would be visible and the nature of the visibility which would typically consist of tips and blades behind the ridge of the Coastal Foothills LCT. Keirs Hill would also have a limited influence for reasons similar to those cited above in respect of Dersalloch.
namely, the greater distance from the southern part of the LCT and the screening effect of intervening landform and vegetation.

5.9.26 The influence of Kirk Hill Wind Farm and Tralorg Wind Farm would give rise to a medium to low sensitivity for this LCT. In Scenario 2, Kirk Hill would have the greatest influence of the application wind farms on account of its close proximity to the Middle Dale LCT, set in the adjacent Maybole Foothills, which abut this LCT to the north. Kirk Hill would be seen as a prominent feature on this northern ridge to the valley, although visibility would be intermittent across the LCT owing to the intermittent screening effect of close and middle range tree cover.

5.9.27 In the southern part of the LCT, where Kirk Hill and Tralorg Wind Farms would form prominent and close range features to the north and south-west, respectively, the cumulative magnitude of effect that would arise with the addition of the proposed development would be medium to high. Although all three developments would appear relatively well contained, and occupy only a proportion of the sector within which they sit, their association with the ridgelines which surround this valley landscape raises their prominence and may lead to a sense of encirclement around the LCT. This effect would occur from the boundary with the Lower Dale LCT to the west, Ruglen to the east, the boundary with the Maybole Foothills LCT to the north and with the Foothills with Forest and Wind Farms LCT to the south.

5.9.28 Further north of Ruglen, the influence of Tralorg Wind Farm, Kirk Hill Wind Farm and the proposed development would be reduced by distance and the screening effect of intervening landform and tree cover, especially in respect of Tralorg, such that the cumulative magnitude of effect would reduce to medium to low.

5.9.29 In respect of Scenario 2, the cumulative effect of the proposed development would be significant in the southern part of the LCT, between the boundary of the Lower Dale LCT and Ruglen. The remaining parts of the LCT would undergo not significant effects.

**Intimate Pastoral Valley**

**Baseline**

<table>
<thead>
<tr>
<th>Wind Farm Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hadyard Hill Wind Farm</td>
<td>Foothills with Forest and Wind Farms</td>
<td>Approx 0.5 km S</td>
</tr>
</tbody>
</table>

5.9.30 Hadyard Hill Wind Farm is the only operational wind farm readily visible from the Intimate Pastoral Valley LCT. It is typically seen set behind the ridge of the Foothills with Forest and Wind Farms LCT that lies to the north, such that the turbines appear as blades or tips spread along the ridgeline, but also with some instances where turbines are seen at fuller extents where visibility carries along the length of the valley.

5.9.31 The baseline assessment presented in Section 5.7 concluded that the effect of the proposed development on the Intimate Pastoral Valley LCT would be significant across the majority of the LCT, with the exception of the northern slopes to the west of Barr and the western end of the valley beyond Traboyack Valley.
5.9.32 The consented Assel Valley and Tralorg Wind Farms would have a limited influence on Scenario 1. Where the ZTV shows visibility to occur to the east of Barr, the consented developments would be seen set behind the operational Hadyard Hill Wind Farm and typically part screened by the intervening landform. Where the ZTV shows visibility to occur to the west of Merkland, visibility would be to fuller extents, although seen to the left of the operational Hadyard Hill Wind Farm, thus increasing the horizontal spread along the ridgeline.

5.9.33 The presence of Assel Valley and Tralorg Wind Farms would alter the sensitivity of the LCT owing to the limited influence these developments have on the LCT. The extents of their visibility are patchy and their influence would occur across areas where operational Hadyard Hill Wind Farm already has some influence. The sensitivity of the LCT would remain medium to high in respect of Scenario 1.

5.9.34 The addition of the proposed development would give rise to a cumulative effect by introducing a further wind farm development into the context of the foothills ridge. The cumulative magnitude of effect would be medium to low. The proposed development would be seen as a prominent feature and this is reflected in the medium to high magnitude of effect assessed in the baseline assessment. In relation to Scenario 1, the magnitude of effect would be less as the consented developments and the operational development have a much weaker influence on the cumulative situation. To the west of Barr, it would be the proposed development that would form the main influence. To the west of Merkland, the magnitude of effect would also be medium to low but this relates to the weaker influence of the proposed development, whereas the consented and operational developments have a stronger influence. The proposed development would be seen at distances beyond 6 km – more distant than Assel Valley and Hadyard Hill Wind Farms which occupy the foothills ridge opposite this western part of the LCT.

5.9.35 In relation to Scenario 1, the cumulative effect of the proposed development would be not significant.
Scenario 2

Table 5.19: Scenario 2 Relevant Application Cumulative Wind Farm Developments

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Millenderdale</td>
<td>Coastal Foothills</td>
<td>Approx. 1 km W</td>
<td>ZTV shows visibility to extend along western part of Stinchar valley.</td>
</tr>
<tr>
<td>Breaker Hill</td>
<td>Coastal Foothills</td>
<td>Approx. 1.5 km W</td>
<td>ZTV shows visibility to extend along western part of Stinchar valley.</td>
</tr>
<tr>
<td>Straid Farm</td>
<td>Coastal Foothills /</td>
<td>Approx. 4 km W</td>
<td>ZTV shows visibility to extend along western part of Stinchar valley.</td>
</tr>
<tr>
<td></td>
<td>Raised Beach Coast</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.9.36 In Scenario 2, the cluster of wind farms comprising Millenderdale and Breaker Hill would have a notable influence across the western part of the Stinchar valley, owing to their close proximity on the Coastal Foothills LCT at the western end of the valley. The alignment of the valley is towards these developments and this would accentuate their influence across the LCT. Millenderdale would appear as the most prominent of the three, with the seven turbines set on Fell Hill (248 m AOD), while Breaker Hill would be seen set on Knockdaw Hill (260 m AOD) at a slightly longer range. The location of Straid Wind Farm on the west facing slopes towards the coast would reduce its visibility and therefore its influence on the character of the Intimate Pastoral Valley LCT.

5.9.37 The influence of Millenderdale Wind Farm and Breaker Hill Wind Farm would reduce the sensitivity of this western part of the valley from medium to high to medium to low. In Scenario 2, these developments, along with operational Hadyard Hill Wind Farm, would reduce the value of the LCT, as well as its susceptibility to the proposed development. The sensitivity of the eastern part of the LCT would remain medium to high as these application wind farms are not visible from this area.

5.9.38 In the western part of the LCT, between the A714 and Merkland, where Millenderdale and Breaker Hill Wind Farms, as well as Tralorg and Hadyard Hill Wind Farms, would form prominent and close range features to the west, north and north-east, respectively, the cumulative magnitude of effect that would arise with the addition of the proposed development would be medium. This reflects the comparatively weaker influence of the proposed development which would be seen at a greater distance than the aforementioned wind farms (approximately 6 km) and typically to the rear or right of closer range operational Hadyard Hill Wind Farm. The proposed development would, nonetheless, increase the horizontal extents of wind farm development along the foothills ridge.

5.9.39 In the western part of the LCT, between Merkland and Barr, the closer proximity of the proposed development at 2.5-6 km, means it would have a stronger influence on the character of the LCT and in respect of Scenario 2 this would give rise to a medium to high magnitude of effect. Despite the slightly weaker influence of Millenderdale and Breaker Hill Wind Farms from this part of the LCT, the addition of the proposed development would be seen to increase the spread of wind farm development along the foothills ridge such that collectively the developments would be almost continuous and would give rise to a sense of encirclement.
5.9.40 In respect of Scenario 2, the cumulative effect of the proposed development would be **significant** in the part of the LCT between Merkland and Barr and not significant in all remaining parts.

**Rugged Uplands**

*Baseline*

<table>
<thead>
<tr>
<th>Table 5.20: Relevant Operational Cumulative Wind Farm Developments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wind Farm</strong></td>
</tr>
<tr>
<td>Hadyard Hill Wind Farm</td>
</tr>
<tr>
<td>Mark Hill</td>
</tr>
<tr>
<td>Arecleoch</td>
</tr>
</tbody>
</table>

5.9.41 Hadyard Hill Wind Farm is visible across the northern ridge in the **Rugged Uplands** LCT, that sits behind Changue Plantation, and more intermittently from the elevated parts and north-west facing slopes of the Shalloch hill ridge. The existing turbines are seen extending along the foothills, albeit often partially screened by the intervening ridgeline.

5.9.42 Mark Hill and Arecleoch Wind Farms are visible from the elevated parts and west-facing slopes of the northern ridge and Shalloch Ridge, with Mark Hill forming a relatively close range development to the western part of the LCT, and both adding to the extents of baseline wind farm development with an influence on this LCT.

5.9.43 The baseline assessment presented in Section 5.7 concluded that the effect of the proposed development on the **Rugged Uplands** LCT would be not significant for the majority of the LCT, with the exception of the ridge along the north of the LCT between Fell Hill and the un-named hill to the north east of Eldrick Hill where the effect would be significant.
### Scenario 1

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tralorg</td>
<td>Coastal Foothills</td>
<td>Approx. 8.5 km WNW</td>
<td>ZTV shows visibility to occur as patches across elevated parts and west facing slopes.</td>
</tr>
<tr>
<td>Assel Valley</td>
<td>Coastal Foothills</td>
<td>Approx. 9 km WNW</td>
<td>ZTV shows visibility to occur as patches across elevated parts and west facing slopes.</td>
</tr>
<tr>
<td>Dersalloch</td>
<td>Foothills with Forest</td>
<td>Approx. 2 km NNE</td>
<td>ZTV shows visibility to occur as patches across elevated parts and north-east facing slopes.</td>
</tr>
</tbody>
</table>

5.9.44 In Scenario 1, the influence of the three consented wind farms on the cumulative situation would be limited. While Tralorg and Assel Valley, in conjunction with Hadyard Hill Wind Farm, would be seen to increase the horizontal extents of wind farm development along the foothills ridge, their more distant location beyond the Hadyard Hill Wind Farm and partial concealment by the landform, means that they would not have strong influence on the cumulative situation.

5.9.45 The ZTV shows that consented Dersalloch Wind Farm would be visible from north-east facing slopes, such that inter-visibility with the proposed development would be limited to small patches on the summits and north facing slopes from which Dersalloch would be seen beyond 9 km.

5.9.46 The sensitivity of the LCT would remain as medium owing to the limited influence of the consented wind farms on the cumulative situation.

5.9.47 While there would be a cumulative effect, in that the proposed development would be seen to increase the horizontal extents of wind farm development from existing Hadyard Hill Wind Farm closer to Dersalloch Wind Farm, the cumulative magnitude of effect would be medium to low. This is because of the sufficient separation between the developments that prevents any sense of coalescence, as well as the association of Dersalloch with a separate group of foothills, which limits the association between the two developments.

5.9.48 In respect of Scenario 1, the effect of the proposed development on the Rugged Uplands LCT would be not significant. This is chiefly due to the comparatively limited influence of the consented sites on the character of the LCT largely owing to the more immediate and stronger influence from operational Hadyard Hill and the proposed development.
### Table 5.22: Scenario 2 Relevant Application Cumulative Wind Farm Developments

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linfairn Farm</td>
<td>Foothills with Forest and Wind Farms</td>
<td>Approx. 2 km N</td>
<td>ZTV shows visibility occurs almost continuously across northern part of the LCT then limited to small patches across the western and southern parts.</td>
</tr>
<tr>
<td>Keirs Hill</td>
<td>Foothills with Forest</td>
<td>Approx. 7 km NNE</td>
<td>ZTV shows visibility occurs across north facing slopes with some localised patches of inter-visibility with the proposed development.</td>
</tr>
<tr>
<td>Glenmount</td>
<td>Rugged Uplands – Lochs and Forests</td>
<td>Approx. 0.5 km NE</td>
<td>ZTV shows visibility occurs across north-east facing slopes. There is little inter-visibility with the proposed development.</td>
</tr>
<tr>
<td>Kirk Hill</td>
<td>Maybole Foothills</td>
<td>Approx. 10.5 km NW</td>
<td>ZTV shows visibility occurs as localised patches across elevated north-west facing slopes.</td>
</tr>
<tr>
<td>Millenderdale</td>
<td>Coastal Foothills</td>
<td>Approx. 11 km SW</td>
<td>ZTV shows visibility occurs as localised patches across south-west facing slopes.</td>
</tr>
<tr>
<td>Breaker Hill</td>
<td>Coastal Foothills</td>
<td>Approx.11.5 km SW</td>
<td>ZTV shows visibility occurs as localised patches across south-west facing slopes.</td>
</tr>
<tr>
<td>Straid Farm</td>
<td>Coastal Foothills / Raised Beach Coast</td>
<td>Approx. 15 km SW</td>
<td>ZTV shows visibility occurs as localised patches across south-west facing slopes.</td>
</tr>
</tbody>
</table>

5.9.49 In Scenario 2, the addition of the application wind farms to the operational and consented wind farms would give rise to an increase in the extents of development visible from the LCT. The majority of the application wind farms would add to the clustering that already occurs from the south-west through to the north-east, keeping the southern and eastern aspects to this LCT largely undeveloped.

5.9.50 The cluster of Millenderdale, Breaker Hill and Straid Farm, set to the south-west of the Rugged Uplands LCT, have a limited influence on the cumulative situation, owing not only to their distance from the LCT, but also the lack of association between the LCT and the Coastal Foothills LCT which they occupy and the limited extents of the wind farm developments that would be visible as well as the limited extents of the LCT from which visibility would occur.

5.9.51 The application wind farm, Keirs Hill, would also have a limited influence on the cumulative situation, largely owing to its location beyond consented Dersalloch Wind Farm, such that it would not be readily apparent as an additional development.
5.9.52 Linfairn Farm and Glenmount Wind Farms would have the greatest influence on the cumulative situation, owing to their proximity to the northern boundary of this LCT, as well as their relative proximity to the proposed development. Linfairn Farm sits on the eastern edge of the *Footills with Forest and Wind Farms* LCT, and not only increases the extents to which wind farm development is visible from the Rugged Uplands LCT but also alters the cumulative situation by partly infilling the separation space between operational Hadyard Hill Wind Farm and consented Dersalloch Wind Farm.

5.9.53 In light of the additional application wind farms in Scenario 2, the sensitivity of the *Rugged Uplands* LCT to the proposed development would be reduced to medium to low as both the value of the view and the susceptibility of the LCT to the proposed development would be reduced by the extents of development.

5.9.54 The addition of the proposed development would, however, have a heightened effect owing to the additional application wind farms, as it would be seen to further infill the gap between Hadyard Hill Wind Farm and Linfairn Wind Farm, such that the separation space would be further reduced. Glenmount Wind Farm, in conjunction with Dersalloch and Keirs Hill Wind Farms would continue the extents of the development to the east of Linfairn Farm.

5.9.55 There are a number of factors that influence the cumulative magnitude of effect experienced across this LCT; namely the extents to which the different wind farms would be visible, their distance from the different parts of the LCT and the nature of their visibility. The greatest potential for a cumulative effect occurs across the northern part of the LCT as this is closest to the cumulative wind farms and the proposed development. The cumulative ZTVs show that visibility is most extensive across the northern part of the LCT and although large forest blocks would preclude visibility from Changue and Balloch Plantations, visibility would occur from the open hills behind, which extend to the south-west and north-east of Nick of the Balloch. Here the cumulative magnitude of effect would be medium to high with the proposed development seen at a range of 4-7 km and Linfairn Farm seen at 3-8 km. The orientation of this hill group towards the proposed development accentuates its influence on the cumulative situation.

5.9.56 The cumulative magnitude of effect across the Shalloch Ridge would be medium owing to the increased distance between this part of the LCT and the proposed development, the patchier extents of visibility, and the stronger influences on the LCT from the *Rugged Uplands* LCT and the wider upland landscape.

5.9.57 In respect of Scenario 2, the cumulative effect of the proposed development on the *Rugged Uplands* LCT would be not significant with the exception of a localised area along the ridge of hills between Cairn Hill (479 m AOD) and the un-named hill (443 m AOD) north-east of Eldrick Hill where the cumulative effect would be significant.

**South Carrick Scenic Area**

5.9.58 The South Carrick SA comprises a number of the LCTs in South Ayrshire, including those assessed above. These LCTs were identified in the initial assessment, in Technical Appendix 5.2, as having potential to undergo significant cumulative effects and have therefore been assessed in detail. The conclusions of these assessments apply to the assessment of effects on the Carrick SA and are therefore summarised below to highlight the collective cumulative effects over this wider area.
5.9.59 In respect of Scenario 1, the cumulative assessment concluded that there would be no significant cumulative effects on the *Foothills with Forest and Wind Farm LCT*, the *Middle Dale LCT*, the *Intimate Pastoral Valley LCT* and the *Rugged Uplands LCT*. This conclusion relates principally to relatively limited influence of the consented wind farms on the cumulative situation, such that the effects could be mostly attributed to the influence of the proposed development on its own and in combination with Hadyard Hill Wind Farm, as is reflected by the greater occurrence of significant effects on LCTs in the baseline assessment.

5.9.60 In respect of Scenario 2, the cumulative assessment concluded that there would be some significant cumulative effects in parts of the *Middle Dale LCT*, the *Intimate Pastoral Valley LCT* and the *Rugged Uplands LCT*, but that the effects on the *Foothills with Forest and Wind Farm LCT* and the majority of the other LCTs would be not significant. Despite the reduction in sensitivity that was assessed in respect of the increased influence of wind farm development on the LCTs, the addition of the proposed development was, in some parts, found to contribute to a cumulative situation which would redefine the character of the LCT and was, therefore, highlighted as significant.

**Bargany GDL**

**Baseline**

5.9.61 There are no operational or under construction wind farms visible from Bargany GDL with the exception of operational Hadyard Hill Wind Farm which is visible from a localised area in the north-east corner.

5.9.62 The assessment of the effects on Bargany, as presented in Section 5.7, concluded that the effect would be not significant for the majority of the GDL with the exception of the central and north-eastern parts where the effect would be significant.

**Scenario 1**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tralorg Coastal Foothills</td>
<td>Approx. 3 km min SW</td>
<td>ZTV shows visibility occurs across Bargany, albeit patchy across south and east.</td>
<td></td>
</tr>
<tr>
<td>Assel Valley Coastal Foothills</td>
<td>Approx. 4 km min SW</td>
<td>ZTV shows visibility occurs across Bargany, albeit patchy across south and east.</td>
<td></td>
</tr>
</tbody>
</table>

5.9.63 The sensitivity of the designed landscape would be reduced from medium to high to medium. Although visibility of Tralorg and Assel Valley Wind Farms would be limited, it would, nonetheless, establish wind farm development as a more evident feature of the Scenario 1 baseline.

5.9.64 The cumulative ZTVs in Figures 5.20 and 5.21 show theoretical visibility of consented Tralorg and Assel Valley Wind Farms would occur across much of the GDL. Actual visibility would be greatly reduced by the extent of mature tree cover that occurs across the estate, such that only the more open fields and parkland areas would be influenced by visibility of Tralorg and Assel Valley Wind Farms. Visibility would
comprise a group of turbines seen set along the ridgeline of Saugh Hill and Tralorg Hill, with the remaining turbines concealed behind it. The foothills to the south, which include Hadyard Hill and Maxwellston Hill are closer in range and form a closer association with Bargany, than Saugh Hill and Tralorg Hill where the consented developments are located.

5.9.65 In respect of Scenario 1, the cumulative magnitude of effect would be **medium to low**. The addition of the proposed development would increase the extents of wind farm development in the foothills and this in turn would increase the influence of wind farm development on Bargany. While the proposed development and the consented developments would be seen as prominent features along the foothills ridgeline, they would also be seen as two relatively well contained and clearly distinct groups, occupying only a small proportion of the wider extents around the GDL. There would be some continuity in terms of their location, as well as their perceived scale and size and this would help towards presenting an overall unified appearance. Taking these factors into account, the addition of the proposed development to the consented developments would not give rise to the creation of a wind farm landscape and, therefore, the cumulative effect would be **not significant**.

**Scenario 2**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kirk Hill</td>
<td>Maybole Foothills</td>
<td>Approx. 2.5 km min NE</td>
<td>ZTV shows visibility occurs across the GDL.</td>
</tr>
</tbody>
</table>

5.9.66 In Scenario 2, Kirk Hill would be the seen at a distance of 2.5 km to 5 km to the north-east. The ZTV shows almost continuous visibility across the GDL, and while actual visibility would occur from the open fields and areas of parkland, the influence of Kirk Hill Wind Farm across the estate would be reduced by the extents of mature tree cover. The application wind farm would be seen as a group of turbines set on the low foothills to the north-east of the GDL.

5.9.67 In respect of Scenario 2, the sensitivity of Bargany to the proposed development would be reduced from medium to high, to **medium**. In Scenario 2 the consented Tralorg and Assel Valley Wind Farms would be seen to the south-west and Kirk Hill Wind Farm would be seen to the north-east, and together, these would reduce the value of the view and the susceptibility of residents to the proposed development.

5.9.68 The addition of the proposed development to Scenario 2 would give rise to a **medium** cumulative magnitude of effect in those areas identified in the main assessment as undergoing a significant effect, namely the east central part and northern part. This is because in Scenario 2, Kirk Hill Wind Farm would already have a notable influence on the character of these areas and the proposed development would be seen to add further to the influence of wind farm development. Its location on the foothills ridge on the opposite side of the valley to the foothills ridge where Kirk Hill would be seen increases the spread of the influence, despite both developments being seen as relatively compact and well-contained.

5.9.69 In the remaining parts of Bargany GDL, the cumulative magnitude of effect would be either **medium to low**, **low**, or there would be no effect, because of the limited influence of the proposed development, the limited influence of the consented and...
application developments or a combination of both and often owing to the screening effect of mature woodland which covers large parts of the estate.

5.9.70 The cumulative effect on Bargany GDL would be **significant** in the east central and northern parts where both the proposed development and Kirk Hill Wind Farm would have a notable influence. The cumulative effect of the proposed development on the remaining parts of Bargany GDL in the west central and southern parts would be **not significant**. This would be on account of the limited visibility of the proposed development singularly and in combination with other cumulative developments, largely owing to the enclosure of the mature policies.

**Cumulative Effects on Views**

5.9.71 The assessment of cumulative effects on views is carried out using the same viewpoints and visual receptors as considered in the assessment of effects on views as described previously in this chapter.

5.9.72 The filtering process presented in Technical Appendix 5.3 indicates that seven of the representative viewpoints and three of the principal visual receptors have the potential to undergo a significant cumulative effect as a result of the addition of the proposed development. These are assessed in detail below.

**Viewpoint 7 - Merrick Summit**

**Baseline**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>LCT Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hadyard Hill Wind Farm</td>
<td>Foothills with Forest and Wind Farm</td>
<td>18.14 km NW</td>
<td>Despite distance, horizontal extents seen to spread along middle range <strong>Foothills</strong> LCT with western turbines largely concealed by landform.</td>
</tr>
<tr>
<td>Mark Hill</td>
<td>Plateau Moorlands</td>
<td>9.72 km W</td>
<td>Seen as medium number of turbines set in <strong>Plateau Moorland</strong> LCT to the west in same sector as Arecleoch. Closest development to viewpoint.</td>
</tr>
<tr>
<td>Arecleoch</td>
<td>Plateau Moorlands</td>
<td>17.79 km WSW</td>
<td>Seen as large number of turbines set in <strong>Plateau Moorland</strong> to the west and in same sector as Mark Hill, albeit more distant.</td>
</tr>
<tr>
<td>Windy Standard</td>
<td>Southern Uplands</td>
<td>23.83 km NE</td>
<td>Seen as small scale elements on distant horizon of <strong>Southern Uplands</strong> LCT.</td>
</tr>
<tr>
<td>Windy Standard Extension (under construction)</td>
<td>Southern Uplands</td>
<td>22.41 km NE</td>
<td>Seen to the fore of Windy Standard and adding to the density of this cluster albeit at distance.</td>
</tr>
</tbody>
</table>

5.9.73 Operational developments occur in clusters with Windy Standard and Windy Standard Extension in the **Southern Uplands** LCT to the north-east of the viewpoint, Mark Hill and Arecleoch in the **Plateau Moorland** LCT to the west and Artfield Fell and Balmurrie Fell, in the same LCT, further south. Operational Hadyard Hill Wind Farm establishes
development in the Foothills with Forest and Wind Farm LCT to the north-west of the viewpoint.

5.9.74 In the baseline view, every sector contains wind farm development with the exception of the sector to the south-east where the view extends across the scenic Rugged Granite Uplands LCT. The closest range development is Mark Hill, seen a minimum distance of 9.72 km from the viewpoint. From this viewpoint, wind farm development is seen contained in the lower Foothills and Plateau Moorlands LCTs that are peripheral to the Rugged Granite Uplands LCT of the Merrick, and although visible, do not encroach into this landscape.

5.9.75 The assessment of this viewpoint, as presented in Section 5.8, concluded that the effects would be not significant following the combination of the medium to high sensitivity and the medium to low magnitude of effect.

Scenario 1

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>LCT Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tralorg</td>
<td>Coastal Foothills</td>
<td>23.57 km NW</td>
<td>Seen as small number of turbines on Coastal Foothills LCT towards western end of operational Hadyard Hill.</td>
</tr>
<tr>
<td>Assel Valley</td>
<td>Coastal Foothills</td>
<td>22.95 km NW</td>
<td>Seen as small number of turbines next to consented Tralorg continuing horizontal extents of development along the ridgeline.</td>
</tr>
<tr>
<td>Dersalloch</td>
<td>Foothills with Forest</td>
<td>18.00 km N</td>
<td>Seen as medium number of turbines to the right of the Shalloch ridge occupying space between Hadyard Hill and Windy Standard.</td>
</tr>
<tr>
<td>Kilgallioch</td>
<td>Plateau Moorland</td>
<td>19.76 km SW</td>
<td>Seen as large number of turbines occupying space between Arecleoch and Artfield Fell / Balmurrie Fell.</td>
</tr>
<tr>
<td>Glenchamber</td>
<td>Plateau Moorland with Forest</td>
<td>28.48 km SW</td>
<td>Seen as medium number of distant turbines to the left of Artfield Fell and in cluster with Airies Farm.</td>
</tr>
<tr>
<td>Airies Farm</td>
<td>Plateau Moorland with Forest</td>
<td>23.21 km SW</td>
<td>Seen as small number of distant turbines to the left of Artfield Fell and in cluster with Glenchamber.</td>
</tr>
<tr>
<td>Afton</td>
<td>Southern Uplands</td>
<td>25.92 km NE</td>
<td>Seen as small number of distant turbines set behind Windy Standard Extension and adding to cluster with Windy Standard.</td>
</tr>
</tbody>
</table>

5.9.76 Despite the addition of the consented wind farms in Scenario 1, the sensitivity of hill walkers would remain medium to high. This is because they all occur beyond an 18 km radius, which not only moderates their influence on the view, but which also
keeps wind farm distant and outwith the surrounding Rugged Granite Uplands LCT which largely characterises the view.

5.9.77 The addition of the proposed development to Scenario 1 would give rise to a medium to low cumulative magnitude of effect.

5.9.78 Wind farm development would be visible in each of the 90 degree sectors seen from Merrick, with the exception of the sector to the south-east, which would have no operational or consented wind farms. The proposed development would therefore not be introducing wind farm development into an undeveloped sector. Furthermore, it would be seen to lie between operational Hadyard Hill and consented Dersalloch and therefore not be seen to increase the margins of wind farm development into parts of the view which are not already influenced by this type of development. The proposed development would also be seen to be contained within the Foothills with Forest and Wind Farm LCT, which marks one of the less remarkable aspects of the view.

5.9.79 The presence of Tralorg and Assel Valley increases the horizontal extents of wind farm development to the left of operational Hadyard Hill Wind Farm, despite their relatively small scale from this distance and partial overlap with operational Hadyard Hill. The proposed development would be seen to extend development further right bringing it to the fore of the distant outline of Arran and into a part of the view where there is little screening from intervening landform. The slightly closer proximity of the proposed turbines combined with their more elevated locations makes them appear slightly larger in scale than the existing Hadyard Hill turbines. These differences are slight, and with sufficient continuity in scale and layout, overall, the turbines would appear as an integrated extension.

5.9.80 Scenario 1 also includes consented Dersalloch to the north of the viewpoint and while the addition of the proposed development would reduce the gap between the existing and consented developments, the shoulder of Shalloch on Minnoch separates these developments in the view and reduces the potential increase to the cumulative magnitude of effect.

5.9.81 The sensitivity rating for Scenario 1 would remain medium to high. This is principally due to the containment of the consented wind farms at a considerable distance from the viewpoint, such that they would not impinge on the closer range Rugged Uplands LCT which forms the predominant characteristic of this view. While the consented wind farms add to the peripheral context of development, they do not have a notable influence on the value of the view or the susceptibility of the viewers.

5.9.82 While the proposed development would present a notable increase in the horizontal extents of development in this sector, in the context of the wider panoramic view this increase is reduced. Furthermore, the photographs show how the Merrick and surrounding Rugged Granite Uplands form the defining influence on the character of the view, in comparison to the Foothills which form a background feature. Wind farm development on these Foothills increases their prominence in the view and the further addition of the proposed development would further increase this prominence, but not to the extent that it would redefine the character of the view.

5.9.83 The addition of the proposed development to Scenario 1 would give rise to a medium to low cumulative magnitude of effect and the effect would be not significant. While the proposed development would make an apparent addition to the cumulative situation, its association with the more distant Foothills combined with the stronger influence of the core of the Rugged Granite Uplands LCT where the viewpoint is
located, ensures that the character of the view is not redefined by the additional development.

Scenario 2

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenmount</td>
<td>Rugged Uplands – Lochs and Forests</td>
<td>13.25 km N</td>
<td>Seen as a medium sized group to the right of Dersalloch, introducing development into the Rugged Uplands LCT.</td>
</tr>
<tr>
<td>Linfairn Farm</td>
<td>Foothills with Forest and Wind Farm</td>
<td>14.31 km N</td>
<td>Visibility obscured by northern ridge extending from Merrick to Shalloch on Minnoch.</td>
</tr>
<tr>
<td>Keirs Hill</td>
<td>Foothills with Forest</td>
<td>20.88 km N</td>
<td>Seen set behind consented Dersalloch in the Foothills with Forest LCT, therefore not increasing extents of wind farm development.</td>
</tr>
<tr>
<td>Kirk Hill</td>
<td>Maybole Foothills</td>
<td>25.13 km NW</td>
<td>Seen as small sized group set on distant foothills to right of Hadyard Hill Wind Farm.</td>
</tr>
<tr>
<td>South Kyle</td>
<td>Southern Uplands</td>
<td>20.29 km NNW</td>
<td>Seen as medium to large sized group extensions to the left of Windy Standard, albeit at distance.</td>
</tr>
<tr>
<td>Benbrack</td>
<td>Southern Uplands with Forest</td>
<td>18.29 km NNW</td>
<td>Seen as medium sized group extending cluster to the left of Windy Standard, albeit at distance.</td>
</tr>
<tr>
<td>Millenderdale</td>
<td>Coastal Foothills</td>
<td>24.42 km WNW</td>
<td>Seen as a small scale and distant group in cluster with Breaker Hill and Straid Farm.</td>
</tr>
<tr>
<td>Breaker Hill</td>
<td>Coastal Foothills</td>
<td>24.92 km WNW</td>
<td>Seen as a small scale and distant group in cluster with Millenderdale and Straid Farm.</td>
</tr>
<tr>
<td>Straid Farm</td>
<td>Coastal Foothills / Raised Beach Coast</td>
<td>27.80 km WNW</td>
<td>Seen as a small scale and distant group in cluster with Breaker Hill and Millenderdale.</td>
</tr>
</tbody>
</table>

In Scenario 2, the application wind farms would increase wind farm development between operational and consented developments, but would not extend wind farm development into the previously undeveloped sector of the view to the south-east. Benbrack and South Kyle applications would add to the cluster that has formed around operational Windy Standard, increasing the extents across the Southern Uplands LCT. A new, albeit distant cluster would be formed in the Coastal Foothills LCT, seen in the view to the right of Mark Hill, comprising Millenderdale, Breaker Hill and Straid Farm. Closer to the proposed development, the influence of Keirs Hill Wind Farm would be reduced by its location behind consented Dersalloch Wind Farm and Linfairn.
Farm would be completely screened by the northern ridge from the Merrick to Shalloch on Minnoch.

5.9.85 The sensitivity rating for Scenario 2 would also remain **medium to high**. This is principally due to the containment of the consented wind farms at a considerable distance from the viewpoint, such that they would not impinge on the closer range Rugged Uplands LCT which forms the predominant characteristic of this view. While the consented wind farms add to the peripheral context of development, they do not have a notable influence on the value of the view or the susceptibility of the viewers.

5.9.86 While the application wind farms increase the developed extents of this panoramic view, the assessment in respect of Scenario 2 remains similar to that of Scenario 1 and the cumulative magnitude of effect remains as **medium to low**. This is because there are no application wind farms in close proximity to the proposed development and those that do occur in the same sector are either grouped with operational or consented developments, or appear distant and small scale.

5.9.87 The effect of the proposed development on the Scenario 2 cumulative baseline would be **not significant**. While the inclusion of the application sites in the cumulative context increases the extent of windfarm development, the view continues to be defined by the character of the Merrick Hills owing to their closer range and strength of character, more than the outlying foothills, which continue to be seen as a background component, despite the addition of the proposed development.

**Viewpoint 9 - Kildoach Hill**

**Baseline**

<table>
<thead>
<tr>
<th>Table 5.26: Relevant Operational Cumulative Wind Farm Developments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind Farm</td>
</tr>
<tr>
<td>Hadyard Hill Wind Farm</td>
</tr>
</tbody>
</table>

5.9.88 Hadyard Hill is the only operational development potentially visible from this viewpoint. The wireline shows it as tips set behind the ridgeline but these are not readily visible from the viewpoint. The baseline situation is, therefore, that there is no wind farm development readily visible from this viewpoint.

5.9.89 The assessment of this viewpoint, as presented in Section 5.8, concluded that the effects would be significant following the combination of the medium to high sensitivity and the medium magnitude of effect.

**Scenario 1**

<table>
<thead>
<tr>
<th>Table 5.27: Scenario 1 Relevant Consented Cumulative Wind Farm Developments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind Farm</td>
</tr>
<tr>
<td>Tralorg</td>
</tr>
</tbody>
</table>
Table 5.27: Scenario 1 Relevant Consented Cumulative Wind Farm Developments

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assel Valley</td>
<td>Coastal Foothills</td>
<td>19.57 km SW</td>
<td>Largely concealed by intervening landform with little influence on the cumulative situation.</td>
</tr>
<tr>
<td>Dersalloch</td>
<td>Foothills with Forest</td>
<td>0.78 km E</td>
<td>Seen as medium number of turbines at close range such that they would appear large in scale.</td>
</tr>
</tbody>
</table>

5.9.90 The sensitivity of hill walkers experiencing Scenario 1 would be reduced from the baseline rating of medium to high, to medium, owing to the close range of Dersalloch Wind Farm. This would make wind farm development a prominent feature of the view and in so doing would reduce the value of the view and susceptibility of hill walkers to the proposed development.

5.9.91 Dersalloch would have the strongest influence on the cumulative situation, owing to its location immediately behind the ridge of Kildoach Hill, such that the turbines would appear as large scale blades sweeping above the skyline. In contrast to the Dersalloch turbines, the proposed turbines would appear comparatively smaller and this would reduce their perceived prominence in the view. While their location in the opposite sector of the view to where Dersalloch Wind Farm would be seen, would increase the cumulative magnitude of effect, this would be moderated by the existing presence of consented Tralorg Wind Farm, which would establish wind farm development as an existing feature in this sector, albeit comparatively small and distant in appearance.

5.9.92 The cumulative magnitude of effect would be medium to low owing to the reduced scale and weaker influence of the proposed development in respect of the closer range and stronger influence of Dersalloch Wind Farm. As a result, the cumulative effect of adding the proposed development to Scenario 1 would be not significant.

Scenario 2

Table 5.28: Scenario 2 Relevant Application Cumulative Wind Farm Developments

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linfairn Farm</td>
<td>Foothills with Forest and Wind Farm</td>
<td>4.01 km SSW</td>
<td>Seen as a medium number of large scale turbines located on the edge of the Foothills with Forest and Wind Farm LCT.</td>
</tr>
<tr>
<td>Keirs Hill</td>
<td>Foothills with Forest</td>
<td>3.50 km NE</td>
<td>Seen as a medium number of large scale turbines in close proximity to the left of Dersalloch.</td>
</tr>
<tr>
<td>Glenmount</td>
<td>Rugged Uplands with Lochs and Forest</td>
<td>5.85 km SE</td>
<td>Not visible from this viewpoint owing to the screening effect of the ridge, but would be visible from summit of Kildoach Hill as medium sized group of large scale turbines.</td>
</tr>
</tbody>
</table>
5.9.93 The sensitivity of hill walkers experiencing Scenario 2 would be reduced from the baseline rating of medium to high, to medium to low, owing to the close range of Dersalloch, Linfairn Farm and Keirs Hill Wind Farms. These would make wind farm development a readily apparent and extensive feature of the Scenario 2 view and in so doing would reduce the value of the view and susceptibility of hill walkers to the proposed development.

5.9.94 In Scenario 2, the application wind farms alter the cumulative situation by adding substantially to the extents of wind farm development seen from this viewpoint. While consented Dersalloch continues to be most influential on the cumulative situation owing to its close proximity, application Keirs Hill increases the horizontal spread in this sector with the majority of the turbines seen at their full height and at close range. Dersalloch and Keirs Hill establish a strong association between the Foothills with Forest LCT and wind farm development.

5.9.95 Linfairn Farm would also be seen as a prominent feature owing to its close range and the full extents of its visibility. Despite being seen set at a lower elevation than the other developments, the Linfairn turbines would appear large in scale, especially with reference to the smaller scale patterns and features of the valley landscapes it abuts. In contrast to these developments, the proposed development would appear well contained in terms of horizontal extents, and its greater distance from the viewpoint would reduce its comparative scale.

5.9.96 Despite the increased extents of wind farm development in Scenario 2, the cumulative magnitude of effect would remain as medium to low. This is largely due to the limited visibility of the proposed development, especially in comparison with the closer range and larger scale developments, which moderate its prominence in the view. As a result, the cumulative effect of adding the proposed development to Scenario 2 would be not significant.

Viewpoint 15 – Monument, Maybole

Baseline

Table 5.29: Relevant Operational Cumulative Wind Farm Developments

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windy Standard</td>
<td>Southern Uplands</td>
<td>31.31 km E</td>
<td>Barely visible as minor feature on distant skyline.</td>
</tr>
<tr>
<td>Windy Standard Extension</td>
<td>Southern Uplands</td>
<td>28.81 km E</td>
<td>Barely visible as minor feature on distant skyline.</td>
</tr>
</tbody>
</table>
5.9.97 Wind farm development is a relatively discreet component of the baseline character, with examples appearing on the distant skyline to the east and north-east and which would only be visible in clear conditions.

5.9.98 The assessment of this viewpoint, as presented in Section 5.8, concluded that the effects would be not significant following the combination of the medium to high sensitivity and the medium to low magnitude of effect.

**Scenario 1**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dersalloch</td>
<td>Foothills with Forest</td>
<td>12.06 km SE</td>
<td>Seen as a medium sized group of turbines set on foothills ridge.</td>
</tr>
</tbody>
</table>

5.9.99 The sensitivity of viewers experiencing Scenario 1 would be reduced from the baseline rating of medium to high, to medium, owing to visibility of Dersalloch Wind Farm. Despite its distance from the viewpoint, Dersalloch would introduce wind farm development into this view where previously there had been none readily visible. This would make wind farm development a feature of the view and in so doing would reduce the value of the view and susceptibility of viewers to the proposed development.

5.9.100 The addition of the proposed development to Scenario 1 would give rise to a medium to low cumulative magnitude of effect. Although the proposed development would not appear as an unfamiliar feature in the view it would be seen in a previously undeveloped sector of the view and this would spread the influence across a wider extent of the foothills ridge.

5.9.101 The two developments would be seen as compact and distinct groups, and the substantial separation between them would prevent the landscape appearing over-developed. A further factor that moderates the cumulative effect would be their distance which at 9.77 km for the proposed development and 12.06 km for Dersalloch, would ensure that their vertical and horizontal extents would be in proportion with the foothills landscape.

5.9.102 The medium sensitivity combined with the medium to low cumulative magnitude of effect would lead to a cumulative effect that would be not significant.

**Scenario 2**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kirk Hill</td>
<td>Maybole Foothills</td>
<td>4.88 km SW</td>
<td>Seen as close range and large scale turbines set on nearby ridge to east.</td>
</tr>
<tr>
<td>Linfain Farm</td>
<td>Foothills with Forest and Wind Farm</td>
<td>11.56 km SE</td>
<td>Seen as small group of tips and blades set behind intervening ridgeline of foothills.</td>
</tr>
</tbody>
</table>
5.9.103 The close proximity and clear view of Kirk Hill Wind Farm means that it would have a notable influence on the cumulative situation. All eight turbines would be visible, seen set behind the intervening landform of Knockbrake (196 m AOD), such that four would be seen as blades and four as blades and nacelles. Despite their location on a more distant hill, their scale comparison would be with the closer range hill and this would make them appear smaller than they otherwise would. Linfairn Farm Wind Farm would also be visible to the right of consented Dersalloch, albeit at the more distant range of 11.56 km and with the turbines set well down such that only blades and nacelles would be visible above a low section in the foothills skyline.

5.9.104 In respect of Scenario 2, the sensitivity of viewers to the proposed development would be reduced from medium to medium to low. The additional development at Kirk Hill would reduce the overall value of the view and the susceptibility of viewers to the proposed development. While Dersalloch is strongly associated with the more distant Foothills with Forest LCT, Kirk Hill Wind Farm would bring development into the closer range Maybole Foothills LCT and this would increase the influence of wind farm development on this viewpoint.

5.9.105 The addition of the proposed development to Scenario 2 would give rise to a medium cumulative magnitude of effect. While the scale of the proposed turbines would appear comparatively smaller than the Kirk Hill turbines, being seen set on the ridge and at full height, they would present structures of a comparable vertical extent, despite their greater distance. They would also increase the influence of this type of development into the more distant foothills and reduce the separation between Kirk Hill Wind Farm and Linfairn Farm and Dersalloch Wind Farms.

5.9.106 The overall cumulative effect would, however, be not significant. This relates chiefly to relatively contained extents of each of the developments, whereby they appear as features within a wider landscape that continues to define the overall character of the view.

**Viewpoint 17 – Hadyard Hill**

**Baseline**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hadyard Hill Wind Farm</td>
<td>Foothills with Forest and Wind Farm</td>
<td>0.74 km S and SE</td>
<td>All 51 turbines seen in close proximity with turbines appearing as large scale structures occupying approx. 120 degree of the view.</td>
</tr>
<tr>
<td>Mark Hill</td>
<td>Plateau Moorland</td>
<td>12.50 km S</td>
<td>Seen as medium number of turbines at medium range set behind Hadyard Hill Wind Farm.</td>
</tr>
<tr>
<td>Arecleoch</td>
<td>Plateau Moorland</td>
<td>20.34 km SW</td>
<td>Seen as large number of turbines on Plateau Moorland LCT at distant range.</td>
</tr>
</tbody>
</table>

5.9.107 The close proximity of Hadyard Hill Wind Farm means that it defines the character of this view. It also affects perceptions regarding the influence of the other operational wind farms by presenting a scale comparison which diminishes the scale of the other developments. Mark Hill and Arecleoch are set behind Hadyard Hill Wind Farm and although they do not increase the extents, they add to the density of wind farm...
development. Despite the distance, Arecleoch is still seen as a substantial wind farm owing to the density of turbines and their horizontal extents, seen through a gap in the closer range turbines, while Mark Hill, despite being closer range, is less prominent owing to the partial screening by intervening landform and closer range turbines.

5.9.108 The pattern of development is based on a concentration of wind farms in the foothills and adjacent plateau moorland which has led to the creation of a wind farm landscape, as reflected in the renaming of this LCT. In contrast there is practically no wind farm development in the remaining sectors to the north-west and north-east where the landscape is generally lower lying and more settled.

5.9.109 The assessment of this viewpoint, as presented in Section 5.8, concluded that the effects would be not significant chiefly owing to the strong influence of Hadyard Hill Wind Farm in the baseline.

**Scenario 1**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assel Valley</td>
<td>Coastal Foothills</td>
<td>6.09 km SW</td>
<td>Seen as a small group of turbines set on adjacent Coastal Foothills LCT to the right of Hadyard Hill Wind Farm.</td>
</tr>
<tr>
<td>Tralorg</td>
<td>Coastal Foothills</td>
<td>5.25 km WSW</td>
<td>Seen as a small group of turbines set on adjacent Coastal Foothills LCT to the right of Hadyard Hill Wind Farm.</td>
</tr>
<tr>
<td>Dersalloch</td>
<td>Foothills with Forest</td>
<td>13.92 km ENE</td>
<td>Seen as small groups of turbines set on Foothills with Forest LCT to the left of Hadyard Hill Wind Farm.</td>
</tr>
<tr>
<td>Kilgallioch</td>
<td>Plateau Moorland</td>
<td>23.24 km S</td>
<td>Seen as large group of turbines set on Plateau Moorland LCT behind Hadyard Hill Wind Farm at distance.</td>
</tr>
<tr>
<td>Chapel Farm</td>
<td>Maybole Foothills</td>
<td>6.35 km NW</td>
<td>Seen as three small scale turbines set on edge of Middle Dale LCT.</td>
</tr>
<tr>
<td>North Threave</td>
<td>Maybole Foothills</td>
<td>5.03 km NW</td>
<td>Seen as single small scale turbine set on edge of Middle Dale LCT.</td>
</tr>
</tbody>
</table>

5.9.110 The consented wind farms generally follow the wider pattern of development through their containment within the Foothills LCTs; Chapel Farm and North Threave being the exceptions by introducing development into the previously undeveloped valley landscape, albeit comparatively smaller in numbers and scale and therefore of a typology typically associated with this location.

5.9.111 Assel Valley and Tralorg increase the horizontal extents across the wider Foothills ridge to the right, filling the remaining open section of this sector. Kilgallioch adds further to the density and extents of Mark Hill, albeit at the more distant range of 20.46 km, and both set behind Hadyard Hill turbines. In contrast, Dersalloch creates an additional feature, offset to the left of Hadyard Hill, such that it appears separate from the main concentration of turbines.
5.9.112 The addition of the consented wind farms in Scenario 1 does not change the sensitivity rating from medium to low, because this is largely based on the strong influence of close range Hadyard Hill Wind Farm, in contrast to which, the additional wind farms have a weaker influence on the value of the view and the susceptibility of hill walkers.

5.9.113 The addition of the proposed development to Scenario 1 would give rise to a cumulative effect in respect of the additional density that the consented developments set to the right and behind Hadyard Hill Wind Farm, establish. But, as in the baseline assessment, this effect is moderated by the existing influence of Hadyard Hill Wind Farm.

5.9.114 Dersalloch presents a different situation, whereby the increase in horizontal extents of the proposed development to the left, closes the separation from Hadyard Hill Wind Farm, although the comparatively distant location of Dersalloch, combined with its limited horizontal extents in the wider view, lessens this effect. Overall, the cumulative magnitude of effect would be medium which, when combined with the medium to low sensitivity would give rise to a not significant effect.

**Scenario 2**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penwhapple</td>
<td>Foothills with Forest and Wind Farm</td>
<td>2.79 km SW</td>
<td>Seen as single turbine set amidst Hadyard Hill turbines and appearing well integrated owing to similar scale and location.</td>
</tr>
<tr>
<td>Kirk Hill</td>
<td>Maybole Foothills</td>
<td>5.31 km N</td>
<td>Seen as isolated group of eight turbines in lower foothills to north.</td>
</tr>
<tr>
<td>High Troweir</td>
<td>Foothills with Forest and Wind Farm</td>
<td>5.97 km SW</td>
<td>Seen as single turbine set behind Hadyard Hill turbines and despite location, not appearing integrated owing to smaller scale.</td>
</tr>
<tr>
<td>Linfairn Farm</td>
<td>Foothills with Forest and Wind Farm</td>
<td>9.68 km E</td>
<td>Not readily visible from this viewpoint owing to screening effect of intervening foothills ridge.</td>
</tr>
<tr>
<td>Millenderdale</td>
<td>Coastal Foothills</td>
<td>11.61 km SW</td>
<td>Seen as a small group of turbines set behind Hadyard Hill Wind Farm and increasing the depth of development in this view.</td>
</tr>
<tr>
<td>Breaker Hill</td>
<td>Coastal Foothills</td>
<td>13.62 km SW</td>
<td>Seen as a small group of turbines set behind Millenderdale and Hadyard Hill Wind Farm and increasing the depth of development in this view.</td>
</tr>
<tr>
<td>Strait Farm</td>
<td>Coastal Foothills / Raised</td>
<td>14.04 km SW</td>
<td>Seen as a couple of distant turbines set behind the intervening ridge.</td>
</tr>
</tbody>
</table>
### Table 5.34: Scenario 2 Relevant Application Cumulative Wind Farm Developments

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beach Coast</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keirs Hill</td>
<td>Foothills with Forest</td>
<td>16.03 km NE</td>
<td>Seen as medium group of turbines at almost full extents set along foothills to the left of Dersalloch Wind Farm.</td>
</tr>
</tbody>
</table>

5.9.115 The addition of the application wind farms would have a limited effect on the sensitivity rating for this viewpoint as the susceptibility of hill walkers would already be strongly influenced by the presence of Hadyard Hill and other operational and consented wind farms. The sensitivity would therefore remain as medium to low.

5.9.116 In Scenario 2, the application wind farms would add to the concentration of development in those sectors of the view where wind farms are already an existing feature. The two closest range applications are single turbines located close to Hadyard Hill Wind Farm. These would make an incremental change amidst a much more extensive cumulative situation. The next closest application would be Linfairn Farm which would not be readily visible from this viewpoint.

5.9.117 While visibility of Straid Farm would be limited owing to intervening landform, Millenderdale and Breaker Hill would be seen to form a more distant cluster behind the Hadyard Hill turbines, and although adding to the depth of the development would not be seen to increase the extents into the wider landscape. Kirk Hill would form a more notable feature, especially as it would be seen to increase the extents of wind farm development into the lower and more settled landscape to the north. While this would not have a direct interaction with the proposed development, it would, nonetheless, add to the sense of encirclement around the viewpoint.

5.9.118 Keirs Hill Wind Farm would make the most notable difference as it would be readily visible and be seen to consolidate the cluster of wind farm development around Dersalloch Wind Farm. This establishes a cumulative situation in which the space between this cluster and Hadyard Hill helps to provide some separation, albeit with visibility of distant wind farms in the background. The addition of the proposed development into this separation space would form a more continuous extent of wind farm development. While this would add to the cumulative magnitude of effect, this effect is moderated by the fact that this view is already characterised by wind farm development and in respect of Scenario 2 would not be seen to increase the influence of this type of development into new sectors of the view.

5.9.119 In Scenario 2, the addition of the proposed development would give rise to a medium cumulative magnitude of effect, but in combination with the medium to low sensitivity, this would lead to a not significant cumulative effect.
Viewpoint 18 – North Threave

Baseline

Table 5.35: Relevant Operational Cumulative Wind Farm Developments

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hadyard Hill Wind Farm</td>
<td>Foothills with Forest and Wind Farm</td>
<td>6.10 km S</td>
<td>Hadyard Hill is seen to extend across the Foothills ridge with the group appearing fragmented owing to screening effect of intervening landform.</td>
</tr>
</tbody>
</table>

5.9.121 Hadyard Hill is the only operational wind farm visible from this viewpoint. It has a notable presence owing to its broad horizontal extents along the ridge of the Foothills with Forest and Wind Farm LCT and its appearance as separate groups of turbines.

5.9.122 The assessment of this viewpoint, as presented in Section 5.8, concluded that the effects would be not significant following the combination of the medium sensitivity and the medium magnitude of change.

Scenario 1

Table 5.36: Scenario 1 Relevant Consented Cumulative Wind Farm Developments

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tralorg</td>
<td>Coastal Foothills</td>
<td>7.20 km SSW</td>
<td>Small group of turbines seen set on foothills ridge to the right of Hadyard Hill Wind Farm.</td>
</tr>
<tr>
<td>Assel Valley</td>
<td>Coastal Foothills</td>
<td>8.04 km SSW</td>
<td>Small group of turbines seen set on foothills ridge to the right of Hadyard Hill Wind Farm and behind Tralorg Wind Farm.</td>
</tr>
</tbody>
</table>

5.9.123 The addition of the consented wind farms to Scenario 1 does not notably alter the sensitivity rating of medium to low, as Hadyard Hill Wind Farm already establishes this type of development as a feature of the view, such that the susceptibility of viewers is already affected, and the limited influence of Tralorg and Assel Valley, owing to their containment in the same sector of the view and relatively compact grouping, means this rating would not be reduced further.

5.9.124 Tralorg and Assel Valley are the only consented wind farms visible from this viewpoint. They would both be located in the Coastal Foothills LCT, which effectively appear as a continuation of the Foothills with Forest and Wind Farm LCT, where the proposed development and operational Hadyard Hill Wind Farm are located. This means that all Scenario 1 cumulative developments are contained within the same 90 degree sector of the view.

5.9.125 Tralorg and Assel Valley are closely located and overlap in the view, such that they appear as one development. They increase the horizontal extents of development along the ridge to the right, although appearing compact in comparison to operational Hadyard Hill Wind Farm.
5.9.126 The addition of the proposed development to Scenario 1 would increase the horizontal extents in the opposite direction, so that almost the full 90 degree view would be seen to be developed. A group of 23 turbines would be seen to the left of the existing turbines, many seen at their full height and within a portion of the view where the wider view opens up to more distant hills. Three other turbines would appear prominent on the Hadyard Hill ridge, albeit in the context of existing turbines.

5.9.127 The addition of the proposed development in respect of the cumulative Scenario 1 would give rise to a medium to low cumulative magnitude of effect. This would result from the limited influence of the consented wind farms, such that the effect that would arise would be mostly attributable to the individual influence of the proposed development, and its relationship in combination with Hadyard Hill Wind Farm, but not so notably with the consented wind farms.

5.9.128 Overall, the combination of the medium sensitivity and the medium to low cumulative magnitude of effect would give rise to a not significant cumulative effect.

Scenario 2

| Table 5.37: Scenario 2 Relevant Application Cumulative Wind Farm Developments |
|-----------------|-----------------|-----------------|-----------------|
| Wind Farm       | Location         | Distance / Direction | Visibility                                |
| Kirk Hill       | Maybole Foothills| 1.42 km E          | Seen as close range and large scale turbines set on nearby ridge to east. |
| Penwhapple      | Foothills with Forest and Wind Farm | 7.18 km S | One blade seen set behind ridge line and integrated with operational Hadyard Hill turbines. |
| High Troweir    | Foothills with Forest and Wind Farm | 9.03 km SSE | One tip seen set between Hadyard Hill and Assel Valley / Tralorg Wind Farms. |

5.9.129 The close proximity and clear view of Kirk Hill Wind Farm means that it would have a strong influence on the cumulative situation. All eight turbines are visible, albeit with one partially obscured by another turbine, and are seen set on the ridge of Craignens Hill not much more than 1 km from the viewpoint. Kirk Hill would form the focus of the view. In contrast, the very limited influence of Penwhapple and Troweir on the cumulative situation means that they do not alter the cumulative situation from that described in respect of Scenario 1.

5.9.130 In respect of Scenario 2, the sensitivity of road-users and residents to the proposed development would increase from medium to low, to medium. While the additional development at Kirk Hill would reduce the overall value of the view, its close range to the viewpoint would raise the susceptibility of viewers to the proposal for further development.

5.9.131 The addition of the proposed development to Scenario 2 would give rise to a medium cumulative magnitude of effect. While the scale of the proposed turbines would appear comparatively smaller than the Kirk Hill turbines, the increase in horizontal extents would mean that the separation between operational Hadyard Hill Wind Farm and Kirk Hill would be reduced. When the addition of the proposed development is seen in the context of the wider extents including Hadyard Hill, Tralorg and Assel...
Valley Wind Farms, as well as Kirk Hill, this addition would give rise to a significant cumulative effect.

**Viewpoint 21 - Shalloch on Minnoch**

**Baseline**

<table>
<thead>
<tr>
<th>Wind Farm Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hadyard Hill Wind Farm</td>
<td>13.07 km WNW</td>
<td>Seen as a large number of turbines, broad in horizontal extents, albeit small in scale owing to distance from viewpoint.</td>
</tr>
<tr>
<td>Mark Hill Plateau Moorland</td>
<td>15.28 km WSW</td>
<td>Seen as medium group of small scale turbines as part of cluster to SW.</td>
</tr>
<tr>
<td>Arecleoch Plateau Moorland</td>
<td>24.67 km SW</td>
<td>Seen as large group of small scale turbines as part of cluster to SW.</td>
</tr>
<tr>
<td>Windy Standard Southern Uplands with Forestry</td>
<td>22.71 km NE</td>
<td>Seen as medium group of small scale turbines as part of cluster to NE.</td>
</tr>
<tr>
<td>Windy Standard Extension Southern Uplands with Forestry</td>
<td>21.23 km</td>
<td>Seen to the fore of Windy Standard but still as small scale turbines and as part of cluster to NE.</td>
</tr>
</tbody>
</table>

5.9.132 Wind farm development is an evident part of the baseline cumulative context from this viewpoint, albeit seen at medium and distant range. Clusters occur associated with the Southern Upland LCTs to the north-east, and the Plateau Moorland LCTs to the south-west. Hadyard Hill Wind Farm stands on its own in the Foothills with Forest and Wind Farm LCT, seen as a linear development set along the foothills ridge.

5.9.133 The assessment of this viewpoint, as presented in Section 5.8, concluded that the effects would be not significant following the combination of the medium to high sensitivity and the medium to low magnitude of effect.

**Scenario 1**

<table>
<thead>
<tr>
<th>Wind Farm Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tralorg Coastal Foothills</td>
<td>19.32 km WNW</td>
<td>Seen as small group of small scale turbines set behind left end of Hadyard Hill.</td>
</tr>
<tr>
<td>Assel Valley Coastal Foothills</td>
<td>19.20 km WNW</td>
<td>Seen as small group of small scale turbines set behind left end of Hadyard Hill.</td>
</tr>
<tr>
<td>Dersalloch Foothills with Forest</td>
<td>12.74 km N</td>
<td>Seen as medium group of small scale turbines set in Foothills with Forest.</td>
</tr>
</tbody>
</table>
5.9.134 The addition of the consented developments to the operational developments creates Scenario 1 in which the clusters to the south and south-west starts to coalesce, the cluster to the north-east expands and becomes denser, and Tralorg and Assel Valley form a cluster with Hadyard Hill Wind Farm that would be associated with the wider foothills ridge. Dersalloch is the only consented wind farm that would be unattached from existing developments, thus forming a separate development between Hadyard Hill Wind Farm and the north-east cluster.

5.9.135 The sensitivity rating of the Scenario 1 cumulative situation would remain medium to high. This is principally due to the containment of the consented wind farms at a considerable distance from the viewpoint, such that they would not impinge on the closer range Rugged Uplands LCT which forms the predominant characteristic of this view. While the consented wind farms add to the peripheral context of development, they do not have a notable influence on the value of the view or the susceptibility of the viewers.

5.9.136 In this context of operational and consented wind farms, the addition of the proposed development would give rise to a medium to low cumulative magnitude of effect. While the proposed development would draw wind farm development closer to Dersalloch Wind Farm, which itself forms an intermediate development to the north-east cluster, there would still be a considerable separation space that would prevent any sense of coalescence from occurring.

5.9.137 Furthermore, the location of Tralorg and Assel Valley mostly behind Hadyard Hill Wind Farm means that these consented development would not be seen to lengthen the horizontal extents along the ridgeline which would otherwise accentuate the further addition made by the proposed development, albeit at the other end of the ridge.

5.9.138 The proposed development, along with the other Scenario 1 developments would be seen at a sufficient distance and associated with the outlying foothills, such that their effect on the Rugged Uplands LCT, which surround the viewpoint, would be moderated and this also limits the cumulative magnitude of effect. The sectors of the view to the south and east would remain unaffected by the proposed development, which would be seen to concentrate development within already developed sectors.

5.9.139 While the proposed development forms an increase in the extents of wind farm development, adding to the sense of enclosure experienced in certain sectors from this viewpoint, but this increase is not of sufficient magnitude to give rise to a significant cumulative effect. The cumulative effect would therefore be not significant.
Table 5.40: Scenario 2 Relevant Application Cumulative Wind Farm Developments

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linfairn Farm</td>
<td>Foothills with Forest and Wind Farm</td>
<td>8.71 km N</td>
<td>Seen as medium group of medium scale turbines set in same sector as Hadyard Hill, to the right of the view.</td>
</tr>
<tr>
<td>Glenmount</td>
<td>Rugged Uplands</td>
<td>9.67 km NNW</td>
<td>Seen as medium group of medium scale turbines set in the Rugged Uplands LCT between the Dersalloch cluster and NE cluster.</td>
</tr>
<tr>
<td>Kirk Hill</td>
<td>Maybole Foothills</td>
<td>19.79 km NW</td>
<td>Seen as a small and distant group of turbines beyond Hadyard Hill Wind Farm.</td>
</tr>
<tr>
<td>Keirs Hill</td>
<td>Foothills with Forest</td>
<td>15.85 km N</td>
<td>Seen as medium group of small scale turbines set behind consented Dersalloch in the sector to the right of the proposed development.</td>
</tr>
<tr>
<td>South Kyle</td>
<td>Southern Uplands with Forest</td>
<td>17.79 km NE</td>
<td>Seen as medium group of small scale turbines adding to extents and density of NE cluster.</td>
</tr>
<tr>
<td>Benbrack</td>
<td>Southern Uplands with Forest</td>
<td>16.21 km NE</td>
<td>Seen as medium group of small scale turbines adding to extents and density of NE cluster.</td>
</tr>
<tr>
<td>Millenderdale</td>
<td>Coastal Foothills</td>
<td>21.52 km W</td>
<td>Seen as small group of small scale turbines set in same sector as Hadyard Hill, to the left of the view.</td>
</tr>
<tr>
<td>Breaker Hill</td>
<td>Coastal Foothills</td>
<td>22.45 km W</td>
<td>Seen as small group of small scale turbines set in same sector as Hadyard Hill, to the left of the view.</td>
</tr>
<tr>
<td>Straid Farm</td>
<td>Coastal Foothills / Raised Beach Coast</td>
<td>24.92 km W</td>
<td>Seen as small group of small scale turbines set in same sector as Hadyard Hill, to the left of the view.</td>
</tr>
</tbody>
</table>

5.9.140 The addition of the application sites to the cumulative baseline would expand the cluster of operational and consented wind farms to the north and north-east, with Linfairn Farm and Glenmount increasing the extents to the left and right of Dersalloch, and Keirs Hill increasing the density behind it. South Kyle and Benbrack would expand the cluster to the north-east and bring it into the middle range, while Millenderdale, Breaker Hill and Straid Farm would form a new, albeit distant cluster to the west. Kirk Hill would add to the cluster around Hadyard Hill, albeit seen as a more distant example.

5.9.141 In respect of Scenario 2, the sensitivity of hill walkers would be reduced from medium to high, to medium, largely on account of the closer range of the application Linfairn Farm and Glenmount Wind Farms to the viewpoint, as well as the increased horizontal
extents that the application wind farms make, especially where they infill gaps to the north and north-east.

5.9.142 Scenario 2 changes the context into which the proposed development would be added, as it comprises wind farm development which appears almost continuous from the cluster to the south, through the west and north, to the cluster to the north-east. While the proposed development would be visible in the centre of these extents and therefore not expanding the extents, it would, nonetheless, reduce the gap between Hadyard Hill and Linfairn Wind Farms and in so doing add to the more continuous extents visible across the north-western sector. The closer proximity of Linfairn Farm, Glenmount and the proposed development would increase the cumulative magnitude of effect by bringing wind farm development closer to the viewpoint, albeit still contained within the outlying hills to the Rugged Uplands.

5.9.143 In respect of Scenario 2, the cumulative magnitude of effect on the view from Shalloch on Minnoch would be medium and the cumulative effect would be significant, despite the reduced sensitivity of the viewpoint.

**Viewpoint 22 - Cornish Hill**

**Baseline**

| Table 5.41: Relevant Operational Cumulative Wind Farm Developments |
|-----------------------------------|----------------|-----------------|--------------------------|
| Wind Farm                        | Location               | Distance / Direction | Visibility                                           |
| Hadyard Hill Wind Farm            | Foothills with Forest and Wind Farm | 11.48 km WNW        | Seen as small sized group with tips and blades set behind the intervening ridgeline of the Foothills. |

5.9.144 Hadyard Hill is the only operational wind farm seen from this viewpoint. The extent of its visibility is limited by the intervening landform such that only a small group of blades and tips can be seen and these form a relatively discreet feature in the view. The main draw of the view is north, where the landscape opens out and the view becomes most expansive.

5.9.145 The assessment of the effects on viewers on Cornish Hill, as presented in Section 5.8, concluded that the effects would be significant following the combination of the medium to high sensitivity and the medium magnitude of effect.

**Scenario 1**

| Table 5.42: Scenario 1 Relevant Consented Cumulative Wind Farm Developments |
|-----------------------------------|----------------|----------------|--------------------------|
| Wind Farm                        | Location | Distance / Direction | Visibility                                           |
| Tralorg                           | Coastal Foothills | 18.51 km WNW | Seen as small sized and small scale group with tips and blades set behind the intervening ridgeline of the Foothills. |
| Assel Valley                      | Coastal Foothills | 18.88 km WNW | Seen as small sized and small scale group with tips and blades set behind the intervening ridgeline of the Foothills. |
Table 5.42: Scenario 1 Relevant Consented Cumulative Wind Farm Developments

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dersalloch</td>
<td>Foothills with Forest</td>
<td>9.1 km N</td>
<td>Seen as medium sized group with medium scale turbines in sector to the right of the proposed development.</td>
</tr>
</tbody>
</table>

5.9.146 In Scenario 1, consented Tralorg and Assel Valley Wind Farms would appear as extensions to Hadyard Hill, seen to the left of the majority of the group and small in scale with the full extents screened by intervening landform. Nonetheless, these developments would increase the horizontal extents of wind farm development seen along the *Foothills with Forest and Wind Farm* ridge in this sector of the view. Consented Dersalloch Wind Farm would be seen as the main feature of the view, set in the *Foothills* to the north where the main draw of the view occurs, with almost all the turbines seen at their full height and at a minimum distance of 9.1 km.

5.9.147 In Scenario 1, wind farm development is contained within the sector to the west and to the north, with no development apparent in the sectors to the south and east. The presence of the consented wind farms would reduce the sensitivity of hill walkers experiencing this view from medium to high to medium, especially as Dersalloch Wind Farm forms such a notable feature in the ‘centre’ of the wider view.

5.9.148 The addition of the proposed development to Scenario 1 would give rise to a medium to low cumulative magnitude of effect. The more notable presence of Dersalloch Wind Farm, in contrast to that of Hadyard Hill Wind Farm, would mean that the proposed development would no longer appear as the defining feature of the view. Dersalloch would already establish wind farm development as a feature of the view and its similar distance and scale would moderate the effect of the proposed development by drawing the viewers’ attention away to the north.

5.9.149 While the proposed development would reduce the space that separates Hadyard Hill Wind Farm and Dersalloch Wind Farm, there would still be a substantial gap that would prevent the sense that wind farm development were occurring continuously along the ridgeline. This effect would be further moderated when considered in the context of the full panorama, in which the sectors to the east and south would remain undeveloped.

5.9.150 The cumulative effect of the proposed development on the Scenario 1 cumulative situation would be not significant. The presence of Dersalloch Wind Farm would reduce the sensitivity of the viewers and the cumulative magnitude of effect by establishing a competing focus in the view.

Scenario 2

Table 5.43: Scenario 2 Relevant Application Cumulative Wind Farm Developments

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linfairn Farm</td>
<td>Foothills with Forest and Wind Farm</td>
<td>5.40 km NW</td>
<td>Seen as medium sized group with medium scale turbines in same sector as the proposed development.</td>
</tr>
<tr>
<td>Wind Farm</td>
<td>Location</td>
<td>Distance / Direction</td>
<td>Visibility</td>
</tr>
<tr>
<td>-----------------</td>
<td>------------------------</td>
<td>----------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Keirs Hill</td>
<td>Foothills with Forest</td>
<td>12.32 km N</td>
<td>Seen as medium sized group set behind consented Dersalloch in Foothills with Forest.</td>
</tr>
<tr>
<td>Glenmount</td>
<td>Rugged Uplands</td>
<td>7.06 km NE</td>
<td>Seen as medium sized group with medium scale turbines in sector to the right of the proposed development.</td>
</tr>
<tr>
<td>South Kyle</td>
<td>Southern Uplands</td>
<td>15.50 km NE</td>
<td>Seen as medium sized group with small scale turbines adding to extents and density of cluster to NE.</td>
</tr>
</tbody>
</table>

5.9.151 Linfairn Farm would be the most prominent of the application wind farms. Seen at a range of 5.40 km, it would be closest to the viewpoint, with the turbines appearing notably larger than the Hadyard Hill or Dersalloch turbines. It would be seen set below the ridgeline and largely back-clothed by the landform but with almost all of the 17 turbines seen at their full height. Its location between Hadyard Hill and Dersalloch Wind Farms would close the separation spaces down in these northern and western sectors of the view.

5.9.152 Glenmount would be seen to the right of the northern sector view. At a minimum distance of 7.06 km, the turbines would appear as a notable feature despite being partially concealed by the intervening landform of the Rugged Uplands LCT. Glenmount would add to the sense that the viewpoint were being surrounded by development.

5.9.153 The other application wind farms would not have such a notable bearing on the cumulative situation, with Keirs Hill, set behind Dersalloch at a range of 12.32 km, and South Kyle visible as a distant feature, largely screened by the ridgeline of the Rugged Uplands LCT.

5.9.154 In respect of Scenario 2, the sensitivity of hill walkers would be reduced from medium to high to medium to low, largely because their susceptibility to the proposed development would be reduced by the presence of the application Linfairn Wind Farm, seen in conjunction with consented Dersalloch and operational Hadyard Hill Wind Farms.

5.9.155 The addition of the proposed development to the Scenario 2 cumulative situation would give rise to a medium cumulative magnitude of effect. Linfairn Farm would reduce the space between the wind farms to the right and existing Hadyard Hill to the left, such that the proposed development would be seen to further reduce the remaining undeveloped space. Although the cumulative wireline shows that there would still be sufficient space between Linfairn Farm and the proposed development, the perception in respect of the wider context would be of the viewpoint becoming enclosed by wind farm development, albeit only within the north and west sectors, with the southern and eastern sectors remaining undeveloped.

5.9.156 The proximity of Linfairn Farm, however, goes some way to reduce the cumulative magnitude of effect by becoming the focus of the view and in so doing reducing the
prominence of the other wind farm developments. The scale of the proposed turbines would be reduced by the comparison with the larger scale Linfairn turbines and this would reduce the overall effect.

5.9.157 The cumulative effect of the proposed development on the Scenario 2 cumulative situation would be not significant. Although the presence of the application Linfairn Wind Farm would reduce the gap between existing and consented developments, it would also reduce the overall sensitivity of hill walkers to the proposed development and create a focus that would, by comparison, reduce the prominence of the proposed development.

**Cumulative Effects on Principal Visual Receptors**

**Dailly**

**Baseline**

5.9.158 There are no operational or under construction wind farms visible from Dailly.

5.9.159 The assessment of the effects on residents in Dailly, as presented in Section 5.8, concluded that the effect would be not significant for the majority of the settlement with the exception of the southern and eastern edges where the effect would be significant.

**Scenario 1**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tralorg</td>
<td>Coastal Foothills</td>
<td>Approx. 6 km min SW</td>
<td>ZTV shows visibility occurs across Dailly, albeit patchy across south and east.</td>
</tr>
<tr>
<td>Assel Valley</td>
<td>Coastal Foothills</td>
<td>Approx. 7 km min SW</td>
<td>ZTV shows visibility occurs across Dailly, albeit patchy across south and east.</td>
</tr>
</tbody>
</table>

5.9.160 The sensitivity of road-users and residents would be reduced from medium to high to medium. Although visibility of Tralorg and Assel Valley Wind Farms would be limited, it would, nonetheless, establish wind farm development as a feature of the Scenario 1 baseline.

5.9.161 Visibility of consented Tralorg and Assel Valley Wind Farms would be limited by a combination of the following factors. As described in the baseline assessment, views out to the surrounding landscape are generally restricted by the enclosure of the built form and tree cover in the settlement. This leaves only the southern edge of the settlement as having potential to gain visibility of Tralorg and Assel Valley. From here visibility is restricted by intervening landform such that Assel Valley and Tralorg Wind Farms would be seen partially concealed behind the skyline and visible from only the more elevated parts along the southern boundary. Their association with the lowest part of the skyline and offset from the central feature of Hadyard Hill, further reduces its prominence.
5.9.162 In respect of Scenario 1, the cumulative magnitude of effect would be medium to low. This relates principally to the limited influence that the consented wind farms would have on the settlement, being seen from only parts of the southern edge and as a relatively compact group offset from the main focus of Hadyard Hill. Although the addition of the proposed development would form a notable feature, the combined effect with the consented development would not be so notable owing to its limited influence. The cumulative effect of the addition of the proposed development would be not significant.

Scenario 2

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kirk Hill</td>
<td>Maybole Foothills</td>
<td>Approx. 3 km N</td>
<td>ZTV shows visibility occurs across the settlement.</td>
</tr>
</tbody>
</table>

5.9.163 In Scenario 2, Kirk Hill would be the seen at a range of 3 km to the north. Again visibility from within the settlement would be largely restricted by built form and tree cover, although from the north-western edge where the public open space occupies the land next to the River Girvan more open views are afforded. Visibility would also occur from the northern edge where the B741 forms a junction with the minor road to Old Dailly.

5.9.164 In Scenario 2, Kirk Hill would be the seen at a range of 3 km to the north. Again visibility from within the settlement would be largely restricted by built form and tree cover, although from the north-western edge where the public open space occupies the land next to the River Girvan more open views are afforded. Visibility would also occur from the northern edge where the B741 forms a junction with the minor road to Old Dailly.

5.9.165 In respect of Scenario 2, the sensitivity of residents in the settlement would be reduced from medium to high, to medium. Whereas there is no wind farm development visible in the baseline situation, in Scenario 2 Tralorg Wind Farm would be seen to the SW and Kirk Hill Wind Farm would be seen to the north, and together these would reduce the value of the view and the susceptibility of residents to the proposed development.

5.9.166 The addition of the proposed development to Scenario 2 would give rise to a medium cumulative magnitude of effect. While the majority of the settlement would gain no visibility of any of the three developments, there would be an effect along the southern, northern and north-western boundaries. Combined visibility between Kirk Hill and the proposed development would occur only on the northern edge, where the presence of these two developments, both at relatively close range and on opposite sides of the valley would add notably to the cumulative effect. On the north-western edge, the effect would be sequential as only Kirk Hill Wind Farm would be visible, while on the southern edge only Tralorg Wind Farm and the proposed development would be visible. In both instances, there would still be a cumulative effect as the other developments are having a notable influence on the adjacent edges of the settlement.

5.9.167 The cumulative effect on the settlement of Dailly would be significant. Although the wind farm developments would not be visible from the majority of the settlement, the combination of glimpsed views, from within the settlement, and fuller visibility from the north-western, northern and southern edges, with the relatively close proximity of Kirk
Hill and the proposed development, and their location on opposite sides of the valley, would be sufficient to establish a perceived presence that would redefine the character of views from the settlement.

**B741**

*Baseline*

<table>
<thead>
<tr>
<th>Wind Farm Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hadyard Hill Wind Farm Foothills with Forest and Wind Farm</td>
<td>3.5 km min S and SE</td>
<td>Seen as small sized group with tips and blades set behind the intervening ridgeline of the Foothills.</td>
</tr>
</tbody>
</table>

5.9.168 Hadyard Hill is the only operational wind farm seen from this section of the B741. The extent of its visibility is limited by the intervening landform such that typically a small group of blades and tips can be seen behind the *Foothills with Forest and Wind Farm LCT* ridge in open sections where the road is not screened by tree cover. Although not prominent in the view, Hadyard Hill does establish wind farm development as a baseline feature visible to road-users on the B741.

5.9.169 The assessment of the effects on the road-users of the B741 in Section 5.8, concluded that the effects would be not significant for the majority of the route with the exception of the section to the north-east of Dailly for a distance of approximately 1.7 km where the effect would be significant. This was on account of the relatively full extents of visibility that would occur from this largely open section of road.

5.9.170 Following the approach of the main assessment, the section of the B741 between Cloystie and Girvan is assessed for cumulative effects, as the ZTV shows that the section further east is unlikely to undergo significant cumulative effects.

**Scenario 1**

<table>
<thead>
<tr>
<th>Wind Farm Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tralorg Coastal Foothills</td>
<td>2.5 km min S and SW</td>
<td>Seen predominantly in open sections between Dailly and Girvan as a prominent feature associated with Saugh Hill on the foothills ridge.</td>
</tr>
<tr>
<td>Assel Valley Coastal Foothills</td>
<td>3.5 km min S and SW</td>
<td>Extents of visibility similar to Tralorg, although partially screened by ridgeline.</td>
</tr>
<tr>
<td>Dersalloch Foothills with Forest</td>
<td>8 km to section from Cloystie N and NE</td>
<td>Visibility limited by intervening landform and tree cover through <em>Middle Dale</em> LCT. Seen as medium sized group with medium scale turbines associated with separate group of foothills in northern sector.</td>
</tr>
</tbody>
</table>

5.9.171 In Scenario 1 consented Tralorg and Assel Valley would be seen to extend wind farm development into the wider foothills ridge to the south-west. Their influence would largely be in the open section of the B741 between Low Craighead and Girvan where...
their association with the prominent Saugh Hill would make them a readily apparent feature to road-users. While Hadyard Hill Wind Farm often appears fragmented along the ridge, Tralorg would appear as a distinct development, with separation between the clusters of existing turbines. Assel Valley would have less of a cumulative influence owing to its location behind the foothills ridge although when visible, it would appear as an extension to Tralorg Wind Farm.

5.9.172 While Dersalloch has a strong influence on the section of the B741 between Dalmellington and Straiton, its limited visibility and limited association with the Middle Dale LCT through which the B741 passes, weakens its influence on the section being assessed.

5.9.173 In respect of Scenario 2, the sensitivity of road-users on the B741 would be reduced from medium to medium to low, largely because their susceptibility to the proposed development would be reduced by the presence of consented Tralorg and Assel Valley Wind Farms, seen as a prominent feature on the foothills ridge.

5.9.174 As described in the baseline assessment in Section 5.8, visibility of the proposed development would be limited in extents by the screening effect of landform and tree cover. The same is true of the operational and consented developments which make up Scenario 1, which means that they would also have a relatively weak influence on the cumulative situation.

5.9.175 The small number of developments visible from the B741 and the limited extents of their visibility, means that there would be very little inter-visibility between these developments. There would, however, be sequential effects arising in respect of travel in both directions, and relating primarily to Tralorg Wind Farm. This development would appear as a prominent feature in the section between Girvan and Low Craighead, over which visibility of the proposed development would be limited. Between Dailly and the junction with Hadyard Hill minor road, the proposed development would form a prominent feature while visibility of Tralorg Wind Farm would be limited.

5.9.176 The addition of the proposed development would add a separate and distinct wind farm associated with a different section of the wider foothill ridge, such that there would be no confusion over the identity of each. Similarities in the number and scale of turbines in each group would help to establish a pattern to the developments, as well as the location of both developments occurring on the southern side of the valley and contained in the foothills ridge. Differences would also occur, with the Tralorg turbines occupying a more prominent position on the hill top, than the proposed turbines which would be set well below the hill top and this would comparatively reduce their sequential cumulative effect. Taking all these factors into account, the addition of the proposed development to Scenario 1 would give rise to a medium cumulative magnitude of effect.

5.9.177 In respect of Scenario 1, the greatest potential for a significant cumulative effect would occur in the section between Girvan and the junction with Hadyard Hill minor road, as this section is closest to the more influential consented wind farms and closest to the proposed development. The medium to low sensitivity combined with the medium cumulative magnitude of effect means, however, that the effect would be not significant.
**Scenario 2**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kirk Hill</td>
<td>Maybole Foothills</td>
<td>1.5 km min W, NW, N and NE</td>
<td>Theoretical visibility is shown to be intermittent along the B741 while actual visibility would be further reduced by tree cover.</td>
</tr>
<tr>
<td>Keirs Hill</td>
<td>Foothills with Forest</td>
<td>8 km min to Cloyntie NE</td>
<td>Seen as medium sized group set behind consented Dersalloch in Foothills with Forest.</td>
</tr>
</tbody>
</table>

5.9.178 In Scenario 2 Kirk Hill Wind Farm is the closest range development to the B741 and although visibility would be limited, it would have the greatest influence on the cumulative situation. Keirs Hill Wind Farm would also be visible from the B741, although its cumulative influence would be very limited owing to a combination of distance, intervening landform and tree cover, as well as a lack of association between the Foothills with Forest LCT in which the development is located and the Middle Dale LCT where the B741 is located.

5.9.179 In respect of Scenario 2, the sensitivity of road-users on the B741 would be reduced from medium to medium to low, largely because their susceptibility to the proposed development would be reduced by the presence of application Kirk Hill seen as a prominent feature on the Maybole Foothills ridge, as well as the presence of consented Tralorg Wind Farm.

5.9.180 The ZTV shows that visibility of Kirk Hill would be patchy to the north-east of Ruglen and the south-west of Dailly owing to the screening effect of intervening landform. Between Ruglen and Dailly, actual visibility would be reduced in parts by tree cover, such that the section with the greatest potential for visibility would occur between the junction with Hadyard Hill minor road and Dailly. In this section Kirk Hill would be seen as a readily apparent feature at a minimum distance of approximately 3 km to the north of the road.

5.9.181 It is in this section that the proposed development would also be readily visible to the south of the road at a minimum distance of 3.5 km. The cumulative effect of these developments would be increased by their location on opposite sides of the valley as this would maximise the extents to which development would visible, despite the relatively contained grouping of both developments. The cumulative magnitude of effect would be medium to high and in combination with the medium sensitivity, the cumulative effect would be significant.

5.9.182 For the remainder of the route the cumulative magnitude of effect would be medium or lower owing to the reduced influence of the cumulative wind farms on the views from the B734. In combination with the medium to low sensitivity, this assessment would lead to a not significant effect.
**Table 5.50: Relevant Operational Cumulative Wind Farm Developments**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hadyard Hill Wind Farm</td>
<td>Foothills with Forest and Wind Farm</td>
<td>0.4 km min All</td>
<td>From foothills section seen as close range and prominent feature. From valley sections seen as small sized group with tips and blades set behind the intervening ridgeline of the Foothills.</td>
</tr>
</tbody>
</table>

5.9.183 Hadyard Hill is the only operational wind farm visible from the B734. Visibility is especially close range in the open section across the *Foothills with Forest and Wind Farm* LCT between Barr and Penkill where the road comes within 1 km of the closest turbines, but limited in the section from Penkill to Girvan which passes through the *Middle Dale* LCT, and the section from Barr to the A714 which passes through the *Intimate Pastoral Valley* LCT.

5.9.184 The assessment of the effects on road-users on the B734 in Section 5.8, concluded that the effects would be not significant for the majority of the route with the exception of the section between Merkland and north of Barr where the effect would be significant.

**Scenario 1**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tralorg</td>
<td>Coastal Foothills</td>
<td>Approx. 1.5 km min S and SE</td>
<td>ZTV shows visibility occurs in section of B734 in Middle Dale between Girvan and Old Dailly, then in Foothills between Old Dailly and Doon Hill.</td>
</tr>
<tr>
<td>Assel Valley</td>
<td>Coastal Foothills</td>
<td>Approx. 2 km min S and SE</td>
<td>ZTV shows visibility occurs in section of B734 in Middle Dale between Girvan and Old Dailly, then in Foothills between Old Dailly and Doon Hill.</td>
</tr>
</tbody>
</table>

5.9.185 Consented Tralorg and Assel Valley Wind Farms would be seen set on the *Coastal Foothills* LCT adjacent to the *Foothills with Forest and Wind Farm* LCT where the existing Hadyard Hill Wind Farm is located. Tralorg would be visible from the section of the B734 between Girvan and Old Dailly as a close range feature, set on the elevated ridge of Saugh Hill above the road, albeit with the steep hill slopes reducing the extents of visibility such that visibility would typically comprise blades and tips, with a short section where there would be no visibility.

5.9.186 Between Old Dailly and Doon Hill the nature of the visibility would change as the Tralorg and Assel Valley turbines would be seen to fuller extents, still in the close range of 1.5 to 3 km, although from Knockgerran, the even closer range influence of Hadyard Hill Wind Farm would become the prominent feature, and this would lessen the cumulative influence of the consented developments. Between Doon Hill and Barr...
and back to the A714, there would be no visibility of Tralorg or Assel Valley Wind Farms.

5.9.187 In respect of Scenario 1, the sensitivity of road-users on the B734 would be reduced from medium to medium to low. While wind farm development is a feature of the baseline situation, the consented developments increase the extents of this type of development, especially in the section of the B734 through the Girvan Valley to the north, and this reduces the value of the views from the road, as well as the susceptibility of road-users to the proposed development.

5.9.188 In respect of Scenario 1, the cumulative magnitude of effect would be medium to low. This relates principally to the limited influence that the proposed development would have on the cumulative situation, owing to the limited extent of the proposed development that would be visible from the Foothills section, the comparatively greater influence of Hadyard Hill Wind Farm and the integration of the proposed turbines with this existing development. While visibility of Tralorg and Assel Valley Wind Farms would increase the influence of wind farm development on the B734, both sequentially in the section through the Middle Dale LCT and in combination in the section across the Foothills LCT, the addition of the proposed development would still have a limited influence and the cumulative effect would be not significant.

**Scenario 2**

<table>
<thead>
<tr>
<th>Wind Farm</th>
<th>Location</th>
<th>Distance / Direction</th>
<th>Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kirk Hill</td>
<td>Maybole</td>
<td>Approx. 6.5 km N NE and NW</td>
<td>ZTV shows visibility occurs only in section between Penkill and Girvan with turbines seen set on low foothills on northern side of valley.</td>
</tr>
<tr>
<td>Millenderdale</td>
<td>Coastal Foothills</td>
<td>Approx. 1 km SW</td>
<td>ZTV shows visibility occurs almost continuously along section through Stinchar Valley between A714 and Barr with small patches in foothills section.</td>
</tr>
<tr>
<td>Breaker Hill</td>
<td>Coastal Foothills</td>
<td>Approx. 2 km SW</td>
<td>ZTV shows visibility occurs almost continuously along section through Stinchar Valley between A714 and Barr with small patches in foothills section.</td>
</tr>
<tr>
<td>Straid Farm</td>
<td>Coastal Foothills</td>
<td>Approx. 4.5 km SW</td>
<td>ZTV shows visibility occurs almost continuously along section through Stinchar Valley between A714 and Barr with small patches in foothills section.</td>
</tr>
</tbody>
</table>

5.9.189 In Scenario 2, Kirk Hill would be the seen at a range of 6.5-9.5 km from the northern section of the B734 that passes through the Middle Dale LCT between Girvan and Penkhill. Kirk Hill would be seen as a compact group of turbines, albeit set on the northern enclosing ridge to the valley.
5.9.190 From the southern section that passes through the Intimate Pastoral Valley LCT on the opposite side of the foothills, theoretical visibility of the cluster in the Coastal Foothills LCT to the south-west is shown to occur. Breaker Hill and Millenderdale Wind Farms would be the most influential of the three, owing to their relatively close proximity and location at the end of the valley, towards which the B734 aligns. The road-side is, however, fairly extensively enclosed by tree cover and this would reduce the extents of actual visibility.

5.9.191 In respect of Scenario 2, the sensitivity of road-users on the B734 would be reduced from medium to medium to low. While wind farm development is a feature of the baseline situation, the consented and application developments increase the extents of this type of development, especially in the section of the B734 through the Stinchar Valley to the south, and this reduces the value of the views from the road, as well as the susceptibility of road-users to the proposed development.

5.9.192 While Kirk Hill would increase the influence of wind farm development on the northern section of the B734, with closer range influences coming from Tralorg and Hadyard Hill Wind Farms, and in light of the limited influence of the proposed development within the central foothills section, the cumulative magnitude of effect would be medium to low and the cumulative effect on these sections would be not significant.

5.9.193 Although the proposed development would add wind farm development to the opposite end of the valley to where Millenderdale and Breaker Hill are located, the effect on road-users would be moderated by the fact that the proposed development would only be visible to those travelling north-east, while Millenderdale and Breaker Hill would only be visible to those travelling south-west. Furthermore, from long sections of the road there would be no visibility of either, owing to the screening effect of close and middle range tree cover. There would, however, be a sequential effect to those travelling in both directions. Where open or partial views occurred, the developments would be seen as prominent features in their respective foothills landscapes and the magnitude of the effect would be medium. The cumulative effect in this southern section would be not significant.

**Summary of Cumulative Effects**

5.9.194 Table 5.53 below shows that the addition of the proposed development to Scenario 1, comprising consented developments in conjunction with operational and under construction developments, would not give rise to any significant cumulative effects.

<table>
<thead>
<tr>
<th>Landscape Character Receptor</th>
<th>Sensitivity</th>
<th>Cumulative Magnitude of Effect</th>
<th>Significance of the Cumulative Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foothills with Forest and Wind Farm LCT</td>
<td>Medium to low</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>Middle Dale LCT</td>
<td>Medium</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>Intimate Pastoral Valley LCT</td>
<td>Medium to high</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>Rugged Uplands LCT</td>
<td>Medium</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>South Carrick Scenic Area</td>
<td>As for LCTs above</td>
<td>As for LCTs above</td>
<td>Not significant</td>
</tr>
</tbody>
</table>
Table 5.53 Summary of Scenario 1 Cumulative Effects

<table>
<thead>
<tr>
<th>Landscape Character Receptor</th>
<th>Sensitivity</th>
<th>Cumulative Magnitude of Effect</th>
<th>Significance of the Cumulative Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bargany Garden and Designed Landscape</td>
<td>Medium</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td><strong>Visual Receptor</strong></td>
<td><strong>Sensitivity</strong></td>
<td><strong>Cumulative Magnitude of Effect</strong></td>
<td><strong>Significance of the Cumulative Effect</strong></td>
</tr>
<tr>
<td>VP7: Merrick</td>
<td>Medium to high</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>VP9: Colonel Hunter Blair Monument</td>
<td>Medium</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>VP15: Monument, Maybole</td>
<td>Medium</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>VP17: Hadyard Hill</td>
<td>Medium to low</td>
<td>Medium</td>
<td>Not significant</td>
</tr>
<tr>
<td>VP18: North Threave</td>
<td>Medium to low</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>VP21: Shalloch on Minnoch</td>
<td>Medium to high</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>VP22: Cornish Hill</td>
<td>Medium</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>Dailly</td>
<td>Medium</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>B741</td>
<td>Medium to low</td>
<td>Medium</td>
<td>Not significant</td>
</tr>
<tr>
<td>B734</td>
<td>Medium to low</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

5.9.195 Table 5.56 below shows that the addition of the proposed development to Scenario 2, comprising application developments in conjunction with operational under construction and consented developments, would give rise to significant cumulative effects across parts of three LCTs and the correlating parts of the South Carrick SA, and in relation to two viewpoints, one settlement and part of one route.

Table 5.56 Summary of Scenario 2 Cumulative Effects

<table>
<thead>
<tr>
<th>Landscape Character Receptor</th>
<th>Sensitivity</th>
<th>Cumulative Magnitude of Effect</th>
<th>Significance of the Cumulative Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foothills with Forest and Wind Farm LCT</td>
<td>Medium to low</td>
<td>Medium</td>
<td>Not significant</td>
</tr>
<tr>
<td>Middle Dale LCT</td>
<td>Medium to low</td>
<td>Medium to high in southern part</td>
<td>Significant around Dailly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium to low in northern part</td>
<td>Not significant in remaining parts</td>
</tr>
<tr>
<td>Intimate Pastoral Valley LCT</td>
<td>Medium to low in western part</td>
<td>Medium to high between Merkland and Barr</td>
<td>Significant between Merkland and Barr</td>
</tr>
<tr>
<td></td>
<td>Medium to high in eastern part</td>
<td>Medium between A714 and Merkland</td>
<td>Not significant in remaining parts</td>
</tr>
</tbody>
</table>
### Table 5.56 Summary of Scenario 2 Cumulative Effects

<table>
<thead>
<tr>
<th>Landscape Character Receptor</th>
<th>Sensitivity</th>
<th>Cumulative Magnitude of Effect</th>
<th>Significance of the Cumulative Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rugged Uplands LCT</td>
<td>Medium to low</td>
<td>Medium to high on northern ridge Medium on Shalloch ridge Medium to low or lower in remaining parts</td>
<td>Significant along northern ridge Not significant in remaining parts</td>
</tr>
<tr>
<td>South Carrick Scenic Area</td>
<td>As for LCTs above</td>
<td>As for LCTs above</td>
<td>Significant / not significant as for LCTs above</td>
</tr>
<tr>
<td>Bargany Garden and Designed Landscape</td>
<td>Medium</td>
<td>Medium in east central and northern parts Medium to low or lower in remaining parts</td>
<td>Significant in east central and northern parts Not significant in remaining parts</td>
</tr>
<tr>
<td>Visual Receptor</td>
<td>Sensitivity</td>
<td>Cumulative Magnitude of Effect</td>
<td>Significance of the Cumulative Effect</td>
</tr>
<tr>
<td>VP7: Merrick</td>
<td>Medium to high</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>VP9: Colonel Hunter Blair Monument</td>
<td>Medium to low</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
<tr>
<td>VP15: Monument, Maybole</td>
<td>Medium to low</td>
<td>Medium</td>
<td>Not significant</td>
</tr>
<tr>
<td>VP17: Hadyard Hill</td>
<td>Medium to low</td>
<td>Medium</td>
<td>Not significant</td>
</tr>
<tr>
<td>VP18: North Threave</td>
<td>Medium</td>
<td>Medium</td>
<td>Significant</td>
</tr>
<tr>
<td>VP21: Shalloch on Minnoch</td>
<td>Medium</td>
<td>Medium</td>
<td>Significant</td>
</tr>
<tr>
<td>VP22: Cornish Hill</td>
<td>Medium to low</td>
<td>Medium</td>
<td>Not significant</td>
</tr>
<tr>
<td>Dailly</td>
<td>Medium</td>
<td>Medium</td>
<td>Significant</td>
</tr>
<tr>
<td>B741</td>
<td>Medium to low</td>
<td>Medium to high between the junction with Hadyard Hill minor road and Dailly Medium or lower across remaining sections</td>
<td>Significant between the junction with Hadyard Hill minor road and Dailly Not significant in remaining sections</td>
</tr>
<tr>
<td>B734</td>
<td>Medium to low</td>
<td>Medium to low</td>
<td>Not significant</td>
</tr>
</tbody>
</table>
5.10 **Summary**

5.10.1 Table 5.57 below presents a summary of the significant effects and significant cumulative effects that would arise as a result of the proposed development. All remaining receptors and parts of receptors would either not be affected or undergo effects that would be not significant.

<table>
<thead>
<tr>
<th>Receptors significantly affected</th>
<th>Description of effect</th>
<th>Geographical extent of effect</th>
<th>Stage of effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coniferous Forestry</td>
<td>Removal of all forestry on site.</td>
<td>Site area.</td>
<td>Construction</td>
</tr>
<tr>
<td>Foothills with Forest and Wind Farm LCT</td>
<td>Direct and indirect effects on landscape character through presence and visibility of turbines, infrastructure, forestry removal and associated construction and decommissioning operations.</td>
<td>During operation the area defined by the Hadyard Hill minor road to the west the edge of Garleffin Wood to the east, Barony Hill / Cairn Hill to the north and the LCT boundary to the south. During construction and decommissioning as above with the additional extents to the B734 to the west.</td>
<td>Construction Operation Decommissioning</td>
</tr>
<tr>
<td>Middle Dale LCT</td>
<td>Indirect effects on landscape character through visibility of turbines and associated construction / decommissioning operations.</td>
<td>The area defined by the southern LCT boundary at Dobbingstone Burn, northern boundary south of Kirk Hill, Glenshalloch Wood to the north-east and Dailly / Quarrel Hill to the south-west.</td>
<td>Construction Operation Decommissioning</td>
</tr>
<tr>
<td>Intimate Pastoral Valley LCT</td>
<td>Indirect effects on landscape character through visibility of turbines and associated construction / decommissioning operations.</td>
<td>The eastern part of the LCT to the east of Barr and the southern slopes of the western part of the LCT to the west of Barr.</td>
<td>Construction Operation Decommissioning</td>
</tr>
<tr>
<td>Cumulative effects on landscape character resulting from the addition of the proposed development to Scenario 2.</td>
<td>As above.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative effects on landscape character resulting from the addition of the proposed development</td>
<td>The area between Merkland and Barr.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 5.57: Summary of Residual Significant Effects

<table>
<thead>
<tr>
<th>Receptors significantly affected</th>
<th>Description of effect</th>
<th>Geographical extent of effect</th>
<th>Stage of effect</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maybole Foothills LCT</strong></td>
<td>Indirect effects on landscape character through visibility of turbines and associated construction / decommissioning operations.</td>
<td>The southern ridge of hills between Quarrel Hill in the south-west and Glenshalloch Wood in the north-east, the LCT boundary to the south and the ridgeline of the hills to the north.</td>
<td>Construction Operation Decommissioning</td>
</tr>
<tr>
<td><strong>Rugged Uplands LCT</strong></td>
<td>Indirect effects on landscape character through visibility of turbines and associated construction / decommissioning operations.</td>
<td>The northern ridge of hills between Fell Hill in the south-west and the unnamed hill north-east of Eldrick Hill in the north-east, the forest line to the north and the ridgeline of the hills to the south.</td>
<td>Construction Operation Decommissioning</td>
</tr>
<tr>
<td><strong>South Carrick SA</strong></td>
<td>As above for all LCTs except Maybole Foothills.</td>
<td>As above for all LCTs except Maybole Foothills.</td>
<td>As above for all LCTs except Maybole Foothills.</td>
</tr>
<tr>
<td><strong>Bargany Gardens</strong></td>
<td>Indirect effects on landscape character through visibility of turbines and associated construction / decommissioning operations.</td>
<td>The areas in the centre and north-east of the GDL defined on mapping as Meadow Main and Brunston Castle Golf Course.</td>
<td>Construction Operation Decommissioning</td>
</tr>
<tr>
<td><strong>Viewpoint 4: B734 near Merkland</strong></td>
<td>Indirect effects on visual amenity through visibility of turbines.</td>
<td>The section of the B734 between Merkland and Barr.</td>
<td>Operation</td>
</tr>
<tr>
<td><strong>Viewpoint 6: Barr village</strong></td>
<td>Indirect effects on visual amenity through visibility</td>
<td>The northern edge of the settlement and east along</td>
<td>Construction Operation</td>
</tr>
<tr>
<td>Receptors significantly affected</td>
<td>Description of effect</td>
<td>Geographical extent of effect</td>
<td>Stage of effect</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------------------</td>
<td>-------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Viewpoint 8: South Balloch</td>
<td>Indirect effects on visual amenity through visibility of turbines and associated construction / decommissioning operations.</td>
<td>West along the minor road towards Barr.</td>
<td>Construction Operation Decommissioning</td>
</tr>
<tr>
<td>Viewpoint 9: Colonel Hunter Blair Monument, Kildoach</td>
<td>Indirect effects on visual amenity through visibility of turbines and associated construction / decommissioning operations.</td>
<td>The summits and elevated land around Craigengower Hill and Kildoach Hill.</td>
<td>Construction Operation Decommissioning</td>
</tr>
<tr>
<td>Viewpoint 10: River Stinchar – Minor Road</td>
<td>Indirect effects on visual amenity through visibility of turbines and associated construction / decommissioning operations.</td>
<td>The minor road between Barr and Balloch.</td>
<td>Construction Operation Decommissioning</td>
</tr>
<tr>
<td>Viewpoint 11: Brunston Castle Golf Course</td>
<td>Indirect effects on visual amenity through visibility of turbines and associated construction / decommissioning operations.</td>
<td>The area of higher land that occurs in north-east of Bargany GDL.</td>
<td>Construction Operation Decommissioning</td>
</tr>
<tr>
<td>Viewpoint 12: Dailly</td>
<td>Indirect effects on visual amenity through visibility of turbines and associated construction / decommissioning operations.</td>
<td>The southern and eastern edges of Dailly.</td>
<td>Construction Operation Decommissioning</td>
</tr>
<tr>
<td>Viewpoint 18: North Threave</td>
<td>Cumulative effects on visual amenity resulting from the addition of the proposed development to Scenario 2.</td>
<td>Representative of the North Threave minor road and associated rural properties.</td>
<td>Construction Operation Decommissioning</td>
</tr>
<tr>
<td>Viewpoint 20: NCR7 near Doughty Hill</td>
<td>Indirect effects on visual amenity through visibility of turbines and associated construction / decommissioning operations.</td>
<td>The NCR7 between Balloch and Garleffin.</td>
<td>Construction Operation Decommissioning</td>
</tr>
</tbody>
</table>
### Table 5.57: Summary of Residual Significant Effects

<table>
<thead>
<tr>
<th>Receptors significantly affected</th>
<th>Description of effect</th>
<th>Geographical extent of effect</th>
<th>Stage of effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewpoint 21: Shalloch on Minnoch</td>
<td>Cumulative effects on visual amenity resulting from the addition of the proposed development to Scenario 2.</td>
<td>Representative of the summit and surrounding elevated slopes of hill.</td>
<td>Construction Decommissioning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operation</td>
</tr>
<tr>
<td>Viewpoint 22: Cornish Hill</td>
<td>Indirect effects on visual amenity through visibility of turbines and associated construction / decommissioning operations.</td>
<td>Representative of the summit and surrounding elevated slopes of hill.</td>
<td>Construction Decommissioning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operation</td>
</tr>
<tr>
<td>Barr</td>
<td>Indirect effects on visual amenity through visibility of turbines and associated construction / decommissioning operations.</td>
<td>The northern edge.</td>
<td>Construction Decommissioning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The southern part.</td>
<td>Operation</td>
</tr>
<tr>
<td>Daily</td>
<td>Indirect effects on visual amenity through visibility of turbines and associated construction / decommissioning operations.</td>
<td>The southern and eastern edges of Daily.</td>
<td>Construction Decommissioning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operation</td>
</tr>
<tr>
<td></td>
<td>Cumulative effects on visual amenity resulting from the addition of the proposed development to Scenario 2.</td>
<td>Dailly</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B741</td>
<td>Indirect effects on visual amenity through visibility of turbines and associated construction / decommissioning operations.</td>
<td>The section between Hadyard Hill minor road junction and Dailly.</td>
<td>Construction Decommissioning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operation</td>
</tr>
<tr>
<td></td>
<td>Cumulative effects on visual amenity resulting from the addition of the proposed development to Scenario 2.</td>
<td>As above.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B734</td>
<td>Indirect effects on visual amenity through visibility of turbines and associated construction / decommissioning operations.</td>
<td>The section between Merkland and north of Barr during all three stages and with an additional extent between north of Barr and Doon Hill during construction / decommissioning.</td>
<td>Construction Decommissioning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operation</td>
</tr>
</tbody>
</table>
Table 5.57: Summary of Residual Significant Effects

<table>
<thead>
<tr>
<th>Receptors significantly affected</th>
<th>Description of effect</th>
<th>Geographical extent of effect</th>
<th>Stage of effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCR7 (Bargrennan to Crosshill minor road)</td>
<td>Indirect effects on visual amenity through visibility of turbines and associated construction/decommissioning operations.</td>
<td>The sections through Nick of the Balloch, the Stinchar Valley and Doughty Hill.</td>
<td>Construction, Operation, Decommissioning</td>
</tr>
</tbody>
</table>

5.10.2 In terms of significant effects on landscape character, these would occur within a 7 km radius of the proposed development and would affect parts of the following five LCTs: *Foothills with Forest and Wind Farm, Middle Dale – Water of Girvan, Intimate Pastoral Valley – River Stinchar, Maybole Foothills* and the *Rugged Uplands*. These effects relate principally to the additional influence of the proposed development despite the existing influence of the existing Hadyard Hill Wind Farm. Cumulative effects would also arise in localised parts of the *Middle Dale* LCT and *Intimate Pastoral Valley* LCT in respect of cumulative Scenario 2.

5.10.3 In terms of significant effects on landscape designations these would occur in parts of two designated areas. The significant effects on the LCTs would apply to the corresponding parts of the South Carrick SA. Significant effects and significant cumulative effects would also occur in part of the Inventory listed Bargany GDL, although not the part where Bargany House and the more ornamental parts of the garden are situated.

5.10.4 The effect on the Merrick Wild Land Area would be not significant owing to the location of the proposed development beyond 7.5 km from the WLA boundary, the existing influence of other operational wind farm developments and the association of the proposed development with operational Hadyard Hill Wind Farm. Moreover, the WLA would continue to be primarily influenced by the intrinsic character of the *Rugged Uplands* LCT.

5.10.5 In terms of representative viewpoints, the effect of the proposed development on nine of the 22 assessed would be significant. All nine viewpoints lie within 10 km of the proposed development. Significant cumulative effects would also arise in relation to two further viewpoints; Viewpoint 18: North Threave and Viewpoint 21: Shalloch on Minnoch, in respect of cumulative Scenario 2.

5.10.6 In terms of principal visual receptors, significant effect would occur in parts of Barr and Dailly with significant cumulative effects arising in Dailly in respect of cumulative Scenario 2. Significant effects would arise from localised parts of the B741 and B734 and from a section of the Bargrennan to Crosshill minor road (NCR7). The localised parts of the B741 would also undergo significant cumulative effects in respect of Scenario 2.

5.10.7 A Residential (Visual) Amenity Survey has been carried out for properties within the first 2.5 km of the proposed development. This is presented in technical Appendix 5.4.

5.10.8 The village of Barr is the only settlement that occurs in the 2.5 km radius. Other than Barr, residential properties are either isolated or clustered in small groups, the majority of these properties being farmsteads or farm related accommodation. The population
within 2.5 km is relatively sparse with a total of thirty-seven properties occurring across the area, three of which are uninhabited, and not including the additional 22 properties in the northern part of Barr. While the properties are mostly situated in the valley landscapes to the north and south of the Foothills with Forest and Wind Farm LCT, 14 are dispersed across this LCT, some coming within 1 km of the existing Hadyard Hill Wind Farm or the proposed development.

5.10.9 The survey identified that 30 of the properties within the study area would undergo a not significant effect, while 26 would undergo a significant effect and three would undergo no effect. There were few properties with an alignment of their principal orientation towards the proposed development and from some views would not occur from the property itself but from the garden grounds or approach road.

5.10.10 Eight properties come within 1 km of the proposed development, with 0.72 km being the closest, and although significant effects have been identified in relation to six of these properties, none of the effects are considered to be overbearing.

5.10.11 A significant visual effect does not automatically equate to an unacceptable visual effect in planning terms and the widely recognised test in Inquiry Decisions, as to acceptability of visual effects on private property, is whether the effect is of such magnitude and proximity to be overbearing or dominant in nature, to the extent that the property could be considered an unattractive place within which to live. The RAS has found no instance of visual impact on residential amenity which it considers to be dominant or overbearing.

5.11 References

Carol Anderson Landscape Associates (2013). South Ayrshire Landscape Wind Capacity Study (LWCS)

Historic Scotland (2015). published on their web-site Inventory listed GDLs http://www.historic-scotland.gov.uk/gardens

Landscape Institute (2011) Landscape Institute Advice Note 01/11, Photography and photomontage in landscape and visual impact assessment.


Scottish Natural Heritage (1998). Dumfries and Galloway landscape assessment, Review No.94


Scottish Natural Heritage (2014a). Published on their web-site Wild Land Areas for Scotland http://www.snh.gov.uk/docs/A1323225.pdf

Scottish Natural Heritage (2014b) Siting and Designing Wind Farms in the Landscape, Version 2.


South Ayrshire Council 2009). Finalised Draft South Ayrshire Core Paths Plan

South Ayrshire Council (2014). South Ayrshire Local Development Plan.

Chapter 6: Noise

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Figure 6.11 Likely Operational Noise Impact Assessment Lanes Farm (NAL10)
6 Noise

6.1 Introduction

6.1.1 This chapter considers the likely significant noise effects associated with the construction, operation and decommissioning of the proposed development. The specific objectives of the chapter are to:

- present the results of predictions of the noise levels that would be incident at neighbouring noise sensitive receptors (NSRs) due to the construction and decommissioning of the proposed development;
- present the construction noise data and assess the impact of noise from the proposed development with reference to existing Government Guidance contained within the updated (February 2014) BS5228-1:2009+A1:2014 ‘Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise’;
- present predictions of the operational wind turbine noise immissions from the proposed development that would be incident at neighbouring NSRs;
- detail existing background noise levels, present the noise data and assess the impact of operational noise from the proposed development with reference to existing Government Guidance and the recommendations of the Department of Trade and Industry (DTI) Noise Working Group on Noise from Wind Turbines (which are contained within ETSU-R-97 ‘The Assessment and Rating of Noise from Wind Farms’) and along with current good practice; and
- present a cumulative noise assessment to take account of all operational and consented wind turbines which may impact on the operational noise immission levels received at NSRs;

6.1.2 The assessments have been carried out by TNEI Services Ltd (TNEI). All assessment and reporting has been completed by appropriately qualified Members of the Institute of Acoustics (IOA).

6.1.3 The chapter is supported by:

- Technical Appendix 6.1: Construction Noise Assessment; and,
- Technical Appendix 6.2: Operational Noise Assessment;
- Figure 6.1: Operational Noise Assessment: Noise Assessment Locations (NAL) & Noise Monitoring Locations (NML);
- Figures 6.2 to Figure 6.6: Time Series Data (Baseline Noise Monitoring Data);
- Figures 6.7 to Figure 6.11: Wind Conditions & Regression Analysis; and,
- Figure 6.12 to Figure 6.21: Operational Noise Impact Assessment.

6.1.4 Please note that whilst the Chapter presents the results of comprehensive noise monitoring, prediction and assessment, only limited detail of the assessment methodology and calculation and assessment parameters are presented within the Chapter itself. Accordingly, the Chapter should be read alongside the above technical appendices, which provide all necessary detail for a thorough analysis of the assessments.
6.1.5 In the interests of clarity, a glossary of terms and abbreviations used throughout this Chapter and the associated Technical Appendices are included at the end of the Chapter in Section 6.11.

6.1.6 The construction of the proposed Development will generate noise during the excavation and laying of foundations, construction of tracks, erection of wind turbines and associated infrastructure, through the use of borrow pits and the haulage of plant and materials within the site.

6.1.7 Operational wind turbines generate noise by two mechanisms: mechanical noise from the gearbox, where fitted, and generator in the nacelle; and aerodynamic noise caused by the wind passing over the turbine blades. Wind turbines are designed in such a manner as to minimise mechanical noise, for example, noise sources in the nacelle are contained in insulated enclosures.

6.1.8 Aerodynamic noise is minimised by the design of the turbine blade; however, some aerodynamic noise is unavoidable. Aerodynamic noise increases in proportion with the speed of the turbine blade relative to the surrounding air; therefore, noise levels will increase with wind speed.

6.1.9 Noise due to construction and decommissioning will lead to short term effects and are temporary in nature. Noise due to the operation of the development will lead to long term effects and are permanent for the lifetime of the development.

6.2 Scope of Assessment

6.2.1 This chapter considers the potential for likely significant noise effects on residential receptors as a result of the proposed development, as described in Chapter 2: Proposed Development.

Scoping and Consultation

6.2.2 Consultation is an essential step in the initial assessment process. The formal scoping process is described in Chapter 1: Introduction, and the consultation responses are summarised in Technical Appendix 1.1: Consultation Register, which also describes how the ES addresses each of the issues raised.

6.2.3 Consultation responses relating to noise issues were received from the following consultees:

- South Ayrshire Council (Scoping Opinion issued 4th March 2014); and,
- Energy Consents & Deployment Unit (ECDU), Directorate For Energy & Climate Change, Electricity Division (Scoping Opinion issued 16th April 2014)

6.2.4 The Council’s Scoping opinion requested that noise was considered from the construction and operational phases of the development and HGV movements generated by the development, however, no specific assessment guidance or criteria were provided.

6.2.5 The ECDU’s Scoping Opinion states that:

"Noise predictions should be carried out to evaluate the likely impacts of airborne noise from the wind turbines and associated construction activities including noise from blasting or piling activities which may affect local residents, during construction, operational and decommissioning stages of the project.”
6.2.6 The response also directs the reader to ETSU-R-97 ‘The Assessment and Rating of Noise from Wind Farms’ (hereafter referred to as ETSU) and PAN1/2011 as appropriate guidance documents.

6.2.7 In addition to the Scoping Report, consultation has also been carried out with Environmental Health of South Ayrshire Council in order to determine appropriate noise monitoring locations and agree on the methodology to be used for the assessment of operational and cumulative wind farm noise. Full details of this consultation process can be found in Technical Appendix 6.2 ‘Operational Noise Assessment’.

6.2.8 In response to the consultations, the assessment of noise considers the following;

- Noise associated with the construction and decommissioning of the development has been assessed in accordance with the guidance presented in BS5228-1: 2009+A1:2014 ‘Code of practice for noise and vibration control on construction and open sites – Part 1: Noise,’ and is presented as Technical Appendix 6.1.

- Noise associated with HGV movements arising from the development has been assessed in accordance with the guidance presented in ‘Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 7, Noise’ and is also presented within Technical Appendix 6.1.

- Noise associated with the operation of the development, including cumulative noise, has been assessed in accordance with ETSU and is presented as Technical Appendix 6.2.

- Baseline noise level monitoring has been undertaken at five locations surrounding the site, as agreed with the Environmental Health Officer (EHO) assigned to the proposed development.

Assessment Methodology

Baseline Characterisation

Study Area

6.2.9 NSRs are properties which are sensitive to noise and, therefore, require protection from nearby noise sources. The study area for the assessment of operational and cumulative noise is informed through the definition of a 35 dBA L90 noise contour; all NSRs identified within or close to the edge of the noise contour are then included for assessment.

6.2.10 NSRs outside of the 35 dBA noise contour can be scoped out from assessment, as detailed in ETSU, which states:

“We are of the opinion that if noise is limited to an $L_{A90,10min}$ of 35 dB(A) up to wind speeds of 10 m/s at 10 m height then this condition alone would offer sufficient protection of amenity, and background noise surveys would be unnecessary.”

6.2.11 This is reiterated in the IOA GPG which states;

“The study area should cover at least the area predicted to exceed 35 dB $L_{A90}$ at up to 10 m/s wind speed from all existing and proposed turbines.”

6.2.12 A scoping noise model, which considers the development operating in conjunction with all nearby wind turbine developments (in scoping, planning, consented and
The model predicts the operational noise immission levels at receptors in accordance with ISO 9613-2 and assumes all turbines are operating at maximum noise output and all receptors are simultaneously downwind of all turbines.

The scoping model was used to inform direct consultation with the EHO allowing identification of Noise Assessment Locations (NALs) and Noise Monitoring Locations (NMLs).

Table 6.1 details the identified NALs. Assessment locations are defined, where appropriate, to the closest garden boundary, rather than the façade of the building. This is to ensure the continued protection of existing amenity of residential outdoor areas. The location of all NALs are also detailed in Figure 6.1.

Each NAL represents a cluster of properties which are considered to be NSRs, with the NAL chosen as the point closest to the proposed development on the basis that if the noise limits are met at these locations, there will be no issue meeting the limits at locations further from the wind farm.

<table>
<thead>
<tr>
<th>NAL ID</th>
<th>Name</th>
<th>Easting</th>
<th>Northing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Delamford Cottage*</td>
<td>229045</td>
<td>599160</td>
</tr>
<tr>
<td>2</td>
<td>Knockrochar</td>
<td>229733</td>
<td>600740</td>
</tr>
<tr>
<td>3</td>
<td>Dobbingstone Farm</td>
<td>230179</td>
<td>600461</td>
</tr>
<tr>
<td>4</td>
<td>Doughty Farm*</td>
<td>232453</td>
<td>597677</td>
</tr>
<tr>
<td>5</td>
<td>Dalquhairn House</td>
<td>232099</td>
<td>596259</td>
</tr>
<tr>
<td>6</td>
<td>Daljedburgh Farm*</td>
<td>230801</td>
<td>596312</td>
</tr>
<tr>
<td>7</td>
<td>Corphin Cottage</td>
<td>228709</td>
<td>596675</td>
</tr>
<tr>
<td>8</td>
<td>Milton Farm</td>
<td>229064</td>
<td>596009</td>
</tr>
<tr>
<td>9</td>
<td>Alton Albany Lodge</td>
<td>227746</td>
<td>594448</td>
</tr>
<tr>
<td>10</td>
<td>Lanes Farm*</td>
<td>226165</td>
<td>595977</td>
</tr>
</tbody>
</table>

Properties classes as financially involved with the proposed development

All of the NALs detailed within Table 6.1 are considered within the operational noise assessment. Construction and decommissioning noise will be highest within the development site; therefore, the construction noise assessment considers the closest NSRs in Table 6.1 to the site only, namely NAL1, NAL4, NAL5, NAL7 and NAL10.

Of the identified NALs, four are classed as financially involved with the development. These properties are subject to amended noise level limits allowing a higher level of operational noise immission, as detailed within ETSU-R-97.

Desk Study / Field Survey

Noise monitoring requirements and subsequent analysis of the baseline data is detailed within ETSU and the IOA GPG.
6.2.19 Through consultation and a site visit with the EHO, five baseline noise monitoring locations (NMLs) were defined; these are detailed in Table 6.3 and shown on Figure 6.1. In addition, the Figure presents the NALs as colour coded groups to denote which set of baseline noise monitoring data are used to determine the noise limits for individual NALs.

<table>
<thead>
<tr>
<th>NML ID</th>
<th>Descriptor</th>
<th>Easting</th>
<th>Northing</th>
</tr>
</thead>
<tbody>
<tr>
<td>NML01</td>
<td>Knockrochar</td>
<td>229755</td>
<td>600763</td>
</tr>
<tr>
<td>NML02</td>
<td>Doughty Farm</td>
<td>232485</td>
<td>597654</td>
</tr>
<tr>
<td>NML03</td>
<td>Dalwyne Cottage</td>
<td>232278</td>
<td>596242</td>
</tr>
<tr>
<td>NML04</td>
<td>Milton Farm</td>
<td>229068</td>
<td>596001</td>
</tr>
<tr>
<td>NML05</td>
<td>16 Glenginnet Road, Barr</td>
<td>227648</td>
<td>594308</td>
</tr>
</tbody>
</table>

6.2.20 Noise monitoring was conducted at the agreed locations for a period of four weeks during January and February 2015. Throughout the monitoring period the existing Hadyard Hill Wind Farm was operating, therefore, analysis of the measured data had to take cognisance of the potential for operational turbine noise to be included within the measured data.

6.2.21 Specifically, all baseline data measured when downwind of the existing turbines has been removed from the data sets of all NMLs. This method of filtering, which is in accordance with the recommendations presented in the IOA GPG, is undertaken to remove the influence of the existing turbines from the measured background noise.

6.2.22 For the purposes of the construction noise assessment a single day of low wind speeds (< 5 ms\(^{-1}\)) and no rainfall has been selected to determine the typical daytime noise levels at each receptor. For that day the \(L_{\text{Aeq,12hr}}\) value has been calculated from the measured \(L_{\text{Aeq,10mins}}\) data for the period 7am – 7pm at each receptor. These values have then been used in order to determine appropriate construction noise limits, in accordance with BS5228.

6.2.23 For the operational noise assessment, the baseline data for the whole monitoring period is categorised into Quiet Daytime (weekdays 18:00-23:00, Saturdays 07:00-13:00 and Sundays 07:00-23:00) and Night-time (23:00-07:00, all days). All data measured outwith these time periods is removed from the analysis. Data is also removed for all periods of measured rainfall and the periods immediately before and after any rainfall event.

6.2.24 The measured \(L_{\text{A90,10mins}}\) data is then correlated with the 10 minute standardised 10m height wind speed, taken from wind speed data measured from an 80m meteorological mast installed on the development site at approximate OS grid coordinates 230866,596996.

6.2.25 The regression analysis of \(L_{\text{A90,10mins}}\) data points with wind speed is then plotted using a polynomial curve and the background noise level established for each integer wind speed from 0 m/s through to 12 m/s.
Sensitivity Criteria

6.2.26 All identified NSRs are residential receptors, therefore, sensitivity is deemed to be high. No other receptor types, such as those detailed within the IEMA guidance are required to be considered within the assessments.

Assessment of Effects

Magnitude of Effect

6.2.27 The assessments of noise effects are made against specific noise limit values. In terms of construction noise the assessment considers noise immission levels against a single fixed limit. For the operational and cumulative noise, the assessments consider noise immission levels against limits which vary with wind speed.

6.2.28 BS5228-1:2009+A1:2014 (hereafter referred to as BS5228), Appendix E Part E.3.2 sets criteria for assessing the potential significance of construction noise effects and gives examples of acceptable threshold values for construction noise. For the purposes of this assessment, having due regard to the existing ambient noise levels around the Development, the Daytime Category A noise threshold values are applicable for all properties. This category has been utilised to assess the significance of the construction and decommissioning impacts during each of the key construction phases. The significance criteria adopted for this assessment is based on Appendix E part E.3.2 of BS5228 and is provided in Table 6.4.

<table>
<thead>
<tr>
<th>Table 6.4: Construction Noise Significance Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assessment Category and Threshold Value Period</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Daytime (07:00 – 19:00) and Saturdays (07:00 to 13:00)</td>
</tr>
</tbody>
</table>

6.2.29 As traffic movements result in relatively low overall noise levels it is more appropriate to assess the impact against a threshold of change rather than an absolute level. For off-site traffic movements it is possible to determine the percentage increase required in existing traffic in order to cause a significant increase using the procedure outlined in the Design Manual for Roads and Bridges (DMRB) which states:

“The Designer should identify whether any of the following conditions are met:

ii) traffic volumes on the existing roads or new routes will increase by at least 25% or decrease by 20% either during construction or when the project is completed. This change in traffic volume is equivalent to a 1 dB(A) change in noise level, which is the minimum change that can be detected by the human ear in the short term (e.g. on opening of a project);”

6.2.30 The impact of increased traffic movements on the roads surrounding the Development is based on Appendix E part E.3.3 of BS5228, which refers to a 5dB(A) change threshold. If the addition of the construction noise exceeds the pre-construction ambient background levels by greater than by 5dB, a significant increase is deemed to occur. If a significant increase is found (level of change of +5dB), it is necessary to review the context with other criteria such as overall noise levels and the character of the noise in order to assess the significance of the impact in EIA terms.
6.2.31 The aim of the operational noise assessment is to determine the likely cumulative impacts of all relevant wind turbines developments in the area and secondly to derive the Development Specific ETSU-R-97 Limits which could be used as part of an enforceable noise related planning condition. ETSU-R-97 does not define significance criteria, but describes a framework for the measurement of wind farm noise and gives indicative noise levels thought to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm developments. Achievement of ETSU-R-97 derived noise limits ensures that wind turbine noise will meet current Government guidance. Depending on the levels of background noise, the satisfaction of the ETSU-R-97 derived limits can lead to a situation whereby, at some locations under some wind conditions and for a certain proportion of the time, the wind turbine noise will be audible. However, audibility is not a criteria in any current guidance.

6.2.32 In terms of the EIA Regulations, the terminology of significance used in this chapter refers to compliance/non-compliance with the ETSU-R-97 derived noise limits. For situations where predicted wind turbine noise meets or is less than the noise limits defined in ETSU-R-97, then the noise effects are deemed not significant. Any breach of the ETSU-R-97 derived noise limits is deemed to result in a significant effect.

**Significance Criteria**

6.2.33 The assessment of significance of effects of short term, construction noise is made as follows:
- Where construction noise levels at NSRs are below the defined noise level limits, the assessment of significance is determined to be ‘not significant’; and
- Where construction noise levels at NSRs are above the defined noise level limits, the assessment of significance is determined to be ‘significant’.

6.2.34 These adverse effects, while important at a local scale, are not likely to be key decision making issues.

6.2.35 The assessment of significance of effects of permanent, operational noise is made as follows:
- Where operational noise levels at NSRs are below the defined noise level limits, the assessment of significance is determined to be ‘not significant’; and
- Where operational noise levels at NSRs are above the defined noise level limits, the assessment of significance is determined to be ‘significant’.

6.2.36 These adverse effects are likely to be important considerations in the decision making process and are potential concerns to the project.

6.3 Baseline Conditions

6.3.1 The area surrounding the proposed Development site is rural in nature, sparsely populated with farmsteads and villages where noise levels are typically low. At all NSRs the dominant noise sources are those occurring naturally, for example, the movement of wind in trees and bushes, bird song and the flow of water in nearby burns. The topography in the area is complex and many NSRs are subject to noise from nearby water courses. Therefore, the NMLs were chosen with due consideration of distance from water course and exposure to wind.
6.3.2 Details with regards to the monitoring equipment, calibration certificates and Field Data Sheets are included with the Annexes of Technical Appendix 6.2.

6.3.3 Figures 6.2 through to Figure 6.6 detail the measured wind speed, wind direction and background noise levels (dB $L_{A90,10\text{mins}}$) in time series format for each monitoring location. Detailed regression analysis of the measured baseline data is provided within Figures 6.7 through to 6.11.

6.3.4 The ETSU-R-97 noise limits are derived by establishing the ‘best fit’ correlation between background noise level and wind speed. The polynomials, i.e. the best fit curves, detailed within the Table are those used for the derivation of the noise level limits. They have been calculated after all filtering of the data i.e. time periods, manual exclusions, directional filtering (to remove downwind elements) and rainfall events.

6.3.5 The limits are based on a level 5dB(A) above the polynomial over a wind speed range from turbine cut-in speed through to 12ms$^{-1}$. Where the derived criterion curve for the quiet daytime period lies below a fixed level in the range 35 - 40dB(A) then ETSU-R-97 states that the criterion curve may be set at an absolute level somewhere within that range. Where the derived criterion curve for night-time lies below a level of 43dB(A) then an absolute level of 43dB(A) is set as the night-time limit.

6.3.6 These derived limits refer to limits for the total operational noise levels from all turbines in the area, therefore, these limits are known as the Total ETSU-R-97 Limits.

6.3.7 Table 6.5 details the $L_{Aeq,(12\text{hours})}$ calculated from the $L_{Aeq,(10\text{mins})}$ measured during 07:00 and 19:00. This value is used to determine appropriate noise limits in accordance with BS5228.

<table>
<thead>
<tr>
<th>Table 6.5: Derived ambient noise levels at NALs (wind speeds &lt;5ms$^{-1}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction noise NAL</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>ID</td>
</tr>
<tr>
<td>NAL1</td>
</tr>
<tr>
<td>NAL4</td>
</tr>
<tr>
<td>NAL5</td>
</tr>
<tr>
<td>NAL7</td>
</tr>
<tr>
<td>NAL10</td>
</tr>
</tbody>
</table>

6.4 Likely Significant Effects

Construction Effects

6.4.1 Construction noise levels at any location will vary throughout the construction period as the combinations and locations of plant machinery vary. The key variables influencing the noise levels at each receptor are:

- The sound power levels of equipment being operated;
- The number of noise sources operating at any one time;
- The duration of operation;
- The distance between the noise source and the receiver; and
The levels of attenuation due to barrier effects, ground absorption and air absorption.

6.4.2 In the absence of detailed planned construction activities, it is possible to estimate the potential noise impact from the use of typical construction plant and activities. Levels of site construction noise are predicted at the nearest NSRs and calculations are made in accordance with BS5228-1:2009, Annex F2.2.

6.4.3 Typical activities during wind turbine construction, with the highest potential to generate noise, include the excavation and laying of foundations, concrete batching, borrow pit excavation and the movement of plant and materials within the site.

6.4.4 Noise predictions of large fixed and mobile plant are based upon 10m sound pressure levels listed in Annex C of BS5228. Smaller pieces of equipment such as generators or hand held tools have insignificant noise output in comparison to larger pieces of plant. The assessment of construction noise, therefore, includes large plant items only.

6.4.5 BS5228 details a calculation method to predict the noise level for a 12 hour period. In order to predict a worst case scenario, the calculations of construction noise assume that all plant for each construction activity will be operating consecutively and continuously for 12 hours. In practice this will not happen, as mobile plant within the site will move around and will not always operate simultaneously. Therefore, the predicted construction noise levels are likely to be much higher than in practice.

6.4.6 A number of construction phases have been assumed and each phase assessed separately. Specifically, the assessment considers the following work phases;

- Phase 1, felling of forestry;
- Phase 2, construction of temporary site compounds;
- Phase 3, construction of site tracks;
- Phase 4, construction of crane hard standings;
- Phase 5, construction of turbine foundations;
- Phase 6, erection of turbines; and,
- Phase 7, construction of substation.

6.4.7 The predicted construction noise levels at each NAL are detailed in Table 6.6. The Table presents the maximum noise levels expected from the operation of all anticipated construction activities assuming that the assessed noise sources are either operating at the closest construction location to each NAL or moving on the closest sections of track to each NAL.
### Table 6.6: Predicted construction noise immission levels, dB $L_{Aeq}$

<table>
<thead>
<tr>
<th>NALs</th>
<th>Descriptor</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 4</th>
<th>Phase 5</th>
<th>Phase 6</th>
<th>Phase 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAL1</td>
<td>Delamford Cottage</td>
<td>23</td>
<td>26</td>
<td>39</td>
<td>33</td>
<td>33</td>
<td>39</td>
<td>13</td>
</tr>
<tr>
<td>NAL4</td>
<td>Doughty Farm</td>
<td>41</td>
<td>17</td>
<td>46</td>
<td>38</td>
<td>38</td>
<td>45</td>
<td>30</td>
</tr>
<tr>
<td>NAL5</td>
<td>Dalquhain House</td>
<td>29</td>
<td>16</td>
<td>31</td>
<td>34</td>
<td>34</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>NAL7</td>
<td>Corphin Cottage</td>
<td>45</td>
<td>25</td>
<td>45</td>
<td>37</td>
<td>37</td>
<td>44</td>
<td>22</td>
</tr>
<tr>
<td>NAL10</td>
<td>Lanes Farm</td>
<td>19</td>
<td>39</td>
<td>46</td>
<td>40</td>
<td>40</td>
<td>46</td>
<td>10</td>
</tr>
</tbody>
</table>

6.4.8 The calculated construction noise levels are comfortably below the daytime 65 dB $L_{Aeq}$ noise limit at all NALs. No construction activities are anticipated at night-time.

6.4.9 Given that there is the potential for some construction phases to overlap, a worst case scenario has been considered by adding the noise levels of all construction phases (Phase 1 through to Phase 7) together. Table 6.7 presents the cumulative noise level of all phases occurring simultaneously.

### Table 6.7: Construction Noise Assessment; All construction phases (1 – 7)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NAL01 Delamford Cottage</td>
<td>A</td>
<td>43</td>
<td>65</td>
<td>Yes</td>
<td>Not Significant</td>
</tr>
<tr>
<td>NAL04 Doughty Farm</td>
<td>A</td>
<td>50</td>
<td>65</td>
<td>Yes</td>
<td>Not Significant</td>
</tr>
<tr>
<td>NAL05 Dalquhain House</td>
<td>A</td>
<td>42</td>
<td>65</td>
<td>Yes</td>
<td>Not Significant</td>
</tr>
<tr>
<td>NAL07 Corphin Cottage</td>
<td>A</td>
<td>50</td>
<td>65</td>
<td>Yes</td>
<td>Not Significant</td>
</tr>
<tr>
<td>NAL10 Lanes Farm</td>
<td>A</td>
<td>50</td>
<td>65</td>
<td>Yes</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

6.4.10 It can be seen that the construction noise level remains below the noise level limits at all NALs even when considering all construction activities occurring concurrently.
6.4.11 It should be noted that the proposed construction and decommissioning phases are temporary in nature and therefore unlikely to give rise to any long-term effects. Furthermore, in practice the noise associated with construction activities will be less than presented as the predictions assume that all plant is operating continually and concurrently at the closest points to receptors. In reality, only a certain proportion of plant will be operating at any one time.

6.4.12 Chapter 11: Transport details the existing (2014) baseline 12 hour traffic flow and the anticipated (2018) 12-hour traffic flow for the proposed construction period and existing traffic flow. The baseline data for the B734 which will act as the main access route to site are reproduced in Table 6.8 with the addition of 125% increase threshold calculations and assessment results.

<table>
<thead>
<tr>
<th>Road ID</th>
<th>Twelve hour traffic flow estimations</th>
<th>5dB level change assessment (based on 125% increase)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Construction traffic only</td>
</tr>
<tr>
<td>B734 at site access (2014 baseline)</td>
<td>383</td>
<td>192</td>
</tr>
<tr>
<td>B734 at site access (2018 baseline)</td>
<td>409</td>
<td>192</td>
</tr>
</tbody>
</table>

6.4.13 Table 6.8 shows that with the addition of anticipated vehicle movements to the existing traffic on the B734, the level of change will be below 5dB during the peak construction period. Thus, there will be no significant impact from road traffic noise on the surrounding area.

**Operational Effects**

6.4.14 Operational noise propagation calculations are undertaken in accordance with ISO9613-2 ‘Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation.’ The ISO standard assumes that all receptors are simultaneously downwind of all wind turbines and assumes other environmental factors conducive to noise propagation, such as moderate temperature inversions, therefore, a worst case noise level is predicted. The Standard also considers atmospheric absorption and ground absorption. The calculations are then modified to reflect the recommendations within the IOA GPG, including making corrections to account for topography, directionality and line of sight.

6.4.15 The model uses as its acoustic input data the octave band sound power level of the turbines. The main assumptions regarding the turbines (type, dimensions, uncertainty), together with noise data, are detailed in Annex 6 of Technical Appendix 6.2. Noise immission levels have been calculated assuming worst case wind direction between the turbines and all NALs. The predicted levels, which includes some use of mode management (as detailed in Section 6.6) are presented in Figures 6.12 through to 6.21. However, as the Total ETSU-R-97 Limits refer to the noise limit for all turbine
developments, assessment of the operational noise levels is undertaken later in this Chapter, within the cumulative noise assessment.

**Decommissioning Effects**

6.4.16 Noise associated with the decommissioning of the Development has been modelled and assessed using the same methodology used within the construction noise assessment. Table 6.9 details the predicted noise immission levels.

| Table 6.9: Predicted decommissioning noise immission levels, dB $L_{Aeq}$ |
|-------------------|-------------------|
| **NALs** | **Descriptor** | **Phase 8 - Decommissioning** |
| NAL1 | Delamford Cottage | 44 |
| NAL4 | Doughty Farm | 41 |
| NAL5 | Dalquhairn House | 42 |
| NAL7 | Corphin Cottage | 38 |
| NAL10 | Lanes Farm | 43 |

6.4.17 The calculated decommissioning noise levels are comfortably below the daytime 65 dB $L_{Aeq}$ noise limit at all NALs. No decommissioning activities are anticipated at nighttime.

**6.5 Cumulative Effects**

6.5.1 A cumulative operational noise impact assessment is required where another wind turbine development in the area may add to the noise immission level of the proposed Development. The cumulative assessment should consider all turbines which are operational, consented or within the planning application process.

6.5.2 A number of wind turbine developments have been identified for consideration within the cumulative assessment of operational noise. Figure 5.13 of the ES details the location of all other turbine developments in the area. The developments identified for assessment are as follows:

- Hadyard Hill Wind Farm (HHWF) – 52 of, Bonus (now Siemens) 2.3MW turbines, with hub heights of 58.5 m and 68.5 m; operational.
- Linfaire Wind Farm (Linfairn) – 17 of, Nordex N90 HS 2.5 MW turbines, with a hub height of 80 m; in planning.
- Tralorg Wind Farm (Tralorg) – 8 of Vestas V80 2 MW turbines, with a hub height of 60 m; consented, not yet constructed.
- Assel Valley Wind Farm (Assel valley) – 10 Vestas V90 3 MW, with a hub height of 80 m; consented, not yet constructed.
- Penwhipples Turbine – 1 of x EWT DW54 500kW turbine, with a hub height of 75 m; refused, appeal status unknown; and,
- Troweir Turbine – 1 of x EWT DW54 500kW turbine, with a hub height of 51 m; decision pending.
6.5.3 The aim of the cumulative noise assessment is to firstly determine the likely cumulative impacts of all relevant wind turbine developments in the area and secondly, to derive the Development Specific ETSU-R-97 Limits which could be used as part of an enforceable noise related planning condition.

6.5.4 The calculation of cumulative noise immission levels uses the same ISO 9613 propagation model as detailed earlier. However, the model assumes that each NSR is simultaneously downwind of every turbine. In reality this cannot happen and for many of the NSRs, the calculated results are likely to be higher than would actually occur. To this end, the IOA GPG states;

6.5.5 “Predictions made using the ISO 9613-2 standard relate to "worst case" conditions (typically downwind propagation from source to receiver and/or downwind refraction under temperature inversions). When considering cumulative noise impacts, the effects of propagation in different wind directions can be considered.”

6.5.6 Accordingly, the noise model is modified to take into account the levels of attenuation associated with varying wind direction (in accordance with the guidance presented in the IOA GPG paragraph 4.4.2). Specifically, the noise model calculates the amount of attenuation per wind sector (in 15° increments) for each NSR and then presents the noise immission level for the worst case scenario i.e. the wind sector offering the least amount of attenuation.

6.5.7 As detailed previously, the Total ETSU Noise Limits relate to the total cumulative wind turbine noise in an area so the limit can sometimes be considered as a ‘noise budget’.

6.5.8 The IOA GPG details that any consented scheme(s) may be justified in using all of the noise limit and that this assumption can, in theory, mean that there is no ‘noise budget’ available for other schemes in the area.

6.5.9 There is no simple rule which can be used to determine a maximum distance at which two or more developments may impact upon each other in relation to noise. Nevertheless, due to the logarithmic way in which decibels are added, if an additional noise source is 10dBA lower than an existing noise source it will have a negligible impact upon the total noise level e.g. 40dBA + 30dBA = 40dBA. Therefore, in terms of wind farm noise, where it can be demonstrated that the turbine noise from a proposed scheme is 10dBA below the noise levels from existing scheme(s) it can be concluded that the new scheme will have a negligible impact on the total noise levels at that location. In such situations the IOA GPG details that a cumulative noise assessment is not required.

6.5.10 Similarly, where noise from a new scheme is 10dBA below the noise limits at a property, it can be concluded that the new scheme will have a negligible impact on the ability of the existing scheme to meet its limits.

6.5.11 Figures 6.12 through to Figure 6.21 illustrate how the predicted noise immission levels from all other nearby wind turbines, excluding the existing Hadyard Hill development and the proposed Development, is at least 10dB below the Total ETSU-R-97 limits. This can be seen by comparing the solid yellow line (predicted noise from all developments except Hadyard Hill and the proposed Development) to the dashed red line (which is the Total ESTU-R-97 limit minus 10dB). This demonstrates that at all NALs the noise levels of other developments are at least 10dB below the limits and, therefore, not contributing at all to the ‘noise budget’. Subsequently, Hadyard Hill and the proposed Development can be tested against the Total ETSU-R-97 limits without
consideration of the other nearby schemes (as they would not impact on the overall noise levels).

6.5.12 This ultimately means that the "Total ETSU-R-97 limits" at all 10 NALs can also act as the "Hadyard Hill+Extension cumulative limits". Therefore, it is proposed that a cumulative noise limit is incorporated into any noise related planning condition and the cumulative assessment proceeds on this basis.

6.5.13 Tables 6.10 and 6.11 present the cumulative assessment for daytime and night-time respectively. Predicted levels account for the use of mode management, where appropriate.

6.5.14 Without the use of mode management the cumulative noise immission levels will exceed the noise limits at two properties under some wind directions and speeds, using the candidate turbine. However, it can be seen that through the use of mode management at all NALs, for all wind speeds and time periods, the predicted cumulative noise immission levels will remain within the Total ETSU-R-97 limits.
### Table 6.10: ETSU-R-97 Compliance Table - Quiet Daytime

<table>
<thead>
<tr>
<th>Location</th>
<th>Wind Speed (m/s) as standardised to 10m height</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>NAL1 - Delamford Cottage</td>
<td>Prevailing Measured Background Noise Level</td>
<td>31.5</td>
<td>32.9</td>
<td>35.2</td>
<td>38</td>
<td>41.1</td>
<td>44.4</td>
<td>47.6</td>
<td>50.6</td>
</tr>
<tr>
<td></td>
<td>Proposed Hadyard Existing &amp; Extension specific Limits</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>46.1</td>
<td>49.4</td>
<td>52.6</td>
<td>55.6</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>Predicted Hadyard Existing &amp; Extension turbine noise</td>
<td>41</td>
<td>41.3</td>
<td>42.1</td>
<td>43.3</td>
<td>44.2</td>
<td>45</td>
<td>45.3</td>
<td>45.3</td>
</tr>
<tr>
<td></td>
<td>Exceedance Level $L_{A90}$</td>
<td>-4</td>
<td>-3.7</td>
<td>-2.9</td>
<td>-1.7</td>
<td>-1.9</td>
<td>-4.4</td>
<td>-7.3</td>
<td>-10.3</td>
</tr>
<tr>
<td>NAL2 - Knockrochar</td>
<td>Prevailing Measured Background Noise Level</td>
<td>31.5</td>
<td>32.9</td>
<td>35.2</td>
<td>38</td>
<td>41.1</td>
<td>44.4</td>
<td>47.6</td>
<td>50.6</td>
</tr>
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<td>-5.4</td>
<td>-4.4</td>
<td>-3</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td>NAL8 - Milton Farm</td>
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<td>32.9</td>
<td>34.6</td>
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<td>38.5</td>
<td>40.5</td>
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<td>44.7</td>
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<tr>
<td></td>
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<td>43</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>43.5</td>
<td>45.5</td>
<td>47.6</td>
<td>49.7</td>
</tr>
<tr>
<td></td>
<td>Predicted Hadyard Existing &amp; Extension turbine noise</td>
<td>34.1</td>
<td>35.5</td>
<td>38</td>
<td>39.8</td>
<td>40.5</td>
<td>40.8</td>
<td>40.9</td>
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<td>-6.7</td>
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<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
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<td>27.5</td>
<td>28.7</td>
<td>30.7</td>
<td>33.8</td>
<td>38.3</td>
<td>44.6</td>
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<td>43</td>
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<td>43</td>
<td>43</td>
<td>43.3</td>
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<td></td>
<td>Predicted Hadyard Existing &amp; Extension turbine noise</td>
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<td>33.7</td>
<td>35.2</td>
<td>36.7</td>
<td>37.5</td>
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<td>38.3</td>
<td>38.3</td>
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<tr>
<td></td>
<td>Exceedance Level $L_{A90}$</td>
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<td>-9.3</td>
<td>-7.8</td>
<td>-6.3</td>
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<td>-11.3</td>
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</table>
### Table 6.11: ETSU-R-97 Compliance Table – Night-time

<table>
<thead>
<tr>
<th>Location</th>
<th>Wind Speed (m/s) as standardised to 10m height</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<tbody>
<tr>
<td>Prevailing Measured Background Noise Level</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prevailing Measured Background Noise Level</td>
<td>28.5</td>
<td>29.8</td>
<td>31.6</td>
<td>33.8</td>
<td>36.2</td>
<td>38.8</td>
<td>41.5</td>
<td>44.1</td>
<td>46.5</td>
</tr>
<tr>
<td>Proposed Hadyard Existing &amp; Extension specific Limits</td>
<td></td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>46.5</td>
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<td>51.5</td>
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<tr>
<td>Predicted Hadyard Existing &amp; Extension turbine noise</td>
<td></td>
<td>41.3</td>
<td>41.4</td>
<td>41.4</td>
<td>42.3</td>
<td>43.4</td>
<td>44.5</td>
<td>44.8</td>
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<tr>
<td>Exceedance Level L₉₀₀</td>
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<td>-3.7</td>
<td>-3.6</td>
<td>-3.6</td>
<td>-2.7</td>
<td>-1.6</td>
<td>-0.5</td>
<td>-1.7</td>
<td>-4.3</td>
<td>-6.7</td>
</tr>
</tbody>
</table>
6.6 **Mitigation**

6.6.1 The predicted construction noise immission levels are below the noise level limits, therefore there are no specific mitigation measures required. Nevertheless, construction would be carried out in compliance with standard good practice measures, as set out in Chapter 2: Proposed Development. Technical Appendix 2.4; Construction Environmental Management Plan provides the outline detail for the management measures that would be implemented to control noise related nuisance effects during construction.

6.6.2 In order to meet the Total ETSU-R-97 Noise Limits the noise propagation model assumes that the noise level of some turbines will be restricted through the use of a mode management scheme, which allows the turbines to be switched into different operating modes under certain wind speed and direction conditions.

6.6.3 A turbine mode management scheme using the candidate turbine is required to meet the proposed limits at two properties; at all other properties the limits can be met with the turbines running in a normal mode of operation. This scheme will be optimised upon final selection of the turbine type, however, for the purpose of the assessment it assumes that mode management is applied to the following turbines;

- To meet all noise limits at NAL7-Corphin Cottage Hadyard Hill Extension turbine numbers T18 to T22 and T28 to T30 would operate, in certain circumstances, using mode management; and

- To meet all noise limits at NAL10-Lanes Farm the existing Hadyard Hill turbine number T21 would operate, in certain circumstances, using mode management.

6.6.4 It should be noted that during the turbine selection process a quieter turbine than the model chosen for the ES noise assessment may be selected. Therefore, less or no mode management may be required. Regardless, additional noise modelling will be undertaken to ensure that the preferred turbine type will be compliant with any conditioned noise limits.

6.7 **Residual Effects**

6.7.1 Construction noise and traffic noise is likely to be audible at the closest residential receptors for certain periods during the construction phase, however the levels are below the noise level limits set out within BS5228. Therefore, the effect of construction noise on all NSRs is determined to be not significant.

6.7.2 The characteristics of wind turbine noise are discussed in ETSU-R-97 and were considered in the setting of the noise limits that the document recommends. Whilst audibility is not a criteria in ETSU-R-97 the satisfaction of the ETSU-R-97 derived limits can lead to a situation whereby, at some locations under some wind conditions and for a certain proportion of the time, the wind turbine noise may be audible at the nearest dwellings.

6.7.3 Predicted wind farm operational noise levels for the Development operating alongside all other proposed and consented turbines meet the Total ETSU-R-97 quiet daytime and night-time noise limits at all residential properties. Therefore, the effect of operational noise on all NSRs is determined to be not significant.
6.8 Summary

6.8.1 This chapter has considered the effects of temporary construction and increased road traffic noise during the construction and decommissioning phases and the permanent noise during the operational phase of the proposed Development. A summary of the assessment findings is presented in Table 6.12.

6.8.2 The guidance contained in BS5228-1:2009+A1:2014 – Part 1 was used to assess the potential construction noise effects of the Development.

6.8.3 Predicted construction and decommissioning noise levels compared with the Category A criteria outlined in Section E.3 of BS5228: Part 1 2009+A1:2014 indicate that the predicted noise levels for all activities, at all receptors are below the guidelines considered acceptable within BS5228. The construction noise effects are therefore deemed not significant.

6.8.4 The operational noise assessment shows that the likely predicted wind farm noise immission levels meet the Total ETSU-R-97 noise limits at all surrounding receptor locations for both quiet daytime and night-time periods.

6.8.5 Noise propagation modelling of all proposed and consented wind turbines in the area has demonstrated that at all NALs the proposed Development and the existing Hadyard Hill Wind Farm are the dominant contributors to noise immission levels and that the noise levels from all other developments are at least 10dB below the Total ETSU-R-97 limits.

6.8.6 The cumulative operational assessment shows that likely predicted wind farm noise immission levels from the Development operating in conjunction with the existing Hadyard Hill Wind Farm meet the Total ETSU-R-97 noise limits at all surrounding receptor locations for both quiet daytime and night-time periods.

6.8.7 Predicted wind turbine noise meets or is less than the noise limits defined in ETSU-R-97, therefore the noise effects are deemed not significant.

6.8.8 It would be appropriate to include noise related planning conditions which detail the operational noise limits applicable to the Development, together with a method of assessment which could be used in the event of a complaint. The Total ETSU-R-97 limits from this report can act as a cumulative noise level limit and it is suggested that they form part of the planning conditions.

<table>
<thead>
<tr>
<th>Likely Significant Effect</th>
<th>Mitigation</th>
<th>Residual Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased levels of noise from construction activities.</td>
<td>Best practice noise control measures, as detailed within BS5228 to be implemented.</td>
<td>Noise levels predicted to be below guideline noise limit values at all receptors.</td>
</tr>
<tr>
<td>Increased levels of road traffic noise from construction and staff vehicles during construction phases.</td>
<td>None required.</td>
<td>Noise levels predicted to be below guideline noise limit values at all receptors.</td>
</tr>
<tr>
<td>Increased levels of noise at receptors attributable to wind turbine operation.</td>
<td>Limited mode management to be employed where appropriate to reduce turbine</td>
<td>Noise levels predicted to be below guideline noise limit values at all receptors.</td>
</tr>
</tbody>
</table>
Table 6.12: Summary of Residual Effects

<table>
<thead>
<tr>
<th>Likely Significant Effect</th>
<th>Mitigation</th>
<th>Residual Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>noise levels in certain wind speeds and directions.</td>
<td>limit values at all receptors.</td>
</tr>
</tbody>
</table>

6.9 References


6.10 Glossary

Amplitude Modulation: In the context of wind turbine noise, amplitude modulation (AM) describes a variation in noise level over time; for example observers may describe a ‘whoosh whoosh’ sound, which can be heard close to a wind turbine as the blades sweep past. This characterises the sound of wind turbines at close quarters and is often referred to as Normal Amplitude Modulation (NAM). The term OAM (Other Amplitude Modulation) is increasingly used to describe an unusual feature of aerodynamic noise from wind turbines, where a greater than normal degree of regular fluctuation in sound level occurs at blade passing frequency, typically about once per second.
Attenuation: the reduction in level of a sound between the source and a receiver due to any combination of effects including: distance, atmospheric absorption, acoustic screening, the presence of a building façade, etc.

Background Noise: the noise level rarely fallen below in any given location over any given time period, often classed according to day time, evening or night time periods. The $L_{A90}$ indices (see below) is often used to represent the background noise level.

Bin: subset or group into which data can be sorted; in the case of wind speeds, bins are often centred on integer wind speeds with a width of 1 m/s. For example the 4 m/s bin would include all data with wind speeds of 3.5 to 4.5 m/s.

Broadband Noise: noise with components over a wide range of frequencies.

Decibel (dB): the ratio between the quietest audible sound and the loudest tolerable sound is a million to one in terms of the change in sound pressure. A logarithmic scale is used in noise level measurements because of this wide range. The scale used is the decibel (dB) scale which extends from 0 to 140 decibels (dB) corresponding to the intensity of the sound level.

dB(A): the ear has the ability to recognise a particular sound depending on its pitch or frequency. Microphones cannot differentiate noise in the same way as the ear, and to counter this weakness the noise measuring instrument applies a correction to correspond more closely to the frequency response of the human ear. The correction factor is called ‘A Weighting’ and the resulting measurements are written as dB(A). The dB(A) is internationally accepted and has been found to correspond well with people’s subjective reaction to noise. Some typical subjective changes in noise levels are:

- a change of 3dB(A) is just perceptible;
- a change of 5dB(A) is clearly perceptible; and
- a change of 10dB(A) is twice (or half) as loud.

Directivity: the property of a sound source that causes more sound to be radiated in one direction than another.

Frequency: the pitch of a sound in Hz or kHz. See Hertz.

Ground Effects: the modification of sound at a receiver location due to the interaction of the sound wave with the ground along its propagation path from source to receiver. Described using the term ‘G’, and ranges between 0 (hard), 0.5 (mixed) and 1 (soft).

Hertz (Hz): sound frequency refers to how quickly the air vibrates, or how close the sound waves are to each other (in cycles per second, or Hertz (Hz)).

Immission – refers to the sound pressure level received from a noise source.

$Lw$: is the sound power level. It is a measure of the total noise energy radiated by a source of noise, and is used to calculate noise levels at a distant location. The $LWA$ is the A-weighted sound power level.

$Leq$: is the equivalent continuous sound level, and is the sound level of a steady sound with the same energy as a fluctuating sound over the same period. It is possible to consider this level as the ambient noise encompassing all noise at a given time. The
\(L_{\text{Aeq,T}}\) is the A-weighted equivalent continuous sound level over a given time period (T).

\(L_{90}\): index represents the noise level exceeded for 90 percent of the measurement period and is used to indicate quieter times during the measurement period. It is often used to measure the background noise level. The \(L_{\text{A90,10min}}\) is the A-weighted background noise level over a ten minute measurement sample.

Noise emission: the noise energy emitted by a source (e.g. a wind turbine).

Noise immission: the sound pressure level detected at a given location (e.g. the nearest dwelling).

Night Time Hours: ETSU-R-97 defines the night time hours as 23.00 to 07.00 every day.

Noise Sensitive Receptor (NSR) – all properties which are sensitive to noise and, therefore, require protection from nearby noise sources.

Noise Monitoring Location (NML) – all locations where baseline noise monitoring has been undertaken. Denotes the exact location of an equipment installation, typically within the grounds of an NSR.

Noise Assessment Location (NAL) – the location at which immission noise levels are calculated, typically at the boundary edge of an NSR’s amenity area. In some cases one NAL may be assigned as a representative assessment location for a number of NSRs, for example, a cluster of houses.

Quiet Daytime Hours: ETSU-R-97 defines the amenity hours as 18.00 to 23.00 Monday to Friday, 13.00 to 23.00 on Saturdays and 07.00 to 23.00 on Sundays.

Sound Level Meter: an instrument for measuring sound pressure level.

Sound Power Level: the total sound power radiated by a source, in decibels.

SWL – indicates sound power level in decibels (dB).

Sound Pressure Level: a measure of the sound pressure at a point, in decibels.

SPL – indicates sound pressure level in decibels (dB).

Standardised Wind Speed: a wind speed measured at a height different than 10 m (generally measured at the turbine hub height) which is expressed to a reference height of 10 m using a roughness length of 0.05 for standardisation purpose (in accordance with the IEC 61400-11 standard).

Tonal Noise: noise which covers a very restricted range of frequencies (e.g. a range of \(\leq\)20 Hz). This noise can be more annoying than broadband noise.

Wind Shear: the increase of wind speed with height above the ground. Emission – refers to the noise level emitted from a noise source, expressed as either a sound power level or sound pressure level.
Chapter 7: Hydrology and Hydrogeology

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Technical Appendix 7.2 Figures:
Figure 7.2.1: Groundwater Dependant Terrestrial Ecosystems
7 Hydrology and Hydrogeology

7.1 Introduction

7.1.1 This chapter assesses the potential effects of the construction, operation and decommissioning of the proposed Hadyard Hill Extension Wind Farm on the surrounding hydrological and hydrogeological environment.

7.1.2 The specific objectives of the chapter are to:
- describe the hydrological and hydrogeological baseline characteristics to appreciate site sensitivities;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- based on the assessment methodology and taking into consideration the site specific sensitivities, describe the potential direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address likely significant effects; and
- carry out an assessment of any identified residual effects following the implementation of mitigation.

7.1.3 This chapter is supported by the following technical appendices:
- Technical Appendix 7.1: Hydrological and Hydrogeological Context to Inform the Assessment; and

7.1.4 Hydrological and hydrogeological considerations have influenced the design of the proposed development and this is considered in Chapter 3: Design Evolution and Alternatives.

7.1.5 The assessment has been carried out by Natural Power Consultants Ltd (Natural Power). For the purposes of this assessment the proposed Hadyard Hill Extension Wind Farm is referred to as the 'proposed development' and the area within the application boundary is the 'site'.

7.2 Scope of Assessment

7.2.1 The proposed development will introduce physical changes which have the potential to alter the hydrological characteristics of the site. During the construction phase and to a lesser extent during the operational phase, potential sources of pollution may be present on site. Hydrological surveys have been undertaken to establish the existing baseline conditions at the proposed development and within the wider study area to assess the potential effects of the proposed development, the significance of these effects and the potential for mitigation.

7.2.2 The proposed development is situated within the catchments of the Water of Girvan and the River Stinchar. This chapter, supported by Technical Appendix 7.1 & 7.2 describes the hydrological and hydrogeological conditions within these catchments and the surrounding area. Technical Appendix 7.1 also considers the potential effects...
7.2.3 Following the identification of key hydrological receptors, this chapter provides an assessment of the potential impacts on water quality, flooding, water resources, and soils and peat primarily during construction and during the operational phase.

7.2.4 The assessment is made on the basis of the proposed development as described in Chapter 2: Proposed Development, incorporating the provision of an outline Construction Environmental Management Plan (CEMP) as described in Technical Appendix 2.4 and the Mitigation by Design set out in Chapter 3: Design Evolution and Alternatives. The assessment also relies on the information set out in Technical Appendix 2.5: Watercourse Crossing Design and in Technical Appendix 2.6: Peat Landslide Hazard and Risk Assessment.

7.2.5 The effects on surface and groundwater may also result in secondary effects on habitats, peat, and ground water dependent terrestrial ecosystems (GWDTEs) and/or aquatic ecology. Technical Appendix 7.2 provides an assessment of GWDTEs considered as having a hydrogeological linkage to the proposed infrastructure. Effects on ecological (non-avian) receptors including fisheries and sensitive habitats are considered in Chapter 9: Ecology. Further information on the extent and depth of peat on the site is considered in Technical Appendix 2.6: Peat Landslide Hazard and Risk Assessment.

**Study Area**

7.2.6 The site is situated within the River Stinchar and Water of Girvan catchments including the drainage basin which feeds into the Scottish Water Penwhapple Drinking Water Reservoir.

7.2.7 The hydrology study area is larger in extent and includes the lower reaches of watercourses that are present within the site, encompassing the hydrological catchments of the identified watercourses. The study area and the relevant hydrological features within the catchments are outlined in Figure 7.1: Hydrological Features and Main Catchments and Figure 7.2: Hydrological Features and Sub Catchments.

**Scoping and Consultation**

7.2.8 The key responses identified the following hydrological buffers as a design constraint in order to avoid adverse effects as follows:

- Scottish Water requested that all proposed infrastructure and activities should be located 100 m or a minimum of 50 m from any watercourse within the catchment of the Penwhapple Reservoir; and
- Scottish Environment Protection Agency (SEPA) requested a detailed assessment for tracks and foundations situated within 100/250 m of groundwater abstractions respectively.

7.2.9 With the exception of two proposed watercourse crossings within minor headwater channels draining into the Penwhapple Reservoir, these constraints have been adhered to as part of the design. Scottish Water also requested that hydrological effects be assessed for all stages of the proposed development, and this has been addressed in Section 7.8. In line with SEPA's response, the principles of the CEMP, which is intended to maximise environmental protection through site specific good
practice mitigation and construction management practices, have been outlined in Chapter 2: Proposed Development, with the outline CEMP provided in Technical Appendix 2.4.

7.2.10 Effects arising from the decommissioning of the proposed development involve smaller scale processes to those employed during construction. Due to this similarity, the results of decommissioning (i.e. the removal of the development) are taken into account in the assessment of ongoing and operational effects in Technical Appendix 7.1 Hydrological and Hydrogeological Research and summarised within Section 7.5 within this chapter.

7.3 Assessment Methodology

Overview of Methods

7.3.1 The assessment has involved the following:

- consultation with relevant statutory and non-statutory bodies;
- detailed desk studies and site visits to establish baseline conditions;
- site visits covered the main hydrological features, each area of proposed infrastructure and within 50 m of turbine locations and Borrow Pit (BP) search areas;
- evaluation of the potential effects of the proposed development and the implications that these could have for the current site conditions;
- identification of possible measures to help protect sensitive hydrological and hydrogeological features and where possible to enhance conditions resulting from the proposed development; and
- evaluation of the significance of likely effects by consideration of the sensitivity of the baseline features within the study area, the potential magnitude of these effects, and the significance of these effects occurring post mitigation.

Baseline Characterisation

7.3.2 Table 7.1 provides information on the methods and information sources that have been used to establish the range of baseline conditions at the site.

<table>
<thead>
<tr>
<th>Table 7.1: Baseline Methods and Information Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Topic</strong></td>
</tr>
<tr>
<td>Topography Confirm surface water catchments</td>
</tr>
<tr>
<td>Designated Nature and Conservation Sites Identify hydrological and hydrogeological designated sites within catchments</td>
</tr>
<tr>
<td>Topic</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
</tbody>
</table>
| Surface Water Hydrology | Describe surface water hydrology  
Describe the hydromorphological conditions of the watercourses  
Collate all hydrological flow data for the immediate area and associated downstream areas  
Identify ephemeral and artificial drainage channels | 1:10,000 OS Raster Data  
Flood Estimation Handbook (FEH) CD-ROM 3  
LowFlows 2 CD-ROM (Wallingford Hydrosolutions 2015)  
Site visits carried out on the 20th August 2014, 22nd – 23rd October 2014 and 2nd – 3rd February 2015 |
| Flooding            | Identify flood risks in line with the Flood Risk Management (Scotland) Act 2009 and Scottish Planning Policy | SEPA (2015) Indicative River and Coastal Flood Map  
http://map.sepa.org.uk/floodmap/map.htm  
Halcrow/HR Wallingford (2004), ISIS Hydrological Software Package, CD-ROM |
| Water Resources     | Identify all private water supply (PWS) abstractions within site catchments and within 250 m of excavations > 1 m depth and within 100 m of excavations < 1 m depth  
Identify Scottish Water infrastructure within site catchments and watercourses within 50 m and 100 m buffers from excavations  
Inform site layout based on desk study and field survey findings | South Ayrshire Council PWS Information (received August 2014)  
Private Water Supply Questionnaire Responses, (received August-November 2014)  
SEPA (2014) Abstraction and Discharge Information, received on 19th September 2014  
Site Investigation Services, Penwhapple Reservoir Water Mains Map, received on 15th August (2014)  
Targeted site visits on the 20th August 2014 22nd – 23rd October and 2nd and 3rd February 2015 |
Table 7.1: Baseline Methods and Information Sources

<table>
<thead>
<tr>
<th>Topic</th>
<th>Baseline Method</th>
<th>Source of Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology &amp; Hydrogeology</td>
<td>Describe the underlying bedrock and superficial geology</td>
<td>British Geological Survey (BGS, 1988) 1:50 000 Geological Map of Scotland</td>
</tr>
<tr>
<td></td>
<td>Establish the underlying aquifer properties and potential pollution risks across the proposed development</td>
<td>British Geological Survey (BGS, 1988) 1:625 000 Hydrogeological Map of Scotland</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SNIFFER (2004) Superficial Aquifer Map</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BGS Base Permeability Data (BGS, 2015) 1:50 0000 Bedrock and Superficial Map</td>
</tr>
</tbody>
</table>

Assessment of Effects

7.3.3 The significance of the potential effects from the proposed development has been defined by taking into account two main factors; the sensitivity of the receiving environment and the potential magnitude of effect, should that effect occur. The approach is based on Scottish Natural Heritage (SNH) guidance (2013).

Sensitivity Criteria

7.3.4 The sensitivity of the receiving environment is defined by the baseline quality as well as its ability to absorb the effect without perceptible change, as defined in Table 7.2.

Table 7.2: Definition and Criteria of Receptor Sensitivity

<table>
<thead>
<tr>
<th>Receptor Sensitivity</th>
<th>Definition</th>
<th>Baseline Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>International or national level importance</td>
<td>High likelihood of fluvial/ tidal flooding in the sub catchment – defined as 1:10 probability in a year</td>
</tr>
<tr>
<td></td>
<td>Receptor with a high quality and rarity, regional or national scale and limited potential for substitution/ replacement</td>
<td>Important designated site on a European, or National level e.g. Habitat Directive Sites, or Sites of Special Scientific Interest (SSSIs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Catchment currently classed as being of High or Good Ecological Status under the requirements of the 2013 River Basin Management Plan classification (RBMP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Public water supply within catchment of proposed construction activity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>There is a high likelihood of hydrological connectivity between the infrastructure and identified PWS source</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Groundwater Dependant Terrestrial Ecosystems (GWDTEs) classified as being highly groundwater dependant under Land Use Planning System Guidance Note 4 (LUPS4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extensive nationally important aquifers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average peat depth &gt;0.5 m within the subcatchment</td>
</tr>
</tbody>
</table>
### Table 7.2: Definition and Criteria of Receptor Sensitivity

<table>
<thead>
<tr>
<th>Receptor Sensitivity</th>
<th>Definition</th>
<th>Baseline Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>Regional, county and district levels</td>
<td>Medium likelihood of fluvial/ tidal flooding in the sub catchment – defined as a 1:200 probability in a year</td>
</tr>
<tr>
<td></td>
<td>Receptor with a medium quality and rarity, regional scale and limited potential for substitution/replacement</td>
<td>There is a medium likelihood of hydrological connectivity between the proposed infrastructure and identified PWS source</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minor regionally important aquifers (not extensive)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Catchment currently classed as being of Moderate Ecological Status under the requirements of the 2013 River Basin Management Plan classification (RBMP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Groundwater Dependant Terrestrial Ecosystems (GWDTEs) classified as being moderately groundwater dependent depending on the hydrogeological setting under Land Use Planning System Guidance Note 4 (LUPS4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average peat depth between 0.3 m – 0.5 m within the sub catchment</td>
</tr>
<tr>
<td>Low</td>
<td>Local importance</td>
<td>Low likelihood of fluvial/ tidal flooding in the sub catchment– defined as a 1:1000 probability in a year</td>
</tr>
<tr>
<td></td>
<td>Receptor is on-site or on a neighbouring site with a low quality and rarity, local scale</td>
<td>There is a low likelihood of hydrological connectivity between the proposed infrastructure and identified PWS source</td>
</tr>
<tr>
<td></td>
<td>Environmental equilibrium is stable and is resilient to changes that are greater than natural fluctuations, without detriment to its present character</td>
<td>Non aquifer- catchment underlain by impermeable rocks without groundwater</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Catchment currently classed as being of Poor or Bad Ecological Status under the requirements of the 2013 River Basin Management Plan classification (RBMP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average peat depth &lt;0.3 m within the sub catchment</td>
</tr>
</tbody>
</table>

**Magnitude of Effect**

7.3.5 The magnitude of effect includes the timing, scale, size and duration of the potential effect. Note that consideration of the temporal duration (short, medium and long term) of effects is based on professional judgement, and for the purposes of this assessment the magnitude criteria are defined in Table 7.3.
Table 7.3: Definition of Magnitude of Effect

<table>
<thead>
<tr>
<th>Magnitude of Effect</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Total loss or major alteration to key elements of surface water hydrology from the baseline (i.e. pre-development) conditions. Changes likely to be long term, experienced for 5-26 years</td>
</tr>
<tr>
<td>Medium</td>
<td>Partial loss or alteration to key elements of surface water hydrology from the baseline (i.e. pre-development) conditions. Changes are likely to be medium term, experienced for 1-5 years</td>
</tr>
<tr>
<td>Low</td>
<td>Minor shift away from the baseline (i.e. pre-development) conditions. Changes are likely to be short term, experienced for 0-12 months</td>
</tr>
<tr>
<td>Negligible</td>
<td>Very slight change from the baseline (i.e. pre-development) conditions, with no measurable change in receptor quantity or quality</td>
</tr>
</tbody>
</table>

Significance Criteria

7.3.6 Table 7.4 defines how the receptor sensitivity combines together with the magnitude of effect to determine the significance of the effect.

Table 7.4: Matrix for Determination of Significance of Effect

<table>
<thead>
<tr>
<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td>High</td>
<td>Major</td>
</tr>
<tr>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td>Low</td>
<td>Minor</td>
</tr>
</tbody>
</table>

7.3.7 Effects are therefore concluded to be Major, Moderate, Minor or Negligible. Effects considered as being Major or Moderate are considered significant in terms of the EIA regulations.

Limitations to the Assessment

7.3.8 PWS information has been obtained from a combination of information provided by South Ayrshire Council as well as consultation with residents of relevant properties. The results of these surveys are therefore as accurate as the information provided.

7.3.9 The assessment of effects has been made on the basis of the proposed development as described in Chapter 2: Proposed Development, with the assumption that any micrositing of turbines or infrastructure, during construction, would not result in an increased magnitude of effect.

7.3.10 The information presented in this assessment is based on desk studies and fieldwork. There is the potential that further constraints may be identified during the post-consent, pre-construction design stage.
7.4 Baseline Conditions

Current Baseline

7.4.1 On the basis of the baseline surveys and available information gathered and provided in Technical Appendix 7.1: Hydrological and Hydrogeological Context to Inform the Assessment, Table 7.5 identifies the receptors for each relevant sub catchment. The sensitivity criteria have been previously outlined in Table 7.2.

<table>
<thead>
<tr>
<th>Table 7.5: Sensitivity of Receptors Identified during Baseline Research (in Technical Appendix 7.1 and Technical Appendix 7.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Receptor</strong></td>
</tr>
<tr>
<td>Flooding</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Water Quality</td>
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<td></td>
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</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Water Resources</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
### Table 7.5: Sensitivity of Receptors Identified during Baseline Research (in Technical Appendix 7.1 and Technical Appendix 7.2)

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Sub Catchment or Contribution Zone(s)</th>
<th>Sensitivity</th>
<th>Criteria Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>positioned directly downgradient of proposed turbine base.</td>
</tr>
<tr>
<td></td>
<td>Unnamed tributaries of Water of Assel and River Stinchar</td>
<td>Medium</td>
<td>Lanes Farm domestic PWS spring is within 250 m buffer but outwith sub catchment of the Permanent Met Mast. The sub catchments have moderate productivity. Moderate potential for connectivity due to close proximity of excavation works close to catchment boundary and potential for shallow groundwater flow to not be bound by same topographic constraints as surface water catchments.</td>
</tr>
<tr>
<td>Dalquhairn Burn</td>
<td>Medium</td>
<td>Doughty Cottage domestic PWS borehole 640 m down gradient from T11 within the same catchment, but there is a slight topographic rise between T11 and source. Moderate potential for connectivity.</td>
<td></td>
</tr>
</tbody>
</table>

#### Hydrogeology

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Sub Catchment or Contribution Zone(s)</th>
<th>Sensitivity</th>
<th>Criteria Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lindsayton Burn</td>
<td>Medium</td>
<td>Majority of site underlain by a Lanark regional aquifer group which has bedrock with low/moderate permeability and superficial deposits with moderate permeability.</td>
<td></td>
</tr>
<tr>
<td>Penwhapple Burn</td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unnamed tributaries of Water of Assel and River Stinchar</td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pingerrach Burn</td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milton Burn</td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dalquhairn Burn</td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### GWDTEs

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Sub Catchment or Contribution Zone</th>
<th>Sensitivity</th>
<th>Criteria Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each identified GWDTE contribution Zone</td>
<td>High</td>
<td>Groundwater Dependant Terrestrial Ecosystems (GWDTEs) classified as being highly groundwater dependant under Land Use Planning System Guidance Note 4 (LUPS4)</td>
<td></td>
</tr>
<tr>
<td>Dalquhairn Burn</td>
<td>Medium</td>
<td>Groundwater Dependant Terrestrial Ecosystems (GWDTEs) classified as being moderately groundwater dependant depending on the hydrogeological setting under Land Use Planning System Guidance Note 4 (LUPS4)</td>
<td></td>
</tr>
</tbody>
</table>
### Table 7.5: Sensitivity of Receptors Identified during Baseline Research (in Technical Appendix 7.1 and Technical Appendix 7.2)

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Sub Catchment or Contribution Zone(s)</th>
<th>Sensitivity</th>
<th>Criteria Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peat and Soils</td>
<td>Lindsayton Burn</td>
<td>Medium</td>
<td>Modified Peat, average recorded depth 0.58 m, with isolated pockets up to 2.6 m</td>
</tr>
<tr>
<td>Dalquhairn Burn</td>
<td>Medium</td>
<td>Unmodified Peat, average recorded depth 0.60 m, with isolated pockets up to 3.1 m</td>
<td></td>
</tr>
<tr>
<td>Penwhapple Burn</td>
<td>Low</td>
<td>Unmodified Peat, average recorded depth 0.28 m, with isolated pockets up to 0.8 m</td>
<td></td>
</tr>
<tr>
<td>Pingerrach Burn</td>
<td>Low</td>
<td>Unmodified Peat, average recorded depth 0.4 m</td>
<td></td>
</tr>
<tr>
<td>Unnamed tributaries of Water of Assel and River Stinchar</td>
<td>Low</td>
<td>Rock and improved Grassland, average recorded depth below 0.2 m</td>
<td></td>
</tr>
<tr>
<td>Milton Burn</td>
<td>Low</td>
<td>Modified Peat, average recorded depth 0.32 m</td>
<td></td>
</tr>
</tbody>
</table>

### 7.5 Likely Significant Effects

#### Potential Construction Effects

7.5.2 The potential for effects on the hydrological environment is greatest during the construction phase due to the high levels of activity. Effects arising from the decommissioning phase will involve similar, but smaller scale processes to those employed during construction. Therefore the potential effects considered as part of the assessment will cover both the construction and decommissioning of the proposed development. The following paragraphs discuss the potential effects that may to occur during the construction phase.

**Increase in Runoff**

7.5.3 Turbine bases, hardstanding areas and access tracks would act as impermeable areas concentrating surface flow into adjacent areas and potentially resulting in increased rates of runoff into the onsite sub catchments to the Water of Girvan and River Stinchar catchments.

7.5.4 Localised increases in runoff volume and rate could cause issues for downstream flood storage capacity and/or pollution incidents. Increases in the volume of runoff entering watercourses could also cause increased levels of erosion and sedimentation.
7.5.5 As discussed in Technical Appendix 7.1 (paragraphs 1.5.6 and 1.5.8), within the sub-catchments of Milton Burn and Pingerrach Burn there is a network of regular artificial drainage associated with the coupes of coniferous forestry. In the areas which are to be felled, localised runoff responses have the potential to increase due to the reduction in precipitation being intercepted by the closed canopy forestry. The effects on runoff will be dependent upon the extent of forestry management and the felling techniques adopted. Felling and extraction would also be planned to minimise the number of drain crossings and reduce any increases in runoff.

7.5.6 However as outlined in Chapter 2: Proposed Development and Technical Appendix 2.4: Construction Environmental Management Plan (CEMP) the site drainage system would be designed to help control and attenuate runoff rates away from construction activities and felled areas. This would be achieved by conveying water to designated areas with flow attenuation and filtration measures, such as v-notch weirs, check dams, silt traps, and settlement ponds. The CEMP would also include management measures to ensure that work taking place during wetter periods, which are typically between the months of October and January, would minimise changes to existing runoff rates and avoid the associated effects on erosion and sedimentation from scouring.

**Modification of Surface Water Drainage Patterns**

7.5.7 The interception of diffuse overland flow by the site infrastructure and associated drainage may potentially disrupt the drainage regime of the area. It is recognised that the installation of forestry drainage will have modified natural drainage patterns within the site catchments. The information in Technical Appendix 7.1 (paragraph 1.5.1) indicates that the forestry drainage system is well established within areas of the Water of Girvan and River Stinchar catchments. It is possible that through the long term maturation of the forestry, the drainage regime has reached a new equilibrium that could be altered as a result of forestry felling associated with wind farm construction. Such changes may include increasing peak flows, concentrating flows and potentially diverting flows. However it is assumed that these effects are likely to be effectively minimised during felling and construction as drainage design would adhere to the principles of industry good practice (Forestry Commission, 2011) guidelines. Watercourses and riparian corridors would be kept free from mulch and tree material as far as practicable. In areas where trees are adjacent to watercourses it may be necessary to leave rows of trees to remain standing where mechanical felling and mulching is carried out, to prevent material from falling into watercourses. Each coupe of forestry adjacent to a watercourse would be reviewed by the appointed construction contractor and the ECoW to determine industry good practices.

7.5.8 Current industry good practice drainage mitigation would be incorporated into infrastructure design and the construction processes as set out in the CEMP. The existing natural hydrological and hydrogeological environment will therefore be kept in balance as far is reasonably practical. This would comprise the provision of a suitable camber along tracks and the installation of cross drains, and/or waterbars at regular intervals to convey flow directly below or across the infrastructure for it to be discharged back into the natural drainage system, following treatment as required. The presence of regular discharge points would help limit the concentration of flows and the diversion of flows between catchments.
Watercourse Impediments

7.5.9 The construction of watercourse crossings has the potential to restrict flow in the various channels and reduce hydraulic capacity, resulting in an increase in flood risk, and promotion of erosion and sedimentation.

7.5.10 However, as outlined in Technical Appendix 2.5: Watercourse Crossing Design, all crossings would be appropriately designed so that they do not alter the natural flow regime for a 1:200 year + climate change flood event. The CEMP also outlines that at all watercourse crossings would be constructed using a range of good practice techniques which would be employed to protect watercourses against erosion and sedimentation. The culverts would be designed in such a way that the invert levels are slightly lower than the corresponding levels on the inlet and outlet sides to allow a natural bed to form. Robust headwalls would be provided to minimise bank instability and associated blockages. Assuming the successful implementation of these best practice measures the impediments to surface flow in drainage features are likely to be minimised.

Modifications of Groundwater Flows and Levels

7.5.11 The information presented in Technical Appendix 7.1 (paragraphs 1.5.7 and 1.5.9) provides evidence that there are saturated areas of ground where the water table is at or near the surface. This occurs within areas of low relief in the sub-catchments of Dalquhairn Burn and Milton Burn. Deep excavations, such as those required for the turbine foundations have the potential to result in groundwater ingress and disrupt the shallow groundwater systems within the peat and peaty soils. However, it is also recognised that due to the forestry operations, the peat and peaty soils within areas of forestry will have undergone significant alteration, including, but not limited to, compression.

7.5.12 In areas where there is a concentration of access tracks and drainage, there is the potential for more widespread lowering of the water table, especially in the open areas to the east resulting in the indirect and long-term impact on the future functionality of surrounding peat and peaty soils, water resources and GWDTEs. Interrupting groundwater flow is likely to reduce the proportion of the zone of contribution and hence supply of water available to such ecosystems.

7.5.13 Appropriate drainage management measures detailed in the CEMP would be implemented to help minimise modifications to groundwater flows and levels. Groundwater ingress would be monitored and limited during excavation works using temporary interceptor (cut-off ditches) and toe drains around the base of excavations. Perforated pipes wrapped in free draining geotextile membrane would also be incorporated into sections of floated track to help maintain groundwater flows and levels in and around areas of proposed infrastructure. As a result of the mitigation measures put in place the impact on the zones of contribution would be effectively reduced.

Leakages and Spillages

7.5.14 During the forestry felling and construction phase, a number of potential pollutants will be present onsite, including oil, fuels, chemicals, unset cement and concrete, waste and waste water from construction activities and staff welfare facilities. The majority of these potential pollutants will be located or stored within the construction compound, which is located in the catchment of the Milton Burn, situated 52 m away from the nearest tributary channel. In addition, there is the potential for
contamination of the peatland and hydrogeological environment including GWDTEs as a result of spillages along the access tracks and construction areas.

7.5.15 In line with the SEPA Pollution Prevention Guideline 5 (PPG5, 2014), mitigation measures would be adopted to protect the surface and groundwater environment from the use of hazardous substances. All equipment, material and chemicals would be securely stored within a bunded area away from watercourses. With the exception of two proposed watercourse crossings within minor headwater channels, all proposed infrastructure and construction activities would be located at least 100 m from watercourses within the Penwhapple Reservoir catchment, and 50 m from watercourses within other catchments. Good practice pollution prevention measures would be detailed within the CEMP.

Sediment- Entrained Runoff

7.5.16 Soil/peat erosion and sediment generation may occur in areas where the ground has been disturbed through forestry felling and/or construction excavation. As detailed in Paragraphs 1.4.7 and 1.4.9 there is a network of forestry drainage ditches situated within the sub catchments of Dalquhairn Burn and Pingerrach Burn. Drainage ditches are particularly prone to sediment generation, due to the high velocities of surface water runoff passing through the drainage network. Sediment generation is expected where the ground has been excavated for the site infrastructure.

7.5.17 Sediment transport in watercourses can result in high turbidity levels which can impact on the water quality, particularly affecting the ecological potential of the watercourses. High turbidity in watercourses can reduce the light and oxygen levels in the watercourses, while sediment deposition can smother plant life and spawning grounds. Sediment deposition can also reduce the flood storage capacity of the watercourses and block culverts, resulting in an increased flood risk.

7.5.18 Forestry felling will expose soils within the catchments of Dalquhairn Burn, Milton Burn, Lindsayston Burn, Penwhapple Burn and Pingerrach Burn. The removal of closed canopy will result in reduced levels of interception and transpiration of precipitation. As such, felling has the potential to increase the volume of runoff entering watercourses, with increased soil erosion and sedimentation.

7.5.19 During the forestry felling and construction phases of the proposed development, suitable sediment management measures would be implemented to appropriately attenuate and treat sediment-entrained runoff. Silt traps, silt fencing, catch pits, and settlement ponds are examples of the typical measures which would be installed as required within the temporary drainage system to help minimise sediment entrained runoff. The CEMP provides further information on the intended application and maintenance of sediment management measures.

Acidification

7.5.20 Tree removal can increase nitrogen mineralisation and nitrification, which can promote nitrate leaching and enhance acidity in waters draining some soils. The effect can last between two to five years after felling, depending upon the rate at which vegetation re-establishes. The filling of trenches with fresh brash could accentuate the effect by promoting leaching below the rooting zone. The River Stinchar catchment is classified as having moderate vulnerability to acidification by the Forestry Commission (2015).
7.5.21 However less than 20% of the main catchments outlined in Figure 7.1: Main Catchments will be felled as part of the felling proposals for the proposed development. Research shows that the effects of harvesting on surface water acidity are difficult to discern when 20% or less of a catchment is felled within any three-year period (Forestry Commission, 2011). A range of good practice forestry management measures will be undertaken to ensure that potential acidification effects are minimised. During felling the harvesting of whole trees, forest residues and tree stumps would be reduced in order to minimise acidification in surface water as much as possible. Forestry contractors would also avoid filling trenches with brash and watercourse crossings would not include material which may result in strongly acidic polluted water run-off.

Compaction of Soils

7.5.22 It is recognised that construction traffic movement will be restricted to specific corridors required to access specific turbine locations. The construction of approximately 1 km of floated track would be required across areas of deep peat. The movement of construction traffic over 1 km of floating track could cause localised compaction of the underlying peat and peaty soils, leading to changes in both the hydrological and hydrogeological regime. The impacts of compaction are likely to be highly localised but can damage the surrounding vegetation due to changes in drainage patterns and result in a reduction in the soil permeability and rainfall infiltration.

7.5.23 As demonstrated in Technical Appendix 2.6: Peat Landslide Hazard and Risk Assessment the layout of the proposed development has been optimised through an iterative process to help avoid areas of peat, and minimise the effects of compaction.

Peat Instability

7.5.24 A peatslide occurs when a portion of the peat mass becomes detached and flows downhill, usually as blocks of solid peat rafted upon a slurry of semi-liquid peat. A peatslide may have a significant effect on river water quality and ecology, particularly fish stocks. The land affected by peatslides usually re-vegetates quite rapidly, although the original balance of vegetation species is unlikely to be re-established as a consequence of the changes in local topography and drainage patterns. Where peat habitats or future restoration have been identified, peat instability can have serious and detrimental effects.

7.5.25 Technical Appendix 2.6: Peat Landslide and Risk Assessment outlines a number of mitigation measures which can be implemented in order to minimise the risk of peat instability during construction of the proposed development. Measures include the introduction of a ‘Peat Hazard Emergency Plan’ to instruct Contractors of response procedures in the event of a peat slide, and the further refinement of layout design through detailed pre-construction ground investigations. A Preliminary Geotechnical Risk Register has also been provided in Technical Appendix 2.6 to help identify potential peatslide risks during construction. Based on the assumption that these working practices and mitigation measures are taken into account during construction it has been concluded that the overall effects of the proposed development on peat instability would be minimal.
7.6 Potential Operational Effects

7.6.1 The effects of the development are expected to be substantially lower during the operational phase. The following paragraphs discuss the potential effects that are predicted to occur during the operational phase.

Watercourse Impediments

7.6.2 During the operational phase, impediments to flows can generally occur as a result of blockages to the drainage system, including watercourse crossings, ditches and watercourses resulting from vegetation and erosion debris.

7.6.3 In line with good practice procedures the watercourse crossings would have been constructed to avoid channel restrictions and to accommodate the natural and flood flow regime. Following construction, the watercourse crossing structures would have settled as surrounding bed material and bank profiles re-stabilised. These robust structures will be in place to allow an appropriate maintenance protocol to take place as required without damage or erosion to the substrate material. Checks will be carried out for a range of features including watercourse crossings, sub surface drainage and silt management measures which would be kept clear and in good order. As such it is considered that impediments to surface water flows would be minimised during the operational phase.

Modification of Surface Drainage Patterns

7.6.4 Modification of surface runoff would occur as a result of the construction of the new and upgraded infrastructure. The operational effects are likely to result in changes to volume and/or changes to runoff rate.

7.6.5 Site tracks and associated drains would intercept some overland flow, interrupting the natural drainage regime by concentrating flows and potentially diverting them from one catchment to another.

7.6.6 The established site drainage system would however have been developed to mimic the natural runoff response of the site catchments as far as possible. The appropriately designed drainage system would serve to maintain surface flows in the vicinity of the new and upgraded infrastructure locations.

Modification of Groundwater Flow and Levels

7.6.7 Cut and floating tracks and their drainage as well as turbine foundations and hardstandings would potentially alter the water table within the upslope and downslope shallow aquifers, which can also have implications for the provision of long term base flow to watercourses, water resources and GWDTEs. Interrupting groundwater flow is likely to reduce the proportion of the zone of contribution and hence supply of water available to such ecosystems.

7.6.8 The appropriately designed drainage system is likely to help minimise the effects on groundwater flows and levels during the operational phase. Sub surface drainage will help encourage the natural long term base flow patterns to be closely replicated.

Water Quality from Leakages and Spillages

7.6.9 The risk from pollution via leakages and spillages is substantially lower during operation than during construction because of the decreased levels of activity in the operational phase. The majority of potential pollutants would have been removed
when construction is complete; however, lubricants for turbine gearboxes, transformer oils and possible fuel leaks from maintenance vehicles would remain.

7.6.10 The staff carrying out maintenance work on the proposed development would continue to adhere to general PPG5 pollution prevention measures including an emergency response procedure in the event of a pollution incident. The appropriate working area buffers (100 m from Penwhapple Reservoir and 50 m from other watercourses) would also be applied to ensure that impacts on water quality from leakages and spillages are avoided.

**Sediment Entrained Runoff and Nutrient Enrichment**

7.6.11 Levels of erosion and sedimentation during operation would be much lower than during the forestry felling and construction phase as there would be no excavations and the areas of bare exposed ground will be minimal. Some erosion and sedimentation is still possible on site tracks and drainage ditches as a result of scouring during extreme rainfall events.

7.6.12 There is also the possibility that the long term decomposition of forestry material left in-situ can result in a sustained pulse of nutrients entering the drainage network. However the effects of forestry on water quality are most likely to occur at the local scale than on the catchment scale.

7.6.13 Occurrences of scouring, and debris decomposition would be mitigated through the implementation of infrastructure checks and ongoing maintenance of site infrastructure including site tracks, drainage ditches, and watercourse crossings. The implementation of these measures and successful re-establishment of vegetation in catchments would help reduce effects on water quality from sediment entrained runoff during the operational phase.

**Acidification**

7.6.14 The potential effects of felling on acidification could continue into the operational phase. However as noted in Paragraph 7.5.21 acidification effects not likely to be discernible at a main catchment scale, and successful forestry management techniques will ensure that they are minimised.

7.7 **Summary**

7.7.1 Through successful mitigation by design and industry good practice measures it is considered that there are no likely significant effects associated with the proposed development during the construction and decommissioning phases. The evaluation of effects provided in Table 7.6 takes into account the potential effects outlined above, mitigation by design outlined in Chapter 2: Proposed Development and Chapter 3: Design Evolution and Alternatives and the good practice construction environmental management measures set out in the CEMP: Technical Appendix 2.4. The assessment is based on the criteria outlined in paragraphs 7.3.3 to 7.3.7.
### Table 7.6: Assessment of Effects during the Construction Phase

<table>
<thead>
<tr>
<th>Potential Effects</th>
<th>Identified Receptor</th>
<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
<th>Significance of Effects</th>
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<tbody>
<tr>
<td><strong>Flood Risk</strong></td>
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<tr>
<td>• Increase in Runoff</td>
<td>Lindsayton Burn</td>
<td>High</td>
<td>Negligible</td>
<td>Minor</td>
</tr>
<tr>
<td>• Modifications to Surface Drainage Patterns</td>
<td>Penwhapple Burn</td>
<td>High</td>
<td>Negligible</td>
<td>Minor</td>
</tr>
<tr>
<td>• Impediments to Surface Water Flow</td>
<td>Unnamed Tributaries of Water of Assel and River Stinchar</td>
<td>Low</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>• Modifications to Groundwater Flow and Levels</td>
<td>Pingerrach Burn</td>
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<td>Negligible</td>
</tr>
<tr>
<td>• Compaction of Soil</td>
<td>Dalquhairn Burn</td>
<td>High</td>
<td>Negligible</td>
<td>Minor</td>
</tr>
<tr>
<td>• Compaction of Soil</td>
<td>Dalquhairn Burn</td>
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<td>Negligible</td>
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<tr>
<td>• Compaction of Soil</td>
<td>Dalquhairn Burn</td>
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<td>Negligible</td>
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<tr>
<td><strong>Water Quality</strong></td>
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<tr>
<td>• Leakages and Spillages</td>
<td>Lindsayton Burn</td>
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<tr>
<td>• Sediment Entrained Runoff</td>
<td>Penwhapple Burn</td>
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<td>Low</td>
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</tr>
<tr>
<td>• Increase in Runoff</td>
<td>Unnamed Tributaries of Water of Assel and River Stinchar</td>
<td>High</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>• Acidification</td>
<td>Pingerrach Burn</td>
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</tr>
<tr>
<td>• Modifications to Surface Drainage Patterns</td>
<td>Dalquhairn Burn</td>
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<td>Negligible</td>
<td>Minor</td>
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</table>
### Table 7.6: Assessment of Effects during the Construction Phase

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<th>Identified Receptor</th>
<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
<th>Significance of Effects</th>
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<tbody>
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<td>• Compaction of Soil</td>
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<td><strong>Water Resources</strong></td>
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<td><strong>Public Water Supplies</strong></td>
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<td>• Leakages and Spillages</td>
<td>Penwhapple Reservoir</td>
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<td>Minor</td>
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<tr>
<td>• Sediment Entrained Runoff</td>
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<td>• Modifications to Surface Drainage Patterns</td>
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<td>• Compaction of Soil</td>
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<tr>
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<td>• Modifications to Surface Drainage Patterns</td>
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<td>• Modifications to Groundwater Flow and Levels</td>
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<th>Potential Effects</th>
<th>Identified Receptor</th>
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<td>Penwhapple Burn</td>
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<td>Minor</td>
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<tr>
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<td>Unnamed Tributaries of Water of Assel and River Stinchar</td>
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<td>Minor</td>
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<tr>
<td>• Modifications to Surface Drainage Patterns</td>
<td>Pingerrach Burn</td>
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<tr>
<td>• Watercourse Impediments</td>
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<td><strong>GWDTEs</strong></td>
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<td><strong>Soils and Peat</strong></td>
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<td>• Compaction of Soil Leakages and Spillages</td>
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<tbody>
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<tr>
<td>• Watercourse Impediments</td>
<td>Dalquhaim Burn</td>
<td>High</td>
<td>Negligible</td>
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</table>

7.7.2 Assuming the mitigation by design and maintenance of industry good practice measures it is considered that during the operational phase there are no likely significant effects associated with the proposed development. The evaluation of effects provided in Table 7.7 takes into account the potential effects outlined in Section 3.2 in Technical Appendix 7.1, mitigation by design outlined in Chapter 2: Proposed Development, Chapter 3: Design Evolution and Alternatives and the appropriate design of permanent works. The assessment is based on the criteria outlined in paragraphs 7.3.3 to 7.3.7 within this chapter.

Table 7.7: Assessment of Effects during Operational and Decommissioning Phase

<table>
<thead>
<tr>
<th>Potential Effects</th>
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<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
<th>Significance of Effects</th>
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<tbody>
<tr>
<td>Flood Risk</td>
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<td>Negligible</td>
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<tr>
<td>• Modifications to Surface Drainage Patterns</td>
<td>Penwhapple Burn</td>
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<tr>
<td>• Watercourse Impediments</td>
<td>Unnamed Tributaries of Water of Assel and River Stinchar</td>
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<tbody>
<tr>
<td>• Compaction of Soil</td>
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<td>Negligible</td>
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<td></td>
<td>Dalquhaim Burn</td>
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<tr>
<td><strong>Water Quality</strong></td>
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<td>• Leakages and Spillages</td>
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<td>• Sediment Entrained Runoff</td>
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<td>• Increase in Runoff</td>
<td>Pingerrach Burn</td>
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<tr>
<td>• Modifications to Surface Drainage Patterns</td>
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<td>Negligible</td>
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<tr>
<td>• Watercourse Impediments</td>
<td>Milton Burn</td>
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<tr>
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<tr>
<td>• Compaction of Soil</td>
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<tr>
<td><strong>Water Resources</strong></td>
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<td><strong>Public Water Supplies</strong></td>
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<tr>
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### Table 7.7: Assessment of Effects during Operational and Decommissioning Phase

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<th>Potential Effects</th>
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<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
<th>Significance of Effects</th>
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<tbody>
<tr>
<td>• Increase in Runoff</td>
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<td>• Modifications to Surface Drainage Patterns</td>
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<td>• Compaction of Soil</td>
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<td><strong>Private Water Supplies</strong></td>
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<tr>
<td>• Leakages and Spillages</td>
<td>Dobbingstone Farm</td>
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<tr>
<td>• Sediment Entrained Runoff</td>
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<td>• Modifications to Surface Drainage Patterns</td>
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<td>• Watercourse Impediments</td>
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<td>• Modifications to Groundwater Flow and Levels</td>
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<td>• Compaction of Soil</td>
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<td><strong>Hydrogeology</strong></td>
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<td>• Leakages and Spillages</td>
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<td>• Modifications to Surface Drainage Patterns</td>
<td>of Assel and River Stinchar</td>
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<tr>
<td>• Compaction of Soil</td>
<td>Pingerrach Burn</td>
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<th>Receptor Sensitivity</th>
<th>Magnitude of Effect</th>
<th>Significance of Effects</th>
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</thead>
<tbody>
<tr>
<td>• Watercourse Impediments</td>
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<td>Minor</td>
</tr>
<tr>
<td>• Modifications to Groundwater Flow and Levels</td>
<td>Dalquhaim Burn</td>
<td>Medium</td>
<td>Negligible</td>
<td>Minor</td>
</tr>
<tr>
<td>• Compaction of Soil</td>
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<tr>
<td><strong>GWDTEs</strong></td>
<td>Contribution Zones (as per TA 7.2): 2,3,7,12,15,16,29,31,32,33,34,35</td>
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<tr>
<td><strong>Soils and Peat</strong></td>
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<td>Negligible</td>
<td>Minor</td>
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<tr>
<td>• Peat Instability</td>
<td>Penwhapple Burn</td>
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<td>Negligible</td>
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<tr>
<td>• Compaction of Soil Leaksages and Spillages</td>
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<td>• Sediment Entrained Runoff and nutrient enrichment</td>
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<td>• Modifications to Surface Drainage Patterns</td>
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</tbody>
</table>
7.8 Mitigation & Monitoring

7.8.1 Details on construction mitigation are outlined in Technical Appendix 2.4: CEMP. In addition, it is recognised that forestry would be felled as part of the construction of proposed development. All forestry operations would be completed in accordance with the Forestry Commission (2011) guidance document. These mitigation requirements are considered standard industry good practice.

7.8.2 As assessed in Tables 7.6 & 7.7 the likely significant effects associated with the construction and operation of the proposed development have been avoided through the design process as well as the consideration and implementation of outline good practice mitigation. Technical Appendix 2.4: CEMP provides the outline details for measures which would avoid or reduce effects to a level not considered to be significant, including:

- requirements for temporary drainage design during construction;
- requirements for water quality monitoring; and
- design philosophy for watercourse crossings.

7.8.3 Regardless of the assessment considering there to be no significant effect on receptors, the sensitivity of the surrounding environment warrants the implementation of site specific monitoring to provide additional levels of reassurance as to the success of the mitigation.

7.8.4 The baseline section has also identified that there are three PWS sources (Doughty Cottage, Lanes Farm, Dobbingstone) which are potentially sensitive groundwater abstractions and the Penwhapple Public Water Supply Reservoir which is a DWPA. Each of the sub catchments of the Water of Girvan and River Stinchar catchments are potentially sensitive as they are classified as having good water quality. Based upon the assessment shown in Tables 7.6 and 7.7 it is expected that the good industry practice will avoid adverse effects on surface water and public and private water supplies.

7.8.5 A programme of water quality monitoring is proposed to ensure that the effects on surface water quality and public and private water supplies are appropriately monitored.

7.8.6 The water monitoring points would be selected along tributaries of the Water of Girvan and River Stinchar, downstream of the construction areas. Monitoring will be carried out in locations in order to provide reassurance that established in-place mitigation measures remain effective and that the site is not having a significant adverse impact upon the environment.

7.8.7 The extent and the frequency of the monitoring would be proportionate to the level of activity on site during the construction, operation and decommissioning of the proposed development. A baseline water quality monitoring programme of up to 12 months prior to construction would be undertaken within selected surface water catchments and the PWS locations identified (Doughty Cottage, Lanes Farm and Dobbingstone). The hydrological monitoring techniques would be agreed following consultation with SEPA, and the Ayrshire Rivers Trust. The establishment of a baseline is very important as it provides a suite of parameters against which to compare samples taken during the development’s lifetime, and with which to assess any impacts and the requirement for any remedial measures. However, due to the
variance in climatic conditions, recording like for like water quality prior to and during construction is likely to be unusual. Therefore, it is also recommended that control sites, situated outside of the area affected by the proposed development, are also established at the time.

7.8.8 The monitoring programme would be site-specific and tailored so as to provide a meaningful and pragmatic indication of the state of the water environment. The following elements are provided in more detail within Technical Appendix 2.4: CEMP:

- Periodic and ad-hoc sampling and analysis of surface water during construction order to complement the programme of visual inspection. Periodic analysis enables monitoring of trends in levels of critical parameters so that deviations from the norm can be identified and actioned;

- Regular visual inspection of surface water management features such as culverts and receiving watercourses in order to establish whether there are increased levels of suspended sediment, erosion or deposition. It is likely that there will be an ongoing need to maintain these structures, for example by the removal of debris, to ensure they continue to function as designed;

- Regular visual inspection of watercourses during construction and decommissioning stages, particularly during periods of high rainfall, in order to establish that levels of suspended solids have not been increased by on-site activities; and

- Additional monitoring as required as a condition of discharge consents, abstraction licences or other environmental regulation.

7.9 Cumulative Effects

7.9.1 The application of a hydrological catchment methodology has been carried out to identify other wind farms located within the same catchments as the proposed development but within a maximum radius of 5 km of the site boundary. The River Stinchar (253 km²) and Water of Girvan (250 km²) are catchments of significant size and whilst there may be other developments located within these, a 5 km search area was deemed a sensible search limit due to the reduction in effects through dilution. This methodology therefore enables a logical evaluation of the potential for significant cumulative effects on the hydrological and hydrogeological environment.

7.9.2 Cumulative wind farm locations are defined in Chapter 5: Landscape and Visual of this ES. There are six wind farms situated within the Water of Girvan catchment and hydrologically linked within 5 km of the proposed development. The existing Hadyard Hill Wind Farm is operational, Tralorg Wind Farm is consented, Linfairn Farm, High Troweir and Penwhapple Wind Farm are under application and/or appeal and Knockskae Wind Farm is at the scoping stage.\(^1\)

7.9.3 The construction and subsequent operation of the six schemes as well as the proposed development has the potential to cumulatively affect the surface and groundwater quantity, quality and flooding activity associated with the Water of Girvan and River Stinchar catchments. However, taking into account the successful implementation of the mitigation by design and embedded mitigation as well as the mitigation and monitoring plans, based on the evaluation criteria presented in

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\(^1\) Assel Valley wind farm is located >5 km from the site.
Paragraphs 7.3.4 to 7.3.7, it is expected that any cumulative effects would be minor and not significant.

7.10 Residual Effects

7.10.1 The assessment of effects in Technical Appendix 7.1: Hydrological and Hydrogeological Research has been carried out assuming the successful implementation of current industry good practice mitigation measures from the CEMP (Technical Appendix 2.4). The assessment has identified that there are no significant effects from the proposed development on the hydrological and hydrogeological environment and therefore it can be concluded that there are no residual effects arising from the proposed development.

7.11 Summary

7.11.1 An assessment has been carried out on the likely significant effects of the proposed development on the hydrological, and hydrogeological environment. The assessment has considered site preparation, construction and operation of the proposed development as well as the decommissioning of the existing Hadyard Wind Farm.

7.11.2 Following the identification and assessment of the key receptors, taking into account the potential effects listed in Technical Appendix 7.1: Hydrological and Hydrogeological Research a comprehensive suite of mitigation and best practice measures have been incorporated into the site specific design in Chapter 2: Proposed Development and 3: Design Evolution and Alternatives. Furthermore, a site specific CEMP and the associated mitigation measures would be implemented to protect the groundwater and surface water resources from pollution and minimise changes to the hydrological environment.

7.11.3 The impact assessment has taken into account the hydrological regime, highlighting that the principal potential effects would occur during the construction phase. Assuming the successful design and implementation of mitigation measures the residual construction effects on all of the identified receptors is considered to be minor and not significant.

7.12 References


Halcrow/HR Wallingford (2004). ISIS Hydrological Software Package, CD-ROM.


7.13 Glossary and Abbreviations

- **Buffer area** – An area which protects the watercourses from pollutants and sediment off the adjacent land.
- **CEMP** – Construction Environmental Management Plan.
- **DWPA** – Drinking Water Protection Areas are designated areas in which the use of certain substances must be carefully managed to prevent the pollution of raw water sources that are used to provide drinking water.
- **Groundwater** – Is water located beneath the ground surface in soil pore spaces and in the fractures of rock formations.
- **Hydrological Regime** – The statistical pattern of a river's constantly varying flow rate.
• Peat – A largely organic substrate formed of partially decomposed plant material.

• PWS – A Private Water Supply is any water supply which is not provided by a water company and is not connected to “mains” supply. Most private supplies are situated in the more remote, rural parts of the country and may serve just one property of several properties through a network of pipes.

• Runoff – Surface runoff is the flow of water over the surface that can result due to the surrounding soils lacking the capacity to infiltrate further water or due to the surface water flowing off infrastructure such as access tracks and hardstandings.

• Sedimentation – The tendency for particles in suspension to settle out of the fluid in which they are entrained.

• Surface Water Catchment – The area from which runoff would naturally discharge to a defined point of a river.

• Topography – The physical features of a geographical area.

• Water Resources – The supply of groundwater and surface water in a given area.
Chapter 8: Archaeology and Cultural Heritage

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8 \textbf{Archaeology and Cultural Heritage}

8.1 \textbf{Introduction}

8.1.1 This chapter considers the likely significant effects on archaeology and cultural heritage associated with the construction, operation and decommissioning of the proposed Hadyard Hill Extension wind farm. The specific objectives of the chapter are to:

- describe the archaeological and cultural heritage baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation.

8.1.2 The assessment has been carried out by AOC Archaeology Group. AOC Archaeology Group is a Registered Archaeological Organisation of the Chartered Institute for Archaeologists (CIfA). AOC conforms to the standards of professional conduct outlined in the CIfA' Code of Conduct, the CIfA Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology, the CIfA Standards and Guidance for Desk Based Assessments, Field Evaluations etc., and the British Archaeologists and Developers Liaison Group Code of Practice.

8.1.3 The chapter is supported by:

- Technical Appendix 8.1: Desk Based-Assessment.
- Technical Appendix 8.2: Site Gazetteer.
- Technical Appendix 8.4: Assessment of Indirect Effects.
- Technical Appendix 8.5: Plates.

8.1.4 Figures 8.1 - 8.6 and Plates 8.1-8.8 are referenced in the text where relevant.

8.2 \textbf{Scope of Assessment}

8.2.5 This chapter considers the potential for likely significant effects on archaeology and cultural heritage as a result of the proposed development, as described in Chapter 2: Proposed Development.

8.2.6 The proposed development has the potential to result in direct impacts such as the disturbance, severance or removal of previously unknown buried archaeological remains particularly within those portions of the site that are covered by peat. There will be no direct impacts on known heritage assets as the development infrastructure has been designed to avoid disturbance to known heritage assets.
8.2.7 During the operational phase of the proposed development there is a potential for adverse effects upon the setting of heritage assets, however any indirect setting effects are potentially reversible following decommissioning of the wind farm.

8.2.8 Off-site project interactions such as the grid connection and road improvements also have the potential to directly impact heritage assets. However the extent of any off site works, if any are required at all, are at present unknown and have therefore been excluded from this assessment. If any are required the implications will be addressed separately.

8.2.9 Potential cumulative effects on heritage assets relate to the additional adverse cumulative effects on the settings of protected heritage assets caused by the proposed development in conjunction with other proposed and operational wind farms.

8.2.10 The site boundary was revised inwards through the EIA process and the number of turbines reduced. Twenty-Two designated assets (Sites 114, 128, 135-6, 139-40, 141-7, 184-5, 191-2, 194, 278-9, 310 and 311) which fell within 5 km (Category B and C Listed Buildings) or 10 km (all other designated assets) of the scoping boundary, now lie beyond the these distances from the nearest proposed turbine and have been screened out of the assessment. Consultation responses relating to archaeological and cultural heritage issues were received from the following consultees:

- South Ayrshire Council (SAC), 4th March 2014; and
- Historic Scotland (HS), 16th April 2014.

8.2.11 The consultation responses are summarised in Technical Appendix 1.1: Consultation Register, which also describes how the ES addresses each of the issues raised.

8.2.12 Based on the consultation responses and the known environmental sensitivities, this assessment also considers the following:

- all designated assets listed by HS (with visualisations provided where appropriate); and
- conservation areas and category A listed buildings listed by SAC.

### Issues Scoped Out

8.2.13 The scope of this assessment takes account of the committed mitigation measures both incorporated into the design and those standard construction and decommissioning mitigation measures incorporated into the proposed development, as described in Chapter 2: Proposed Development, and Technical Appendix 2.4: Construction Environmental Management Plan (CEMP). Table 8.1 summarises the issues scoped out of the assessment:

<table>
<thead>
<tr>
<th>Potential Effect</th>
<th>Basis for Scoping Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct impacts upon known heritage assets</td>
<td>The proposed development has been designed to avoid direct impacts on all known heritage assets within the site.</td>
</tr>
<tr>
<td>Effects on the setting of heritage assets of negligible sensitivity.</td>
<td>Receptors of negligible sensitivity as defined in Table 8.2 are scoped out of the detailed assessment on the basis that there is no likely significant effect on their setting is deemed possible.</td>
</tr>
</tbody>
</table>
Table 8.1: Issues Scoped Out of the EIA

<table>
<thead>
<tr>
<th>Potential Effect</th>
<th>Basis for Scoping Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects on setting of Inventory Battlefields</td>
<td>There are no Inventory battlefields located within 10 km of the proposed development.</td>
</tr>
</tbody>
</table>

8.3 Assessment Methodology

8.3.14 The scope of this assessment meets the requirements of current planning policy and advice as set out in Scottish Planning Policy (SPP) (Scottish Government 2014), Scottish Historic Environment Policy (SHEP) (Historic Scotland 2011) and Planning Advice Note (PAN) 2/2011 ‘Archaeology and Planning’ (Scottish Government 2011).

Baseline Characterisation

Study Area

8.3.15 This chapter considers the baseline condition of heritage assets within and immediately surrounding the site (Figure 8.1), and identifies statutory protected Scheduled Monuments, Category A Listed Buildings, Inventoried Gardens and Designed Landscapes and Conservation Areas within 10 km of the site and Category B and C Listed Buildings within 5 km. Eight non-designated sites within 5 km of the proposed development, recorded as being of national importance on the Non Statutory Register (NSR) formerly maintained by WoSAS, are also considered. The assessment also considers six non-designated gardens and designed landscapes recorded by the Ayrshire Designed Landscapes Survey (Peter McGowan Associates and Dingwall 2009) (Figure 8.2) within 5 km of the proposed development.

Desk Study / Field Survey

8.3.16 The following data sources were consulted during preparation of this assessment:

- National Monuments Record for Scotland (NMRS) (RCAHMS, Bernard Terrace, Edinburgh):
  - for NMRS data, aerial photographs, archive photographs, NMRS maps, various archaeological and historical publications, and unpublished archaeological reports.

- National Map Library (National Library of Scotland, Causewayside, Edinburgh):
  - for old Ordnance Survey maps (1st & 2nd Edition, small- and large-scale) and pre-Ordnance Survey historical maps.

- Historic Scotland (Longmore House, Salisbury Place, Edinburgh):
  - for Scheduled Monument data, Listed Buildings data and Inventory Garden and Designed Landscape data.

- West of Scotland Archaeology Service:
  - for Historic Environment Record data.

- South Ayrshire Council:
  - for information on designated Conservation Areas.
8.3.17 Each heritage asset referred to in the text is listed in the Technical Appendix 8.2: Site Gazetteer. Each heritage asset has been assigned a 'Site Number' unique to this assessment, and the gazetteer includes information regarding the type, period, grid reference, NMRS number, HER number, statutory protective designation, and other descriptive information, as derived from the consulted sources.

8.3.18 Each heritage asset, including archaeological or historical sites, monuments or buildings, referred to in the text is plotted on the location maps (Figures 8.1 and 8.2). The site is outlined in red.

8.3.19 An archaeological walkover survey of the site was undertaken by AOC in August 2014 in order to relate the existing landscape to research findings and to identify possible hitherto unrecorded heritage assets. The results of the walkover survey were then integrated with the research findings and are reported together in the Desk-Based Assessment (Technical Appendix 8.5). The site was systematically surveyed and a photographic record was maintained of all previously known and newly identified heritage assets within the site. A hand-held GPS was used to note the position of any surviving previously unrecorded remains. All heritage assets were marked on plans, at a relevant scale keyed by means of Grid Reference to the Ordnance Survey mapping. The commercial plantations were excluded from the survey due to the density of plantation and the extensive artificial drainage which is likely to have destroyed any buried remains which may have once been present. Visits were made to all the designated assets considered within the settings assessment during November 2014 following the fixing of the turbine positions and the finalising of the ZTV.

Sensitivity Criteria

8.3.20 The definition of cultural significance is readily accepted by heritage professionals both in the UK and internationally and was first fully outlined in the Burra Charter, which states in article one that ‘cultural significance’ or ‘cultural heritage value’ means aesthetic, historic, scientific, social or spiritual value for past, present or future generations (ICOMOS 1999, Article 1.2). This definition has since been adopted by heritage organisations around the world, including HS. In their Scottish Historic Environment Policy (SHEP), HS note that to have cultural significance an asset must have a particular ‘artistic; archaeological; architectural; historic; traditional (factors listed in the 1979 Act, (HMSO 1979); aesthetic; scientific; [and/or] social [significance] – for past, present or future generations’ (2011, 71). Heritage assets also have value in the sense that they ‘...create a sense of place, identity and physical and social wellbeing, and benefits the economy, civic participation, tourism and lifelong learning’ (Scottish Government 2014, 1). For clarity and to avoid confusion, the term cultural value will be used throughout this assessment though, as outlined above, it is acknowledged this is the same as cultural significance as identified in SHEP. All heritage assets have some value, however some assets are judged to be more important or than others and are thus more sensitive to change. The level of that importance is, from a cultural resource management perspective, determined by establishing the asset’s capacity to inform present or future generations about the past. In the case of many heritage assets their importance has already been established through the designation (i.e. scheduling, listing and inventory) processes applied by HS.

8.3.21 The criteria used to establish importance in this assessment are presented in Table 8.2 below and are drawn from Annexes 1-6 of SHEP which outline the criteria for establishing National Importance:
Table 8.2: Criteria for Establishing Relative Importance of Heritage Assets

<table>
<thead>
<tr>
<th>Asset Importance</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>International and National</strong></td>
<td>World Heritage Sites; Scheduled Monuments (Actual and Potential); Category A Listed Buildings; Inventory Gardens and Designed Landscapes; Inventory Battlefields; Fine, little-altered examples of some particular period, style or type.</td>
</tr>
<tr>
<td><strong>Regional</strong></td>
<td>Category B Listed Buildings; Conservation Areas; Major examples of some period, style or type, which may have been altered; Asset types which would normally be considered of national importance that have been partially damaged (such that their ability to inform has been reduced).</td>
</tr>
<tr>
<td><strong>Local</strong></td>
<td>Category C Listed Buildings; Lesser examples of any period, style or type, as originally constructed or altered, and simple, traditional sites, which group well with other significant remains, or are part of a planned group such as an estate or an industrial complex; Cropmarks of indeterminate origin; Asset types which would normally be considered of regional importance that have been partially damaged or asset types which would normally be considered of national importance that have been largely damaged (such that their ability to inform has been reduced).</td>
</tr>
<tr>
<td><strong>Negligible</strong></td>
<td>Relatively numerous types of remains; Findspots of artefacts that have no definite archaeological remains known in their context; Asset types which would normally be considered of local importance that have been largely damaged (such that their ability to inform has been reduced).</td>
</tr>
</tbody>
</table>

8.3.22 Whilst determining the relative cultural value of a heritage asset is a key consideration in establishing the importance of an asset and therefore its sensitivity to direct effects, it is widely recognised (see Lambrick 2008) that the importance of an asset is not the same as its sensitivity to changes to its setting. Thus in determining effects upon the setting of assets by a proposed development, both importance and sensitivity to changes to setting need to be considered.

8.3.23 Setting is a key issue in the case of some, but by no means all assets. A nationally important heritage asset does not necessarily have high sensitivity to changes to its setting (relative sensitivity). An asset’s sensitivity to changes to its setting refers to its capacity to retain its ability to inform this and future generations in the face of changes to its setting. The ability of the setting to contribute to an understanding, appreciation and experience of the asset and its value also has a bearing on the sensitivity of that asset to changes to its setting. Assets with high sensitivity will be vulnerable to changes which affect their setting and even slight changes may reduce their information content or the ability of setting to contribute to the understanding,
appreciation and experience (see HS Setting Guidance 2010) of that asset. Less sensitive monuments would be able to accommodate greater changes to their settings without significant reduction in their ability to inform and in spite of such changes the relationship between the assets and its setting would still be legible. The relative sensitivity of Scheduled Monuments, Listed Buildings and other statutory monuments and non-statutory monuments of national importance within the study area to changes to their settings was determined using the criteria outlined in Table 8.3.

<table>
<thead>
<tr>
<th>Relative Sensitivity</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>An asset whose setting contributes significantly to an observer’s understanding, appreciation and experience (Factors noted in HS guidance on setting 2010) of it should be thought of as having High Sensitivity to changes to its setting. This is particularly relevant for assets whose settings, or elements thereof, contribute directly and substantially to their significance (e.g. form part of their Contextual Characteristic (SHEP 2011, Annex 1). For example an asset which retains an overtly intended or authentic relationship with its setting and the surrounding landscape. These may in particular be assets such as ritual monuments which have constructed sightlines to and/or from them or structures intended to be visually dominant within a wide landscape area i.e. castles, tower houses, prominent forts etc. An asset, the current understanding, appreciation and experience of which, relies heavily on its modern aesthetic setting. In particular an asset whose setting is an important factor in its protection (as per SPP 2014 definition of setting) and in retention of its cultural value.</td>
</tr>
<tr>
<td>Medium</td>
<td>An asset whose setting contributes moderately to an observer’s understanding, appreciation and experience of it should be thought of as having Medium Sensitivity to changes to its setting. This could be an asset for which setting makes a contribution to significance but whereby its value is derived mainly its intrinsic characteristics (SHEP 2011, Annex 1). This could for example include assets which had an overtly intended authentic relationship with their setting and the surrounding landscape but where that relationship (and therefore the ability of the assets’ surroundings to contribute to an understanding, appreciation and experience of them) has been moderately compromised either by previous modern intrusion in their setting or the landscape or where the monument itself is in such a state of disrepair that the relationship cannot be fully determined. An asset, the current understanding, appreciation and experience of which, relies partially on its modern aesthetic setting regardless of whether or not this was intended by the original constructors or authentic users of the asset. An asset whose setting is a contributing factor to its protection and the retention of its cultural value.</td>
</tr>
<tr>
<td>Low</td>
<td>An asset whose setting makes some contribution to an observer’s understanding, appreciation and experience of it should generally be thought of as having Low Sensitivity to changes to its setting. This may be an asset whose main significance lies in its intrinsic characteristics and whereby changes to its setting will not materially diminish our understanding, appreciation and experience of it. This could for example include assets which had an overtly intended authentic relationship with their setting and the surrounding landscape but where that relationship (and therefore the ability of the assets’ surroundings to contribute to an understanding, appreciation and experience of them) has been significantly compromised either by previous modern intrusion to its setting or landscape or where the asset itself is in such a state of disrepair that the relationship cannot be determined.</td>
</tr>
</tbody>
</table>
Table 8.3: Criteria for Establishing Relative Sensitivity to Changes in Setting

<table>
<thead>
<tr>
<th>Relative Sensitivity</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marginal</td>
<td>An asset whose setting makes minimal contribution to an observer’s understanding, appreciation and experience of it should generally be thought of as having Marginal Sensitivity to changes to its setting. This may include assets for which the authentic relationship with their surrounding has been lost, possibly having been compromised by previous modern intrusion, but who still retain cultural value in their intrinsic and possibly wider contextual characteristics.</td>
</tr>
</tbody>
</table>

8.3.24 The determination of an asset’s sensitivity is first and foremost reliant upon the determination of its setting. The criteria set out in Table 8.3 above are intended to be a guide. Assessment of individual assets will be informed by knowledge of the asset itself, of the asset type if applicable and by site visits to establish the current setting of the assets. This will allow for the use of professional judgement and each asset will be assessed on an individual basis. It should be noted that assets may fall into a number of the sensitivity categories presented above e.g. a country house may have a high sensitivity within its own landscaped park or garden but its level of sensitivity to changes in the wider setting may be less.

8.3.25 In establishing the relative sensitivity of an asset to changes to its setting an aesthetic appreciation of that asset and its setting must be arrived at. Technical Appendix 8.3 outlines the range of factors which must be considered when establishing an aesthetic appreciation and therefore determining sensitivity. These have been used as a guide in assessing each monument from known records and in the field. In defining these criteria, emphasis has been placed on establishing the current setting of each monument.

Assessment of Effects

Magnitude of Effect

8.3.26 This chapter assesses two different types of potential effect on heritage assets. The first is a potential direct impact on unknown archaeological remains by the proposed development; the second are potential effects upon the setting of heritage assets by the proposed development. A direct impact by the proposed development potentially results in an irreversible loss of information content whereas an effect on setting by a wind farm is generally reversible. The potential magnitude of the physical impact upon heritage assets caused by the proposed development has been rated using the classifications and criteria outlined in Table 8.4.

Table 8.4: Criteria for Establishing Magnitude of Physical Impact

<table>
<thead>
<tr>
<th>Physical Impact</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Major loss of information content resulting from total or large-scale removal of deposits from a site whether or not the site is associated with a monument. Major alteration of a monument’s baseline condition. Any physical alteration to a Scheduled Monument. Any physical alteration to a Category A Listed Building; massive alterations to a Category B or Category C Listed Building.</td>
</tr>
</tbody>
</table>
Table 8.4: Criteria for Establishing Magnitude of Physical Impact

<table>
<thead>
<tr>
<th>Physical Impact</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>Moderate loss of information content resulting from material alteration of</td>
</tr>
<tr>
<td></td>
<td>the baseline conditions by removal of part of a site whether or not the</td>
</tr>
<tr>
<td></td>
<td>site is associated with a monument</td>
</tr>
<tr>
<td></td>
<td>Slight alteration of a monument’s baseline condition</td>
</tr>
<tr>
<td>Low</td>
<td>Slight alteration of a monument’s baseline condition</td>
</tr>
<tr>
<td></td>
<td>Minor detectable impacts leading to the loss of information content.</td>
</tr>
<tr>
<td></td>
<td>Minor alterations to the baseline condition of a monument.</td>
</tr>
<tr>
<td>Marginal</td>
<td>Very slight or barely measurable loss of information content.</td>
</tr>
<tr>
<td></td>
<td>Loss of a small percentage of the area of a site’s peripheral deposits.</td>
</tr>
<tr>
<td></td>
<td>Very slight and reversible alterations to a monument.</td>
</tr>
<tr>
<td>None</td>
<td>No physical impact anticipated.</td>
</tr>
</tbody>
</table>

8.3.27 The magnitude of effect by the proposed development is an assessment of the magnitude of change to the setting of any given designated heritage asset. Table 8.5 outlines the main factors affecting magnitude of effect.

Table 8.5: Factors Affecting Magnitude of Effect

<table>
<thead>
<tr>
<th>Site Details</th>
<th>Importance of Detail for Assessing Magnitude Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Proximity to centre of development</td>
<td>Increasing distance an asset from the proposed development will in most cases, diminished the effects on its setting.</td>
</tr>
<tr>
<td>2) Visibility of development (based on ZTV model and wire lines where appropriate)</td>
<td>The proportion of the development that will be intervisible with the asset will directly affect the magnitude of effect on its setting.</td>
</tr>
<tr>
<td>3) Complexity of landscape</td>
<td>The more visually complex a landscape is, the less prominent the new development may seem within it. This is because where a landscape is visually complex the eye can be distracted by other features and will not focus exclusively on the new development. Visual complexity describes the extent to which a landscape varies visually and the extent to which there are various land types, land uses, and built features producing variety in the landscape.</td>
</tr>
<tr>
<td>4) Visual obstructions</td>
<td>This refers to the existence of features (e.g. tree belts, forestry, landscaping or built features) that could partially or wholly obscure the development from view. The form of mapping called ZTV always presents a worst case scenario for visibility precisely because the readily accessible digital mapping does not take cognisance of vegetation, structures and local micro-topography. Site visits are always necessary for a real appraisal of the magnitude of effects.</td>
</tr>
</tbody>
</table>

8.3.28 It is acknowledged that Table 8.5 primarily deals with visual factors affecting setting. While the importance of visual elements of settings, e.g. views, intervisibility, prominence etc, are clear, it is acknowledged that there other, non-visual factors which could potentially result in setting effects. Such factors could be other sensory considerations, e.g. noise or smell, or could be associative. Where applicable these
will be considered in coming to a conclusion about magnitude of effect. Once the above has been considered, the prediction of magnitude of effect upon setting will be based upon the criteria set out in Table 8.6. In applying these criteria particular consideration will be given to the relationship of the proposed development to those elements of setting which have been defined as most important in contributing to the ability to understand, appreciate and experience the heritage assets and its significance.

<table>
<thead>
<tr>
<th>Magnitude of Setting Effect</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Direct and substantial visual impact on a significant sightline to or from a ritual monument or prominent fort; Direct severance of the relationship between an asset and its setting; Major alteration to the penumbral or close settings of a Scheduled Monument; Major imposition within a Cultural Landscape; An effect that changes the setting of an asset such that it threatens the protection of the asset (SPP 2014) and the understanding of its cultural value.</td>
</tr>
<tr>
<td>Medium</td>
<td>Oblique visual impact on an axis adjacent to a significant sightline to or from a ritual monument but where the significant sightline of the monument is not obscured; Impacts upon the glacis of a prominent fort (based on the proportion of the glacis that would be obscured); Partial severance of the relationship between an asset and its setting; Significant alteration to the setting of an asset of beyond those elements of the setting which directly contribute to the understanding of the cultural value of the asset; Significant but not major imposition within a Cultural Landscape. An effect that changes the setting of an asset such that the understanding of the asset and its cultural value is diminished.</td>
</tr>
<tr>
<td>Low</td>
<td>Peripheral visual impact on a significant sightline to or from a ritual monument; Insignificant alteration to the setting of an asset of beyond those elements of the setting which directly contribute to the understanding of the cultural value of the asset; Minor imposition within a Cultural Landscape. An effect that changes the setting of an asset, but where those changes do not materially affect an observer’s ability to understand, appreciate and experience the asset.</td>
</tr>
<tr>
<td>Marginal</td>
<td>All other setting effects.</td>
</tr>
<tr>
<td>None</td>
<td>No setting effects anticipated.</td>
</tr>
</tbody>
</table>

**Significance Criteria**

8.3.29 The predicted significance of direct effect upon each asset was determined by considering its importance in conjunction with the magnitude of impact predicted on it. The method of deriving the significance of impact classifications is shown in Table 8.7.
### Table 8.7: Method of Rating Significance of Direct Effects on Heritage Assets by The Proposed Development

<table>
<thead>
<tr>
<th>Importance of Asset</th>
<th>Negligible</th>
<th>Local</th>
<th>Regional</th>
<th>National</th>
<th>International</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Minor-Moderate</td>
<td>Moderate</td>
<td>Moderate-Major</td>
<td>Major</td>
<td>Extreme</td>
</tr>
<tr>
<td>Moderate</td>
<td>Minor</td>
<td>Minor-Moderate</td>
<td>Moderate</td>
<td>Moderate-Major</td>
<td>Major</td>
</tr>
<tr>
<td>Low</td>
<td>Negligible</td>
<td>Minor</td>
<td>Minor-Moderate</td>
<td>Moderate</td>
<td>Moderate-Major</td>
</tr>
<tr>
<td>Marginal</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Minor</td>
<td>Minor-Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

The impacts recorded in grey highlighted cells are ‘significant’ in terms of the Electricity Works (EIA) (Scotland) Regulations 2000.

8.3.30 The significance of the effect on the setting of cultural heritage assets is judged to be the interaction of the asset’s sensitivity to changes to its setting (Table 8.3) and the magnitude of the effect (Table 8.6) and also takes into consideration the cultural importance of the asset (Table 8.2). In order to provide a level of consistency the assessment of sensitivity, the prediction of magnitude of effect and the assessment of significance of effect have been guided by pre-defined criteria. A qualitative descriptive narrative for each asset to summarise and explain each of the professional value judgements that have been made is included within Technical Appendix 8.4.

8.3.31 The interactions determining significance of effect on settings of the assets in question is shown in Table 8.8.

### Table 8.8: Significance of Effect on the Setting of Heritage Assets

<table>
<thead>
<tr>
<th>Impact Magnitude</th>
<th>Marginal</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Minor</td>
<td>Minor-Moderate</td>
<td>Moderate</td>
<td>Major</td>
</tr>
<tr>
<td>Medium</td>
<td>Negligible</td>
<td>Minor</td>
<td>Minor-Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Low</td>
<td>None/Negligible</td>
<td>Negligible</td>
<td>Minor</td>
<td>Minor-Moderate</td>
</tr>
<tr>
<td>Marginal</td>
<td>None</td>
<td>None</td>
<td>Negligible</td>
<td>Minor</td>
</tr>
</tbody>
</table>

The impacts recorded in highlighted cells are ‘significant’ in terms of the Electricity Works (EIA) (Scotland) Regulations 2000.

### 8.4 Baseline Conditions

**Current Baseline Archaeological and Historical Evidence**

**Archaeological and Cultural Heritage Value**

8.4.32 A desk-based assessment (Technical Appendix 8.1) undertaken during the preparation of the Environmental Statement identified 53 cultural heritage assets
within the site, from study of existing records and aerial photographs as well as a walkover survey undertaken in August 2014 (Figure 8.1).

8.4.33 The importance of the assets known within the site has been classified according to the method shown in Table 8.2 the results are shown in Table 8.9 and discussed below.

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Site Name</th>
<th>Status</th>
<th>Description</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>19/</td>
<td>Penbleath</td>
<td>Not Designated</td>
<td>Building</td>
<td>Negligible</td>
</tr>
<tr>
<td>20</td>
<td>Delamford</td>
<td>Not Designated</td>
<td>Sheepfold</td>
<td>Negligible</td>
</tr>
<tr>
<td>21</td>
<td>Delamford</td>
<td>Not Designated</td>
<td>Shielings</td>
<td>Local</td>
</tr>
<tr>
<td>34</td>
<td>The Lanes</td>
<td>Not Designated</td>
<td>Building</td>
<td>Negligible</td>
</tr>
<tr>
<td>35</td>
<td>The Lanes</td>
<td>Not Designated</td>
<td>Cairn (Possible)</td>
<td>Regional</td>
</tr>
<tr>
<td>58</td>
<td>Corphin</td>
<td>Not Designated</td>
<td>Building/ Sheepfold</td>
<td>Negligible</td>
</tr>
<tr>
<td>81/292</td>
<td>Corphin Hill</td>
<td>Not Designated</td>
<td>Enclosures/ Sheepfolds/ Structures</td>
<td>Negligible</td>
</tr>
<tr>
<td>82</td>
<td>Milton Burn</td>
<td>Not Designated</td>
<td>Cairn (Possible)</td>
<td>Regional</td>
</tr>
<tr>
<td>84</td>
<td>Braker</td>
<td>Not Designated</td>
<td>Cultivation Remains/ Farmstead</td>
<td>Negligible</td>
</tr>
<tr>
<td>198</td>
<td>Doughty</td>
<td>Not Designated</td>
<td>Cultivation Remains/ Enclosure</td>
<td>Negligible</td>
</tr>
<tr>
<td>199</td>
<td>Green Hill</td>
<td>Not Designated</td>
<td>Sheepfold</td>
<td>Negligible</td>
</tr>
<tr>
<td>200</td>
<td>Green Hill</td>
<td>Not Designated</td>
<td>Enclosure</td>
<td>Negligible</td>
</tr>
<tr>
<td>201</td>
<td>Green Hill</td>
<td>Not Designated</td>
<td>Rig and Furrow</td>
<td>Negligible</td>
</tr>
<tr>
<td>202</td>
<td>Delamford</td>
<td>Not Designated</td>
<td>Rig and Furrow</td>
<td>Negligible</td>
</tr>
<tr>
<td>203</td>
<td>Green Hill</td>
<td>Not Designated</td>
<td>Enclosure</td>
<td>Negligible</td>
</tr>
<tr>
<td>204</td>
<td>Mull of Miljoan</td>
<td>Not Designated</td>
<td>Possible Cairn</td>
<td>Regional</td>
</tr>
<tr>
<td>205</td>
<td>Mull of Miljoan</td>
<td>Not Designated</td>
<td>Possible Cairn</td>
<td>Regional</td>
</tr>
<tr>
<td>206</td>
<td>The Lanes</td>
<td>Not Designated</td>
<td>Farmstead/ Sheepfold</td>
<td>Negligible</td>
</tr>
<tr>
<td>207</td>
<td>The Lanes</td>
<td>Not Designated</td>
<td>Sheepfold</td>
<td>Negligible</td>
</tr>
<tr>
<td>212</td>
<td>Delamford</td>
<td>Not Designated</td>
<td>Structure</td>
<td>Negligible</td>
</tr>
<tr>
<td>213</td>
<td>Braker</td>
<td>Not Designated</td>
<td>Enclosure/ Possible Settlement</td>
<td>Local</td>
</tr>
<tr>
<td>214</td>
<td>Doughty</td>
<td>Not Designated</td>
<td>Building</td>
<td>Negligible</td>
</tr>
<tr>
<td>Site No.</td>
<td>Site Name</td>
<td>Status</td>
<td>Description</td>
<td>Importance</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------</td>
<td>------------------</td>
<td>----------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>215</td>
<td>Delamford</td>
<td>Not Designated</td>
<td>Enclosure/ Oval Earthwork</td>
<td>Local</td>
</tr>
<tr>
<td>224</td>
<td>Delamford Peat Rig</td>
<td>Not Designated</td>
<td>Boundary Wall/ Dyke</td>
<td>Negligible</td>
</tr>
<tr>
<td>225</td>
<td>Delamford Peat Rig</td>
<td>Not Designated</td>
<td>Bank/ Field Boundary</td>
<td>Negligible</td>
</tr>
<tr>
<td>226</td>
<td>Delamford Peat Rig</td>
<td>Not Designated</td>
<td>Bank/ Boundary Wall</td>
<td>Negligible</td>
</tr>
<tr>
<td>227</td>
<td>Delamford Peat Rig</td>
<td>Not Designated</td>
<td>Bank/ Field Boundary</td>
<td>Negligible</td>
</tr>
<tr>
<td>229</td>
<td>Delamford Peat Rig</td>
<td>Not Designated</td>
<td>Drystone Wall</td>
<td>Negligible</td>
</tr>
<tr>
<td>232</td>
<td>Delamford Peat Rig</td>
<td>Not Designated</td>
<td>Wall/Dyke</td>
<td>Negligible</td>
</tr>
<tr>
<td>235</td>
<td>Milton Hill</td>
<td>Not Designated</td>
<td>Wall/ Dyke</td>
<td>Negligible</td>
</tr>
<tr>
<td>236</td>
<td>Milton Hill</td>
<td>Not Designated</td>
<td>Wall/ Dyke</td>
<td>Negligible</td>
</tr>
<tr>
<td>237</td>
<td>Milton Hill</td>
<td>Not Designated</td>
<td>Wall/ Dyke</td>
<td>Negligible</td>
</tr>
<tr>
<td>238</td>
<td>Milton Hill</td>
<td>Not Designated</td>
<td>Wall/ Dyke</td>
<td>Negligible</td>
</tr>
<tr>
<td>245</td>
<td>Daljedburgh Hill</td>
<td>Not Designated</td>
<td>Structure/ Shieling</td>
<td>Local</td>
</tr>
<tr>
<td>246</td>
<td>Daljedburgh Hill</td>
<td>Not Designated</td>
<td>Structure/ Shieling</td>
<td>Local</td>
</tr>
<tr>
<td>248</td>
<td>Doughty Hill</td>
<td>Not Designated</td>
<td>Sheepfold</td>
<td>Negligible</td>
</tr>
<tr>
<td>250</td>
<td>Doughty Hill</td>
<td>Not Designated</td>
<td>Sheepfold</td>
<td>Negligible</td>
</tr>
<tr>
<td>251</td>
<td>Doughty Hill</td>
<td>Not Designated</td>
<td>Structure/ Shieling</td>
<td>Local</td>
</tr>
<tr>
<td>252</td>
<td>Doughty Hill</td>
<td>Not Designated</td>
<td>Wall/Bank</td>
<td>Negligible</td>
</tr>
<tr>
<td>253</td>
<td>Doughty Hill</td>
<td>Not Designated</td>
<td>Wall/Bank</td>
<td>Negligible</td>
</tr>
<tr>
<td>254</td>
<td>Doughty Hill</td>
<td>Not Designated</td>
<td>Wall/Bank</td>
<td>Negligible</td>
</tr>
<tr>
<td>255</td>
<td>Doughty Hill</td>
<td>Not Designated</td>
<td>Wall/Bank</td>
<td>Negligible</td>
</tr>
<tr>
<td>256</td>
<td>Doughty Hill</td>
<td>Not Designated</td>
<td>Wall/Bank</td>
<td>Negligible</td>
</tr>
<tr>
<td>266</td>
<td>Doughty Hill</td>
<td>Not Designated</td>
<td>Bank/ Wall/ Dyke</td>
<td>Negligible</td>
</tr>
<tr>
<td>271</td>
<td>Milton Hill</td>
<td>Not Designated</td>
<td>Linear Feature/ Rig and Furrow</td>
<td>Negligible</td>
</tr>
<tr>
<td>272</td>
<td>Milton Hill</td>
<td>Not Designated</td>
<td>Rig and Furrow</td>
<td>Negligible</td>
</tr>
<tr>
<td>300</td>
<td>Wigton – Maybole Toll Road</td>
<td>Not Designated</td>
<td>Toll Road</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
### Table 8.9: Relative Importance of Heritage Assets within the Site

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Site Name</th>
<th>Status</th>
<th>Description</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>301</td>
<td>Pinblaith</td>
<td>Not Designated</td>
<td>Settlement/Farmstead</td>
<td>Negligible</td>
</tr>
<tr>
<td>303</td>
<td>East Pinblaith</td>
<td>Not Designated</td>
<td>Farmstead</td>
<td>Negligible</td>
</tr>
<tr>
<td>306</td>
<td>Craiginmoddie</td>
<td>Not Designated</td>
<td>Boundary</td>
<td>Negligible</td>
</tr>
<tr>
<td>307</td>
<td>Green Larg</td>
<td>Not Designated</td>
<td>Boundary</td>
<td>Negligible</td>
</tr>
<tr>
<td>308</td>
<td>Corphin</td>
<td>Not Designated</td>
<td>Sheepfold</td>
<td>Negligible</td>
</tr>
<tr>
<td>309</td>
<td>The Lanes</td>
<td>Not Designated</td>
<td>Cistern</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

8.4.34 Four possible cairns (Sites 35, 82, 204 and 205) have been identified within the site. Whilst these cairns are not designated, their isolated positions suggest that they are more likely to relate to burial rather than clearance and they consequently have the potential to inform our understanding of Neolithic and Bronze Age burial practices. If these cairns were better preserved, and scheduled they would be considered nationally important, however Sites 35 has been considerably reduced whilst Sites 82, 204 and 205 have been planted over by commercial forestry and most probably have been severely damaged. For this reason the cairns do not reach the threshold for national importance as outlined in Annex 1 of SHEP and are deemed to be of regional importance.

8.4.35 Four shielings or clusters of shielings (Sites 21, 245, 246 and 251) have been identified within the site. Although these transitory settlements are common, they offer the potential to research the late medieval and early post medieval economy of upland Ayrshire and are consequently considered to be of Local Importance. A sub-circular enclosure (Site 213) recorded from aerial photographs at Braker and an oval earthwork (Site 215) known from aerial photographs at Delamford, could on account of their irregular shapes, pre date the post-medieval period and they are also consequently judged to be of local importance.

8.4.36 The Wigton to Maybole toll road (Site 300) first recorded by Roy on his 1752-55 military survey, passes through the eastern side of the site. Although an intact 18th century toll road would have an elevated value, the course of the toll road is now overlain by the modern road, which is likely to have truncated any remains of the earlier road. The toll road is consequently of negligible importance.

8.4.37 The remaining assets are all common features, relating to either medieval farming practices or the post-medieval agricultural economy and are consequently of negligible importance.

8.4.38 Assets of Negligible Importance cannot be subject to an effect of significance, in terms of EIA regulations. As such these assets are not considered further in this assessment.

8.4.39 Both this baseline assessment and the accompanying desk-based assessment (Technical Appendix 8.1) detail heritage assets which were either previously recorded or identified as part of this assessment process. However the possibility of previously unknown archaeological remains, particularly those from the prehistoric, medieval or
post-medieval periods being encountered during development cannot be discounted and this is considered under Mitigation (Section 8.6).

8.4.40 Any survival is however likely to vary considerably across the site. Experience has demonstrated that it is highly unlikely that any remains will survive within areas which are either presently planted, or have previously been planted with dense commercial plantations, as the drainage and earthmoving works which proceed such forestry are typically so extensive that they will have destroyed any remains which may have once been present. For these reasons it is considered unlikely that buried archaeological remains will survive either within the plantation on the Mull of Miljoan where turbines 24-25 and 29 and their related infrastructure are proposed or within the adjoining plantations at Daljedburgh Forest, Dobbingstone or Doughty where turbines 3-5, 8, 9, 13-5, and 17-21 are proposed. There is a greater possibility of survival within upland moorland areas where turbines 2, 10-12, 22-23, 16, 1, 6, 7 and 26-28 are proposed, although masking deposits of peat may obscure evidence in some areas. There is a still a greater chance of remains surviving within pastoral areas, or on land adjacent to known sites settlements and monuments, particularly on Milton Hill where turbines 30, 31 and a met mast are proposed. This is evidenced by earthwork remains associated with field systems (Sites 235-8, 240-4, and 271-2), some of which fall outside the site, which were identified within the vicinity during the walkover survey. This suggests the presence of an agricultural settlement on the hillside. The field system remains have been deemed in Table 8.9 to be of negligible importance as similar systems are of a common type found across much of upland Scotland. If any previously unrecorded domestic habitation remains are subsequently found associated with them then they are unlikely to exceed local importance.

Designated Assets Beyond the Site Boundary

8.4.41 There are 24 Scheduled Monuments, 11 Category A Listed Buildings and three Inventory Garden and Designed Landscapes with 10 km of the proposed turbines (as defined on Figure 8.2). Old Dalquharran Castle (Site 117) which is both Category A Listed and Scheduled has been counted as a listed building so as to avoid duplication. These are all considered to be of national importance. Fifteen Category B Listed Buildings within 5 km of the nearest turbine and five Conservation Areas within 10 km are of regional importance. Eighteen Category C Listed Buildings within 5 km of the proposed turbines are of local importance. This list includes assets which fall beyond the ZTV. All the designated assets are plotted on Figure 8.2.

Future Baseline

8.4.42 Future baselines (without the proposed development) would largely be expected to mirror the current baseline. Any alteration to the baseline condition of the heritage assets within the site would likely relate to slow encroachment of peat growth and very gradual deterioration of upstanding structures as a consequence of natural weathering and in some cases stock grazing. As a result, the current baseline is taken as the basis for the assessment presented here.

8.5 Likely Significant Effects

Construction Effects

8.5.43 No direct effects are anticipated upon any known heritage asset.

8.5.44 Potential effects on known or unknown buried archaeological remains in the case of this development relate to the possibility of disturbing, removing or destroying in situ
remains and artefacts during groundbreaking works (including excavation, construction and other works associated with the development) on this site.

8.5.45 The proposed development has been designed to avoid any impact upon the 53 cultural heritage assets identified and as such there would be no direct effects upon known assets.

8.5.46 The site comprises undeveloped moorland including some peat covered areas and thus any currently unknown remains buried beneath the site would be expected to survive relatively undisturbed. Given the identification of known prehistoric, medieval and post-medieval assets within the site, there is a possibility that hitherto unknown buried archaeological remains survive within the site. These could be subject to potential direct effects.

**Operational Effects**

8.5.47 Operational effects include effects upon the setting of assets such as Listed Buildings, Scheduled Monuments, Conservation Areas and Inventory Historic Gardens and Designed Landscapes.

8.5.48 No designated heritage assets fall within the site boundary.

8.5.49 This assessment has identified 24 Scheduled Monuments, 11 Category A Listed Buildings, three Inventoried Gardens and Designed Landscapes and five Conservation Areas within 10 km of the proposed turbines site boundary and 15 Category B and 18 Category C Listed Buildings within 5km of the proposed turbines.

8.5.50 Consideration will also be given to the settings of eight non-designated sites within 5 km of the proposed development recorded as being of national importance on the Non-Statutory Register (NSR) formerly maintained by WoSAS. Consider is also given to six non-designated gardens and designed landscapes recorded within 5 km of the proposed development by the Ayrshire Designed Landscapes Survey (Peter McGowan Associates and Dingwall 2009).

8.5.51 No Inventoried Historic Battlefields fall within 10 km of the site boundary.

8.5.52 In their response to the scoping opinion request HS highlighted the potential for impacts upon the settings of the following Scheduled Monuments:

- Bencallen Hill Chambered Cairn (Site 148) (Index no. 3890);
- Knockinculloch, Enclosures on E slope of, 600m NW of Glenalla (Site 100) (Index no. 3357);
- The Lady Chapel, 640m NE of Kilkerran (Site 295) (Index no. 3358);
- Drummochreen House (Site 294) (Index no 5387);
- Dalquharran Castle (Old Castle) (Site 117) (Index no 316);
- Mote Knowe, Motte, Kilkerran (Site 18) (Index no 2863);
- Maxwellston Hill, Fort (Site 25) (Index no 2201); and
- Cairnhill, Pallisaded Enclosure and Timber House 220m NNE of (Site127) (Index 5479).

8.5.53 Category A Listed Buildings highlighted for assessment by HS:
• Kilkerran House (Site 11) (HB no. 1114);
• Drumburle (Site 115) (HB no. 1119);
• Dalquharran Castle (Ruin) (Site 117) (HB no. 1142);
• Dalquharran Castle (Site 116) (HB no. 125);
• Bargany House (Site 124) (HB no. 1171);
• Penkill Castle (Site 132) (HB no. 1148);
• Kilochan Castle (Site 133) (HB no. 1173); and
• Blairquhan Castle (Site 138) (HB no. 19094).

8.5.54 Inventoried Gardens and Designed Landscapes highlighted for assessment by HS:
• Kilkerran (Site 10);
• Bargany (Site 273); and
• Blairquhan (Site 137).

8.5.55 Zone of Theoretical Visibility (ZTV) mapping indicates that there would be no visibility of the proposed development from four of the assets highlighted by HS; The Kilkerran Lady Chapel (Site 295), Kilkerran House (Site 11), Penkill Castle (Site 131), and Blairquhan House (Site 133), as well as element of all three of the Inventoried Gardens and Designed Landscapes that they highlight. The setting of Kilkerran House and Blairquhan Castle will nevertheless be considered in the context of the designed landscapes within which they stand.

8.5.56 SAC highlighted concerns regarding potential impacts upon the setting of the Barr Conservation Area (Site 274) in their scoping response. Although SAC refer to ‘Dailly Conservation Area’ within their scoping response, consultation with the Council confirmed that there is no such designation and consequently only the settings of individual Listed Buildings within Dailly need be considered here.

8.5.57 Cultural heritage specific wire lines have been prepared showing theoretical visibility from:
• Mote Knowe Kilkerran (Site 18) (Figure 8.7 CH Viewpoint 1);
• Maxwellston Hill Fort (Site 26) (Figure 8.8 CH Viewpoint 2);
• Knockinculloch, Enclosure (Site 100) (Figure 8.9 CH Viewpoint 3);
• Drumburle (Site 115) (Figure 8.10 CH Viewpoint 4);
• Dalquharran Castle (Site 116) (Figure 8.11 CH Viewpoint 5);
• Bargany House (Site 124) (Figure 8.12 CH Viewpoint 6);
• Bencallen Hill Chambered Cairn (Site 148) (Figure 8.13 CH Viewpoint 7); and
• The view across the Kilkerran Inventoried Garden and Designed Landscape (Site 10) from the B741 (Figure 8.14 CH Viewpoint 8).

8.5.58 Six of the LVIA viewpoints are also relevant to cultural heritage:
• Barr Village (LVIA Viewpoint 6), showing view from northern edge of Barr Conservation Area (Site 274);
• Brunston Castle Golf Course (LVIA Viewpoint 11), within Bargany Inventoried Garden and Designed Landscape (Site 273);

• Glenton (LVIA Viewpoint 12), showing view to the west of the Kilkerran Inventoried Garden and Designed Landscape (Site 10);

• B741, south of Crosshill (LVIA Viewpoint 13), showing general visibility in the landscape to the south of Crosshill (Sites 114 and 275);

• Kirkmichael (LVIA Viewpoint 14) showing visibility within the Kirkmichael Conservation Area (Site 277); and

• Monument, Maybole (LVIA Viewpoint 15), showing visibility to the south of Maybole Conservation Area (Site 279) and St. Mary's Church (Site 191).

8.5.59 Whilst the settings of all the designated heritage assets can potentially be affected by development, in this instance the rolling topography of the Ayrshire countryside means that many of the assets within the 5 and 10 km study areas, fall outwith the ZTV and as a consequence their visual settings would not be affected by the development. The assessment has been informed by detailed GIS based ZTV mapping data and visualisations supplied by the applicant and informed by field work with visits made to the designated heritage assets themselves. The extent to which tree cover, hedge lines, walls and intervening buildings could affect the theoretical visibility indicated on the ZTV was also taken into consideration in the assessment based on field observations.

8.5.60 ZTV analysis has shown that 28 designated heritage assets within the 5 and 10 km heritage study areas (Sites 11, 12, 15, 130, 132, 138-147, 167-170, 172, 184-186, 193, 276, 280, 295 and 312) fall outwith the ZTV and consequently no intervisibility is predicted. These assets are included in Table 8.10 (Technical Appendix 8.2), although they have not been carried forward for full assessment.

8.5.61 Site visits undertaken in November 2014 found that intervening vegetation, structures or buildings would prevent visibility from 17 designated assets (Sites 14, 119, 120, 129, 131, 134, 152, 157 – 161, 165, 184-186, and 277). These have therefore been scoped out of the full setting assessment, although the specific reasons for their exclusion are detailed in Table 8.10 (Technical Appendix 8.2).

8.5.62 Seven of the Scheduled monuments within the 10 km ZTV (Sites 127 and 173-178) represent buried archaeological remains recorded only from cropmark evidence. Cropmarks are often only detectable from aircraft and are visible at certain times of the year within specific types of crops. Cropmarks result from specific weather conditions which cause the moisture levels within buried features to vary from the levels within the surrounding soils. It can be reasonably argued that where no upstanding remains survive, such as is the case with Sites 127 and 173-178, their value primarily lies in their intrinsic characteristics, represented by their buried remains. The contribution that their setting makes to an understanding of them and their cultural value is limited. They have been considered as part of this assessment and no significant impact has been found. As such they are not discussed further here.

8.5.63 Fifty Five designated assets within the 5 km and 10 km heritage study areas which lie within the ZTV and where visibility with the proposed development is predicted have been taken forward to detailed assessment.
Decommissioning Effects

8.5.64 On the basis that no ground or landscaping works would be required, beyond those areas which would be impacted during construction, then no further direct impacts would result from decommissioning.

8.5.65 Any indirect effects upon the settings of designated assets would cease following the completion of decommissioning.

8.6 Mitigation

8.6.66 This assessment has identified a number of assets of Regional, Local and Negligible Importance ranging in date from the prehistoric to post-medieval periods within the site. However the development layout and infrastructure have been finalised such as to avoid any direct impacts on these known sites. All known sites within 50 m of the proposed development (working areas) will be fenced off with a visible buffer under archaeological supervision prior to the start of construction work in order to avoid accidental damage by heavy plant movement. The proposed fencing would include protection of the series of stone and turf wall dykes (Sites 235, 236 and 237) of Negligible Importance identified on Milton Hill during the walkover survey which lie within 15m of a proposed meteorological mast and also an area of rig and furrow (Site 272) which the access track between turbines 30 and 31 will pass within 20m of. These assets are judged in Table 8.9 to be of negligible importance. In addition it is proposed that a watching brief be undertaken during groundworks associated with the construction of turbines 30 and 31, the Milton Hill permanent met mast on Milton Hill and the access tracks which link between them. Similarly it is proposed to carry out a watching brief to the south of Penwhapple Reservoir where a new access track will be required. The track would extend from the former quarry to turbine 27 and its adjacent permanent met mast. The watching brief would be required due to the proximity of these works to a possible cairn (Site 35) reported at The Lanes. The purpose of such archaeological works would be to identify any potential direct effects on archaeological remains, to assess their value and to mitigate any impact upon them either through avoidance or, if preservation in situ is not warranted, through preservation by record. Any requirement for archaeological works either during or preceding construction would be agreed with SAC, as advised by WoSAS.

8.6.67 Any archaeological field work commissioned in order to mitigate direct effects would result in the production and dissemination of a professional archive, which could add to our understanding of the site’s cultural heritage.

8.6.68 No mitigation is possible for Indirect (setting) effects.

8.7 Residual Effects

Construction Effects

8.7.69 This assessment has identified a number of assets of Regional, Local and Negligible Importance ranging in date from the prehistoric to post-medieval periods within the site. However the development layout and infrastructure have been finalised such as to avoid any direct impacts on these known sites. As such, no significant direct effects have been identified on known cultural heritage assets. Following the completion of construction no further groundworks would be undertaken and as a consequence no residual direct effects would occur as a result of the construction.
Operational Effects

8.7.70 A summary of the predicted residual indirect effects upon the settings of cultural heritage assets as a result of the proposed development is provided in Table 8.10, which has been prepared using the guidance provided in Tables 8.3, 8.5, 8.6 and 8.7. Full details of the assessment, including qualitative assessments, are included in Technical Appendix 8.4.
<table>
<thead>
<tr>
<th>Site No.</th>
<th>Site Name</th>
<th>Designation</th>
<th>No. of Turbine Tips Visible (Based on ZTV Analysis)</th>
<th>Distance to Nearest Turbine</th>
<th>Current Factors Affecting Visibility</th>
<th>Relative Sensitivity</th>
<th>Magnitude of Effects</th>
<th>Level of Effects (* significant effect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Kilkerran Castle</td>
<td>Category B Listed</td>
<td>1-7</td>
<td>1.5km</td>
<td>Severely ruined only NNW gable and wall survive. Set within trees which will at least partially obscure visibility</td>
<td>Medium</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>10</td>
<td>Kilkerran</td>
<td>Inventoried Garden and Designed Landscape</td>
<td>15-21 (SW corner) 1-7 northern edge</td>
<td>2.3km</td>
<td>Majority of designed landscape outwith ZTV. However turbines will be visible along northern edge, adjacent to the B741 and from here it will be possible to view turbines behind the park</td>
<td>High</td>
<td>Low</td>
<td>Minor-Moderate</td>
</tr>
<tr>
<td>11</td>
<td>Kilkerran House</td>
<td>Category A Listed</td>
<td>None</td>
<td>3.3km</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>12</td>
<td>Kilkerran House</td>
<td>Category C Listed</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>13</td>
<td>Drumgirnan Bridge</td>
<td>Category B Listed</td>
<td>1-7</td>
<td>4.5km</td>
<td>Visibility will be oblique and obscured by intervening forestry plantations</td>
<td>Medium</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>14</td>
<td>Gigmagog</td>
<td>Category B Listed</td>
<td>1-7</td>
<td>3.9km</td>
<td>Intervening tree cover will block visibility</td>
<td>Medium</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>15</td>
<td>Kilkerran Woodside</td>
<td>Category B Listed</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>16</td>
<td>Aird Bridge</td>
<td>Category B Listed</td>
<td>1-7</td>
<td>4km</td>
<td>Intervening tree cover will largely, if not completely block visibility</td>
<td>Medium</td>
<td>Marginal</td>
<td>Negligible</td>
</tr>
<tr>
<td>Site No.</td>
<td>Site Name</td>
<td>Designation</td>
<td>No. of Turbine Tips Visible (Based on ZTV Analysis)</td>
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<td>Magnitude of Effects</td>
<td>Level of Effects (* significant effect)</td>
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<tr>
<td>18</td>
<td>Mote Knowe</td>
<td>Scheduled Monument</td>
<td>4 Blade tips (Figure 8.7 CH Viewpoint 1)</td>
<td>0.96km</td>
<td>1 blade tip (Turbine 6) may appear prominent however the remainder will be set behind the existing turbines and may be obscured.</td>
<td>Medium</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>25</td>
<td>Maxwellston Hill</td>
<td>Scheduled Monument</td>
<td>29-31 (Figure 8.8 CH Viewpoint 2)</td>
<td>2.4km</td>
<td>Whilst some intervening plantations are visible, the open nature of the landscape coupled with the height of the hill fort mean that any screening effect will be insignificant.</td>
<td>Medium</td>
<td>Medium</td>
<td>Minor-Moderate</td>
</tr>
<tr>
<td>100</td>
<td>Knockinculloch</td>
<td>Scheduled Monument</td>
<td>14 (Figure 8.9 CH Viewpoint 3)</td>
<td>1.8km</td>
<td>Commercial forestry will partially, but not completely, obscure visibility.</td>
<td>Low</td>
<td>Medium</td>
<td>Minor</td>
</tr>
<tr>
<td>115</td>
<td>Drumburle</td>
<td>Category A Listed</td>
<td>11 (Figure 8.10 CH Viewpoint 4)</td>
<td>3.96km</td>
<td>Wire line indicates that 11 turbines will theoretically be visible, although only 4 will be visible at hub height. For the remaining 7 turbines only the extreme tips with theoretically be visible. It is likely that intervening trees will completely block visibility of the 7 blade tips.</td>
<td>High</td>
<td>Low</td>
<td>Minor-Moderate</td>
</tr>
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<td>Relative Sensitivity</td>
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<td>Level of Effects (* significant effect)</td>
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<tr>
<td>116</td>
<td>Dalquharran Castle (18th Century)</td>
<td>Category A List ed</td>
<td>20 (Figure 8.11 CH Viewpoint 5)</td>
<td>4.3km</td>
<td>Wire line indicates 20 turbines theoretically visible, 16 above hub height Trees will partially obscure visibility at ground level</td>
<td>High</td>
<td>Medium</td>
<td>Moderate*</td>
</tr>
<tr>
<td>117</td>
<td>Dalquharran Castle (15th Century)</td>
<td>Category A Listed</td>
<td>15-21</td>
<td>3.9km</td>
<td>Castle ruins stand within trees which will obscure visibility</td>
<td>High</td>
<td>Low</td>
<td>Minor-Moderate</td>
</tr>
<tr>
<td>118</td>
<td>Dailly, Parish Manse</td>
<td>Category B Listed</td>
<td>15-21</td>
<td>3.85km</td>
<td>Visibility will largely, if not entirely, be blocked by intervening trees and buildings</td>
<td>Medium</td>
<td>Marginal</td>
<td>Negligible</td>
</tr>
<tr>
<td>119</td>
<td>Dailly, Main Street, Churchyard</td>
<td>Category B Listed</td>
<td>15-21</td>
<td>3.9km</td>
<td>Visibility will be entirely blocked by rising ground, walls, buildings and trees.</td>
<td>High</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>120</td>
<td>Dailly, Main Street, Parish Church/ War Memorial</td>
<td>Category B Listed</td>
<td>15-21</td>
<td>3.9km</td>
<td>Visibility will be entirely blocked by rising ground, walls, buildings and trees.</td>
<td>High</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>121</td>
<td>Dailly, 45 Main Street, Greenhead Hotel</td>
<td>Category C Listed</td>
<td>15-21</td>
<td>3.9km</td>
<td>Visibility from the front elevation will be blocked by rising ground, walls, buildings and trees. Some potential visibility from the rear upper floor window, although it is possible that this will also be blocked by topography, buildings, vegetation and walls</td>
<td>Low</td>
<td>Marginal</td>
<td>None</td>
</tr>
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<td>Site Name</td>
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<tr>
<td>122</td>
<td>Lochmodie Cottage</td>
<td>Category C</td>
<td>15-22</td>
<td>4.8km</td>
<td>Visibility will either be largely or completely blocked by intervening tree cover</td>
<td>Low</td>
<td>Marginal</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>(3 dwellings)</td>
<td>Listed</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>123</td>
<td>Brunston Castle</td>
<td>Category B</td>
<td>8-15</td>
<td>4.46km</td>
<td>Castle ruins stand within tree cover on golf course which will at least impede visibility.</td>
<td>Medium</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td></td>
<td>Listed</td>
<td></td>
<td></td>
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<tr>
<td>124</td>
<td>Bargany House</td>
<td>Category A</td>
<td>Wire line indicates that 6 turbines will be visible; 2 at hub height and 4 blade tips. (Figure 8.12 CH Viewpoint 6)</td>
<td>4.5km</td>
<td>Intervening vegetation will I completely obscure visibility</td>
<td>High</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Bridge</td>
<td>Listed</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>125</td>
<td>Bargany House</td>
<td>Category B</td>
<td>0-7</td>
<td>4.5km</td>
<td>Intervening vegetation will I completely obscure visibility</td>
<td>Medium</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Bridge</td>
<td>Listed</td>
<td></td>
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<td>Magnitude of Effects</td>
<td>Level of Effects (*) significant effect</td>
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<tr>
<td>126</td>
<td>Maxwellston</td>
<td>Category C Listed</td>
<td>1-7</td>
<td>3.7km</td>
<td>Intervening trees are likely to largely, if not completely, impede visibility</td>
<td>Medium</td>
<td>Marginal</td>
<td>Negligible</td>
</tr>
<tr>
<td>127</td>
<td>Cairnhill</td>
<td>Scheduled Monument</td>
<td>8-14</td>
<td></td>
<td>Cropmark site detectable only through aerial photographs or possibly remote sensing.</td>
<td>Marginal</td>
<td>Marginal</td>
<td>None</td>
</tr>
<tr>
<td>129</td>
<td>Hawkhill</td>
<td>Category B Listed</td>
<td>1-7</td>
<td>5km</td>
<td>Turbines are only theoretically visible from the rear of building, therefore any visibility will be blocked by the building itself.</td>
<td>Low</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>130</td>
<td>Old Dailly Parish Church, Churchyard</td>
<td>Category B Listed</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>131</td>
<td>Penkill Farm</td>
<td>Category C Listed</td>
<td>1-7</td>
<td>4.12km</td>
<td>Turbines are only theoretically visible from the NW corner of building, therefore any visibility will be blocked by the building itself.</td>
<td>Low</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>132</td>
<td>Penkill Castle</td>
<td>Category A Listed</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>Site No.</td>
<td>Site Name</td>
<td>Designation</td>
<td>No. of Turbine Tips Visible (Based on ZTV Analysis)</td>
<td>Distance to Nearest Turbine</td>
<td>Current Factors Affecting Visibility</td>
<td>Relative Sensitivity</td>
<td>Magnitude of Effects</td>
<td>Level of Effects (* significant effect)</td>
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</tr>
<tr>
<td>133</td>
<td>Kilochan Castle</td>
<td>Category A Listed</td>
<td>8-14</td>
<td>5.5km c.7.65km to the nearest visible turbine</td>
<td>Surrounding tree cover will likely to block visibility from the ground floor and potentially the lower levels of the tower.</td>
<td>High</td>
<td>Low</td>
<td>Minor-Moderate</td>
</tr>
<tr>
<td>134</td>
<td>Kilochan Stables</td>
<td>Category A Listed</td>
<td>8-14</td>
<td>5.5km c.7.65km to the nearest visible turbine</td>
<td>The intervening castle will block views of the stable from the castle.</td>
<td>High</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>137</td>
<td>Blairquhan</td>
<td>Inventoried Garden and Designed Landscape</td>
<td>8-21</td>
<td>7km</td>
<td>18-21 turbines theoretically visible on the northern edge and central part of the designated area, fewer turbines will be visible from other areas with the designed landscape. The core of designed landscape lies outwith the ZTV. Blairquhan House and the other Listed buildings are located outwith the ZTV.</td>
<td>High</td>
<td>Low</td>
<td>Minor-Moderate</td>
</tr>
<tr>
<td>138</td>
<td>Blairquhan House</td>
<td>Category A Listed</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
</tbody>
</table>
Table 8.10: Summary of Effects upon the Setting of Designated Heritage Assets Considered by this Assessment

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Site Name</th>
<th>Designation</th>
<th>No. of Turbine Tips Visible (Based on ZTV Analysis)</th>
<th>Distance to Nearest Turbine</th>
<th>Current Factors Affecting Visibility</th>
<th>Relative Sensitivity</th>
<th>Magnitude of Effects</th>
<th>Level of Effects (* significant effect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>148</td>
<td>Bencallen Hill, The Druids Grave</td>
<td>Scheduled Monument</td>
<td>30 (Figure 8.13 CH Viewpoint 7)</td>
<td>3.165km</td>
<td>Tree cover may partially impede extreme right hand views of the turbine</td>
<td>Medium</td>
<td>Medium</td>
<td>Minor-Moderate</td>
</tr>
<tr>
<td>149</td>
<td>Barr, 13 Glenginnet Road, Woodbine Cottage (row)</td>
<td>Category C Listed</td>
<td>1-7</td>
<td>2.3km</td>
<td>Existing buildings and topography will largely if not completely block visibility</td>
<td>Low</td>
<td>Marginal</td>
<td>None</td>
</tr>
<tr>
<td>150</td>
<td>Barr, 13 Glenginnet Road, Woodbine Cottage (row)</td>
<td>Category C Listed</td>
<td>1-7</td>
<td>2.3km</td>
<td>Existing buildings and topography will largely if not completely block visibility</td>
<td>Low</td>
<td>Marginal</td>
<td>None</td>
</tr>
<tr>
<td>151</td>
<td>Barr, United Free Church, Manse</td>
<td>Category C Listed</td>
<td>1-7</td>
<td>2.3km</td>
<td>Rising topography will largely block views from the rear of the house. Only two windows in rear elevation. Manse fronts to the south.</td>
<td>Medium</td>
<td>Marginal</td>
<td>Negligible</td>
</tr>
<tr>
<td>152</td>
<td>Barr, Old Parish Church and Churchyard</td>
<td>Category C Listed</td>
<td>1-7</td>
<td>2.45km</td>
<td>Topography and intervening buildings will completely block visibility.</td>
<td>High</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
Table 8.10: Summary of Effects upon the Setting of Designated Heritage Assets Considered by this Assessment

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<tr>
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<th>Distance to Nearest Turbine</th>
<th>Current Factors Affecting Visibility</th>
<th>Relative Sensitivity</th>
<th>Magnitude of Effects</th>
<th>Level of Effects (* significant effect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>153</td>
<td>Barr, Stinchar Road, Barr Parish Church</td>
<td>Category C Listed</td>
<td>1-7</td>
<td>2.53km</td>
<td>Topography and intervening buildings will largely, if not completely, block views of the turbines from the church yard. However turbines may be visible in views of the church from Gregg Bridge (Site 156) to the south.</td>
<td>Medium (to changes beyond village)</td>
<td>Marginal</td>
<td>Negligible</td>
</tr>
<tr>
<td>154</td>
<td>Alton Albany, Lodge</td>
<td>Category C Listed</td>
<td>29-31</td>
<td>2.5km</td>
<td>Intervening trees will largely, if not completely, block visibility.</td>
<td>Medium</td>
<td>Marginal</td>
<td>Negligible</td>
</tr>
<tr>
<td>155</td>
<td>Barr, Stinchar Bridge</td>
<td>Category B Listed</td>
<td>15-21</td>
<td>2.5km</td>
<td>Views northward will be severely impeded by trees although it is possible that some limited visibility of the turbines will occur</td>
<td>Low</td>
<td>Low</td>
<td>Negligible</td>
</tr>
<tr>
<td>156</td>
<td>Barr, Water of Gregg, Gregg Bridge</td>
<td>Category C Listed</td>
<td>1-7</td>
<td>2.5km</td>
<td>Intervening trees and buildings may completely block visibility.</td>
<td>Low</td>
<td>Low</td>
<td>Negligible</td>
</tr>
<tr>
<td>157</td>
<td>Barr, 4a Stinchar Road, Burnlea</td>
<td>Category B Listed</td>
<td>1-7</td>
<td>2.5km</td>
<td>Visibility blocked by intervening buildings and vegetation</td>
<td>Low</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>158</td>
<td>Barr, 1a Changue Road, Jolly Shephard Hotel</td>
<td>Category C Listed</td>
<td>1-7</td>
<td>2.5km</td>
<td>Visibility blocked by intervening buildings and vegetation</td>
<td>Low</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>159</td>
<td>Barr, 4 Changue Road Bridge View</td>
<td>Category C Listed</td>
<td>1-7</td>
<td>2.5km</td>
<td>Visibility blocked by intervening buildings and vegetation</td>
<td>Low</td>
<td>None</td>
<td>None</td>
</tr>
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<td>Site No.</td>
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<td>Magnitude of Effects</td>
<td>Level of Effects (* significant effect)</td>
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</tr>
<tr>
<td>160</td>
<td>Barr, 6 Changue Road, Shalloch Cottage</td>
<td>Category C Listed</td>
<td>1-7</td>
<td>2.5km</td>
<td>Visibility blocked by intervening buildings and vegetation</td>
<td>Low</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>161</td>
<td>Barr, 7 Changue Road, Gregholm</td>
<td>Category B Listed</td>
<td>1-7</td>
<td>2.5km</td>
<td>Visibility blocked by intervening buildings and vegetation</td>
<td>Low</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>162</td>
<td>Barr, Dinmurchie</td>
<td>Category C Listed</td>
<td>1-7</td>
<td>2.65km</td>
<td>Derelict farmhouse, Some visibility possible, through trees in winter. Although intervening trees will largely block visibility.</td>
<td>Medium</td>
<td>Marginal</td>
<td>Negligible</td>
</tr>
<tr>
<td>163</td>
<td>Alton Albany</td>
<td>Category B Listed</td>
<td>22-28</td>
<td>2.8km</td>
<td>House positioned by river, tree cover will largely, if not completely, block visibility</td>
<td>Medium</td>
<td>Marginal</td>
<td>Negligible</td>
</tr>
<tr>
<td>164</td>
<td>Alton Albany Farmhouse</td>
<td>Category C Listed</td>
<td>22-28</td>
<td>2.9km</td>
<td>Visibility will be through tree cover</td>
<td>Medium</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>165</td>
<td>Auchensoul</td>
<td>Category C Listed</td>
<td>1-7</td>
<td>3.5km</td>
<td>Tree cover will completely block visibility</td>
<td>Medium</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>c.5.7km</td>
<td>to the nearest visible turbine</td>
<td></td>
<td></td>
<td></td>
</tr>
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</tr>
<tr>
<td>166</td>
<td>Kirkdominae</td>
<td>Category B Listed</td>
<td>1-7</td>
<td>3.9km c.6.15km to the nearest visible turbine</td>
<td>Tree cover will largely, or completely, block visibility</td>
<td>Medium</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>167</td>
<td>Camregan Castle</td>
<td>Scheduled Monument</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>168</td>
<td>Houdston Hill</td>
<td>Scheduled Monument</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>169</td>
<td>Dow Hill</td>
<td>Scheduled Monument</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>170</td>
<td>Girvan, Shalloch Hill</td>
<td>Scheduled Monument</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>171</td>
<td>Dinvin</td>
<td>Scheduled Monument</td>
<td>22-28</td>
<td>7.4km</td>
<td>Surrounding land outwith ZTV however the summit upon which the monument stands lifts it into view.</td>
<td>High</td>
<td>Low</td>
<td>Minor-Moderate</td>
</tr>
<tr>
<td>172</td>
<td>Girvan, Mote Hill Road</td>
<td>Scheduled Monument</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
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<th>Level of Effects (* significant effect)</th>
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<tbody>
<tr>
<td>173</td>
<td>Girvan Mains, Temporary Roman Camp</td>
<td>Scheduled Monument</td>
<td>8-14</td>
<td></td>
<td>Cropmark site detectable only through aerial photographs or possibly remote sensing. No visual presence within the landscape.</td>
<td>Marginal</td>
<td>Marginal</td>
<td>None</td>
</tr>
<tr>
<td>174</td>
<td>Girvan Mains, Temporary Roman Camp</td>
<td>Scheduled Monument</td>
<td>1-7</td>
<td></td>
<td>Cropmark site detectable only through aerial photographs or possibly remote sensing. No visual presence within the landscape.</td>
<td>Marginal</td>
<td>Marginal</td>
<td>None</td>
</tr>
<tr>
<td>175</td>
<td>Girvan Mains, Temporary Roman Camp</td>
<td>Scheduled Monument</td>
<td>8-14</td>
<td></td>
<td>Cropmark site detectable only through aerial photographs or possibly remote sensing. No visual presence within the landscape.</td>
<td>Marginal</td>
<td>Marginal</td>
<td>None</td>
</tr>
<tr>
<td>176</td>
<td>Girvan Mains, Enclosure</td>
<td>Scheduled Monument</td>
<td>1-7</td>
<td></td>
<td>Cropmark site detectable only through aerial photographs or possibly remote sensing. No visual presence within the landscape.</td>
<td>Marginal</td>
<td>Marginal</td>
<td>None</td>
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</tr>
<tr>
<td>177</td>
<td>Girvan Mains, Settlement, Ring Ditch</td>
<td>Scheduled Monument</td>
<td>8-14</td>
<td></td>
<td>Cropmark site detectable only through aerial photographs or possibly remote sensing. No visual presence within the landscape.</td>
<td>Marginal</td>
<td>Marginal</td>
<td>None</td>
</tr>
<tr>
<td>178</td>
<td>Girvan Mains, Ring Ditch</td>
<td>Scheduled Monument</td>
<td>8-14</td>
<td></td>
<td>Cropmark site detectable only through aerial photographs or possibly remote sensing. No visual presence within the landscape.</td>
<td>Marginal</td>
<td>Marginal</td>
<td>None</td>
</tr>
<tr>
<td>179</td>
<td>Craighead Hill, Dun</td>
<td>Scheduled Monument</td>
<td>None</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>180</td>
<td>Dowhill Mount</td>
<td>Scheduled Monument</td>
<td>8-14</td>
<td>9.3km</td>
<td>Proposed turbines will appear behind existing operational Hadyard Hill Wind Farm</td>
<td>High</td>
<td>Marginal</td>
<td>Minor</td>
</tr>
<tr>
<td>181</td>
<td>Hollowshean</td>
<td>Scheduled Monument</td>
<td>15-21</td>
<td>9km</td>
<td>None</td>
<td>High</td>
<td>Marginal</td>
<td>Minor</td>
</tr>
<tr>
<td>186</td>
<td>Corsraguel Abbey</td>
<td>Scheduled Monument</td>
<td>None</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>187</td>
<td>Kildoon Fort</td>
<td>Scheduled Monument</td>
<td>22-28</td>
<td>7.73km</td>
<td>Turbines will appear on the southern horizon</td>
<td>High</td>
<td>Marginal</td>
<td>Minor</td>
</tr>
<tr>
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<td>--------------------------------------</td>
</tr>
<tr>
<td>193</td>
<td>Straiton, Main Street, Straiton Parish Church</td>
<td>Category A Listed</td>
<td>None</td>
<td>-</td>
<td>Intervening trees may block visibility</td>
<td>Medium</td>
<td>Marginal</td>
<td>Negligible</td>
</tr>
<tr>
<td>195</td>
<td>Drumfad Dovecot</td>
<td>Category A Listed</td>
<td>15-21</td>
<td>9.32km</td>
<td>Intervening trees may block visibility</td>
<td>Medium</td>
<td>Marginal</td>
<td>Negligible</td>
</tr>
<tr>
<td>273</td>
<td>Bargany Designed Landscape</td>
<td>Inventoried Garden and Designed Landscape</td>
<td>14 (visible from golf course) (LVIA Viewpoint 11)</td>
<td>3.6km</td>
<td>Parts of the designated area falls outwith the ZTV. Trees will block visibility from the western core of the Inventoried Garden and Designed Landscape which has a High Relative Sensitivity Eastern part of the designed Landscape, where visibility is predicted now contains a golf course, holiday chalet park, modern housing and a road network (LVIA Viewpoint 11.01). Although it falls within the Inventoried Designed Landscape it has a Low Relative Sensitivity.</td>
<td>Low</td>
<td>Low</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
### Table 8.10: Summary of Effects upon the Setting of Designated Heritage Assets Considered by this Assessment

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</thead>
<tbody>
<tr>
<td>274</td>
<td>Barr Conservation Area</td>
<td>Conservation Area</td>
<td>29-31 northern tip of designated area. 1-7 within historic core (LVIA Viewpoint 6)</td>
<td>2.165km</td>
<td>Visibility within the historic core of the conservation area will be largely, if not entirely blocked by intervening trees, topography and buildings. More open visibility with some tree shielding from northern end of conservation area (Glenginnet Road), visibility greatest from the extreme northern extent of the village</td>
<td>Medium (to changes beyond village)</td>
<td>Medium</td>
<td>Minor-Moderate</td>
</tr>
<tr>
<td>275</td>
<td>Crosshill Conservation Area</td>
<td>Conservation Area</td>
<td>15-21</td>
<td>6.67km</td>
<td>Between 8-14 turbines theoretically visible from the extreme southern tip of conservation area (Site 114). Elsewhere views will be block by intervening, buildings, walls and vegetation.</td>
<td>Medium</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>276</td>
<td>Girvan Conservation Area</td>
<td>Conservation Area</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
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<tbody>
<tr>
<td>277</td>
<td>Kirkmichael Conservation Area</td>
<td>Conservation Area</td>
<td>22-28 extreme northern edge.</td>
<td>9.4km</td>
<td>Within conservation area views will be block by intervening, buildings, walls and vegetation. ZTV indicates some theoretical visibility from western extent of conservation area. However, the site visit confirmed these will be blocked by trees.</td>
<td>High</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>280</td>
<td>Straiton Conservation Area</td>
<td>Conservation Area</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>283</td>
<td>Balcletchie</td>
<td>Ayrshire Designed Landscape</td>
<td>15-21</td>
<td>1.89km</td>
<td>Low Low Negligible</td>
<td>Low</td>
<td>Low</td>
<td>Negligible</td>
</tr>
<tr>
<td>294</td>
<td>Drumocheen House</td>
<td>Scheduled Monument</td>
<td>15-21</td>
<td>4km</td>
<td>Low Low Negligible</td>
<td>Low</td>
<td>Low</td>
<td>Negligible</td>
</tr>
<tr>
<td>295</td>
<td>Kilkerran Lady Chapel</td>
<td>Scheduled Monument</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>312</td>
<td>Rowantree, Tollhouse and Inn</td>
<td>Scheduled Monument</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>313</td>
<td>Tormitchell</td>
<td>Ayrshire Designed Landscape</td>
<td>22-28</td>
<td>2.44km</td>
<td>Low Low Negligible</td>
<td>Low</td>
<td>Low</td>
<td>Negligible</td>
</tr>
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</tr>
<tr>
<td>314</td>
<td>Benan</td>
<td>Ayrshire Designed Landscape</td>
<td>1-7</td>
<td>5.17km (centre)</td>
<td>Recorded by Blaeu 1654. Had been removed by 1680 (Peter McGowan Associates and Dingwall 2009, 10). No longer survives</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>315</td>
<td>Penkill</td>
<td>Ayrshire Designed Landscape</td>
<td>29-31</td>
<td>3.17km</td>
<td>The core of the designed landscape surrounding Penkill Castle (Site 132) falls outside the ZTV.</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>316</td>
<td>Dalquharran Castle</td>
<td>Ayrshire Designed Landscape</td>
<td>22-28</td>
<td>3.63km</td>
<td>Trees which will block or obscure visibility from some parts of the designed landscape</td>
<td>Medium</td>
<td>Medium</td>
<td>Minor-Moderate</td>
</tr>
<tr>
<td>317</td>
<td>Kirkbride House</td>
<td>Ayrshire Designed Landscape</td>
<td>8-14</td>
<td>4.38km</td>
<td>Visibility will, to at least a degree be blocked by plantations</td>
<td>Medium</td>
<td>Low</td>
<td>Minor</td>
</tr>
<tr>
<td>318</td>
<td>Pinbreck Hill Cairn</td>
<td>WoSAS NSR Site</td>
<td>29-31</td>
<td>4.36km</td>
<td></td>
<td>Low</td>
<td>Medium</td>
<td>Minor</td>
</tr>
<tr>
<td>319</td>
<td>The Pilot, House- Platform, 500m WNW of</td>
<td>WoSAS NSR Site</td>
<td>29-31</td>
<td>7.70km</td>
<td></td>
<td>Low</td>
<td>Medium</td>
<td>Minor</td>
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<tr>
<td>320</td>
<td>Dalquharran Colliery, cropmarks 60m E of</td>
<td>WoSAS NSR Site</td>
<td>15-21</td>
<td>4.35km</td>
<td>Cropmark site detectable only through aerial photographs or possibly remote sensing. No visual presence within the landscape.</td>
<td>Marginal</td>
<td>Marginal</td>
<td>None</td>
</tr>
<tr>
<td>321</td>
<td>Maxwellston, Enclosure 540m WNW of</td>
<td>WoSAS NSR Site</td>
<td>8-14</td>
<td>4.16km</td>
<td>Cropmark site detectable only through aerial photographs or possibly remote sensing. No visual presence within the landscape.</td>
<td>Marginal</td>
<td>Marginal</td>
<td>None</td>
</tr>
<tr>
<td>322</td>
<td>Balcletchie, Cairn 380m NNW of</td>
<td>WoSAS NSR Site</td>
<td>15-21</td>
<td>1.95km</td>
<td>Low Medium Minor</td>
<td>Low</td>
<td>Medium</td>
<td>Minor</td>
</tr>
<tr>
<td>323</td>
<td>Dalquhairn, Cairn 220m SSW of</td>
<td>WoSAS NSR Site</td>
<td>8-14</td>
<td>0.91km</td>
<td>Low Medium Minor</td>
<td>Low</td>
<td>Medium</td>
<td>Minor</td>
</tr>
<tr>
<td>324</td>
<td>Pinvalley Cairn 110m N of</td>
<td>WoSAS NSR Site</td>
<td>22-28</td>
<td>2.13km</td>
<td>Cairn destroyed. No longer visible no longer visible on the ground surface. No evidence of any surviving below ground remains</td>
<td>-</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>325</td>
<td>Knockeen, Cairn 300m WSW of</td>
<td>WoSAS NSR Site</td>
<td>15-21</td>
<td>1.41km</td>
<td>Low Medium Minor</td>
<td>Low</td>
<td>Medium</td>
<td>Minor</td>
</tr>
</tbody>
</table>
Predicted Significant Effects

8.7.71 Dalquharran Castle (Site 116) is an 18th century (1782-1790) country house by Robert Adam. Built for the architect’s brother in law, Thomas Kennedy of Dunure, Adam designed the castle in a crenellated gothic style rigidly structured around an underlying formal Palladianism. Dalquharran has similarities with nearby Culzean Castle, designed by Adam for another branch of the Kennedy family between 1777 and 1812. The castle stands north of Dailly on the south facing slopes of the Girvan Valley it was built in replacement of an earlier 15th century Dalquharran Castle (Site 117) the remains of which survive to its southeast on the north bank of the River Girvan. Adam’s castle is Category A Listed, whilst its 15th century predecessor is both Category A Listed and Scheduled. Whilst the landscape within which the castles are set is not designated it is included in the Ayrshire Designed Landscapes Survey (Site 317) (Peter McGowan Associates and Dingwall 2009) and is discussed in Technical Appendix 8.4. Although visibility between the two castles is limited by trees, taken together the two castles form a sequential group and each contribute greatly to the immediate setting of the other. A contemporary north-west facing view of Dalquharran (Cocking 1789, not illustrated) clearly shows the two castles standing together within the designed landscape. It not only highlights the contrast between the old and the new but also emphases that the estate, and by implication the family, were long established.

8.7.72 Whilst the architectural value of Adam’s Dalquharran is undoubted, it’s has been compromised by two actions, the first occurred in the 1880’s when two wings were added to the sides of the castle (Technical Appendix 8.5: Plate 8.9). Although they are broadly similar in style to the original, the wings stand almost to the full height of Adam’s work and elongate his composition meaning that the castle can no longer be read as the classicised reflection of the traditional Scottish tower house which he had intended. The extensions are also asymmetrical and as a consequence the balance and proportion which was central to Palladian architecture has been compromised. The second action was the loss of the castle roof which occurred around 1970, the consequence of which has been either the total or near total loss of all the interiors. Very little of the timberwork survives and the building has become a stone shell. The castle is fenced off and could not be entered on safety grounds, although it appeared from outside the fence line that few if any of the floors survive.

8.7.73 Adam placed the castle prominently on a hill overlooking the Girvan Valley, clearly with the intention of making it appear conspicuous and visually dominant when viewed from the south and southeast and it could be argued that views in that direction towards the castle from the direction of the B741 form its principal ‘public setting’. The location of the proposed development to the south of the castle means that the proposed turbines would not intervene in these views of the castle from the south. However as with many stately homes Dalquharran can also be said to have a ‘private’ setting, that is to say views both from within the grounds and out from the castle which were intended for the enjoyment of the occupants. Dalquharran has two distinct fronts; the north-west elevation; the principal entrance to the castle, fronted a courtyard, with a crenulated stable block on the opposing side; the southeast elevation by contrast was laid out so as to front open views out across the Girvan Valley towards the hills opposite. It is this elevation which appears so conspicuous when viewed from the southeast. Adam structured the southeast elevation around a central four storey circular rotunda (Technical Appendix 8.5: Plate 8.10), placing two of the castle’s principal state rooms within the rotunda; the drawing room on the elevated ground floor, over the basement and the library on the top floor. Large windows set within the southeast elevation, afforded considerable views out from the castle and it can be
reasonably argued that the both drawing room and the library were placed within the rotunda so as to enjoy the maximum benefit of these views. Although the castle is ruined its shell still forms a prominent landmark and Adam's intended sight lines out from the castle are still clearly discernible. The castle clearly has a high aesthetic value and also retains an intended authentic relationship with its setting and the surrounding landscape and as a consequence is judged to have a High Relative Sensitivity. Whilst the 1880's extensions are arguably of poorer architectural quality and damage Adam's original vision, they still fall within the castle's Category A Listing and their impact is limited to the castle's south-west and northeast elevations where they butt against, block and possibly destroy Adam's original elevations.

8.7.74 Wire line evidence (Figure 8.11 CH Viewpoint 5) indicates that 20 turbines would be visible, 14 of which would stand above hub height in views southeast from the castle's southeast elevation, although the nearest turbine (Turbine 6) would be 4.26km away. Whilst turbines would clearly be visible from all the upper floors within the southeast elevation, the loss of the floors means that these views are presently unobtainable. Overgrown vegetation in front of the southeast elevation currently severely impedes visibility out from the central area, in front of the rotunda, at ground level and it is possible that visibility would be entirely blocked in summer (Plate 8.11). However, this finding is based on the ground level in front of the fenced enclosure which currently secures the castle. A flight of steps within the fenced area leads up through the surviving drawing room doors into the elevated ground floor. It is possible, indeed likely, that there would be greater visibility from the elevated ground floor both within the rotunda and along the southeast elevation, although this cannot be verified without access to the interior of the structure.

8.7.75 Overall, whilst the proposed turbines would be visible from the castle, they would stand out with its immediate setting which can be defined as the castle's grounds and its position within the Girvan Valley. The proposed development would also not intrude on its critical associative relationship with the ruins of its 15th century predecessor which lie to the south. Whilst overgrown vegetation currently obscures views of the proposed development from the ground in front of the rotunda, visibility from within the elevated ground floor is likely to be greater. The proposed development would be visible in views out from the castle's southeast elevation, however the nearest turbine would be placed 4.26 km from the castle and the turbines would be set within the wider panorama of the hills which extend southwards from the Girvan Valley. This distance of separation would mediate the Magnitude of Effect (Table 8.5) that the turbines would have, as the wide panoramas intended by Adam to be available from the castle would still be readily understandable. On balance the presence of turbines on the opposing hillslope would represent a significant alteration to the setting of the castle. However, the criteria laid out in Table 8.6 attaches weight to 'those elements of the setting which directly contribute to the understanding of the cultural value of the asset'. In the case of Dalquharran, the core elements of the castle's setting can be defined as its relationship with the crenellated stable courtyard to its north-west (which forms its curtilage), its visual relationship with its predecessor (Site 117) and the remnants of the designed landscape which intertwined them. Given that the castle was clearly intended to be visually prominent, views of the rotunda from the south over the Girvan also directly contribute to the understanding of its cultural value. Whilst the placing of rooms at height within the rotunda suggests that importance was also attached to views out across the Girvan, these views would have been wide, taking in a panorama rather than focussed on a single monument or landscape feature such as a prominent crag or summit. However it is clear than in his positioning of the castle and the rotunda in particular Adam attached weight to out across the wider valley. Whilst the turbines would form new features within this
significant view they would not obscure the view of the landscape and as such the intended relationship between Adam's Dalquharran and the landscape to the southeast. The degree of separation between the castle and the turbines, 4.3km to the nearest turbine, would also be a factor in limiting the magnitude of their visual effect (Table 8.5). Consequently, the proposed development would not materially diminish the observer’s ability to understand the relationship between the building and views in that direction. Given all of the above the magnitude of effect is, on balance, judged to be to Medium. Given the castle's High Relative Sensitivity to changes to its setting, the effect is assessed as Moderate and Significant. However it needs to be recognised that given the castle's poor condition and the loss of the floors in particular, views from the upper floor windows and from Adam's library in the upper rotunda in particular are no longer obtainable and that any visibility would be from the ground in front of the castle where views are presently partially blocked by vegetation (Technical Appendix 8.5: Plate 8.11).

**Predicted Non-Significant Effects**

The settings assessment found that the effect of the development upon the settings of 33 designated assets would be less than significant (Negligible to Minor Moderate). For a further 35 designated assets there would be either no effect (None) where these assets either fall outwith the ZTV or are represented by cropmark evidence only or effects of No Significance on the settings of where using the criteria outlined in Table’s 8.2, 8.3, 8.5, 8.6 and 8.8, settings effects are judged to be less than Negligible. These findings are listed in Table 8:10 above and are explored in detail along with non-significant effects on the settings of eight non-designated sites included on the WoSAS NSR and 6 non-designated designed landscapes reported on the Ayrshire Designed Landscapes Survey (Peter McGowan Associates and Dingwall 2009) in Technical Appendix 8.4.

**Decommissioning Effects**

8.7.76 Decommissioning works would be limited to the removal of turbines and their infrastructure. If further groundworks are required during the decommissioning works or if plant movements are required beyond the hardstanding comprising the turbine infrastructure then all known sites within 50 m of the proposed working areas would be fenced off with a visible buffer under archaeological supervision prior to the start of decommissioning work in order to avoid accidental damage by heavy plant movement. Indirect effects upon the settings designated assets would also be reversed with the removal of turbines. Consequently, **No Significant** decommissioning effects are predicted and no mitigation measures, apart from potentially fencing archaeological monuments, are considered necessary during the removal of the wind farm.

**8.8 Cumulative Effects**

8.8.77 Cumulative effects, in this context, are considered to be additional effects resulting from the placing of the proposed development alongside other operational, consented or proposed wind farms within the landscape. In terms of cultural heritage, it is necessary to consider whether the effects of other schemes in conjunction with the proposed development will result in an additional cumulative change upon the settings of heritage assets, beyond the levels predicted for the proposed development alone in Table 8.10. The potential for direct effects are not considered as these will be unaffected by other wind farm schemes.
8.8.78 Cumulative effects are assessed using the same criteria as was used in determining effects resulting from the proposed development alone as outlined in Section 8.3 and Tables 8.3, 8.5 8.6 and 8.8. The factors for determining the magnitude of effect outlined in Table 8.5 are particularly relevant when considering the potential for cumulative resulting from additional wind farm schemes, as the scope of a cumulative assessment is to a large extent determined by distance. Wind farms located 20 or 30 kilometres away are less likely to result in a significant additional cumulative change upon the settings of heritage assets than a wind farm which stands within 5km as they will appear significantly smaller and are more likely to be ‘lost’ within a haze at the rear of distant views or their effect diminished by the complexity of the intervening landscape. For example whilst the wireline (CH Viewpoint 2) shows the operational Artfield Fell (WF 6), Balmurrie Fell (WF 7) turbines to be theoretically visible from the Scheduled fort on Maxwellston Hill (Site 25) at distances of 29.08 km and 29.38 km neither could be seen from the monument on the day of the site visit despite clear visibility.

8.8.79 This observation is in line with PAN 45, which although now superseded by SPP 2014, provided more detailed guidance than SPP on the visibility of turbines. PAN45 noted that wind turbines located at a distance of 15 to 30 km away are ‘only seen in very clear visibility – a minor element in the landscape’. Scottish Natural Heritage’s (SNH) Siting and Designing Wind Farms in the Landscape notes, however, that, ‘The visibility and visual impacts of a wind farm are affected by the distance from which it is viewed, as well as other aspects such as weather conditions and siting. In the past, guidance notes such as Planning Advice Note 45 have offered generic categories of visibility and visual impact in relation to distance, suggesting the following: that in an open landscape at distances of up to 2 km, a wind farm is likely to be a prominent feature; between 2–5 km it will be relatively prominent; between 5–15 km only prominent in clear visibility when it is seen as part of the wider landscape; and over 15 km it will only be seen in very clear visibility and as a minor element in the landscape. However, in practice these guidelines are limited in their application: – firstly, because it is unclear what height of turbine these distances were based upon; and, – secondly, because visual impacts are not directly proportional to distance, as the nature of a view (e.g. a framed/open view or back-clothed/skyline view) and its context are as important as the size of a development within that view’ (Scottish Natural Heritage 2009, Para 4.20). However, it is considered that impacts at such distances are unlikely in most instances, to have a significant impact on the cultural heritage value of assets.

8.8.80 For the reasons outlined above only wind farm schemes located within 15 km of the proposed development have been considered. This assessment is based upon a list of operational or consented developments along with sites where permission has been applied for and sites where proposals are currently at scoping. Cumulative sites are mapped on Figure 5.13a and its accompanying legend. Operational wind farms are discussed with the cumulatives, although as pre-existing developments they form part of the baseline. The list was compiled in consultation with SAC and SNH and is current to the 9th of December 2014\(^\text{1}\). Wind farms which fall within 15 km and which are considered within this chapter are listed in Table 8.11 below.

\(^{1}\) With the exception of Kirk Hill wind farm – Kirk Hill wind farm was submitted for consent following the 9th December 2014 cut-off; however given it’s proximity to the proposed development, it has been considered as an ‘applicant/appeal’ site.
### Table 8.11: Cumulative Wind Farm Developments within 15 km of the Site

<table>
<thead>
<tr>
<th>Figure 5.13 WF No.</th>
<th>Project Name</th>
<th>Status</th>
<th>Description (no x blade tip height)</th>
<th>Distance from Proposed Development (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hadyard Hill</td>
<td>Operational</td>
<td>52 x 100/110 m</td>
<td>0.39</td>
</tr>
<tr>
<td>2</td>
<td>Dowhill Farm</td>
<td>Operational</td>
<td>1 x 77 m</td>
<td>8.59</td>
</tr>
<tr>
<td>3</td>
<td>Mark Hill</td>
<td>Operational</td>
<td>28 x 110 m</td>
<td>9.72</td>
</tr>
<tr>
<td>34</td>
<td>Tralorg</td>
<td>Consented</td>
<td>8 x 100 m</td>
<td>4.48</td>
</tr>
<tr>
<td>35</td>
<td>Assel Valley</td>
<td>Consented</td>
<td>10 x 110 m</td>
<td>5.02</td>
</tr>
<tr>
<td>36</td>
<td>North Threave</td>
<td>Consented</td>
<td>1 x 53.71 m</td>
<td>8.00</td>
</tr>
<tr>
<td>37</td>
<td>Chapleton Farm</td>
<td>Consented</td>
<td>3 x 67 m</td>
<td>8.21</td>
</tr>
<tr>
<td>38</td>
<td>Dersalloch</td>
<td>Consented</td>
<td>23 x 110/115/12.5 m</td>
<td>8.62</td>
</tr>
<tr>
<td>72</td>
<td>Penwhapple</td>
<td>Application/Appeal</td>
<td>1 x 102 m</td>
<td>1.37</td>
</tr>
<tr>
<td>73</td>
<td>Linfarin Farm</td>
<td>Application/Appeal</td>
<td>17 x 126.5 m</td>
<td>3.55</td>
</tr>
<tr>
<td>74</td>
<td>High Troweir</td>
<td>Application/Appeal</td>
<td>1 x 79 m</td>
<td>4.26</td>
</tr>
<tr>
<td>75</td>
<td>Millenderdale</td>
<td>Application/Appeal</td>
<td>7 x 125 m</td>
<td>9.52</td>
</tr>
<tr>
<td>76</td>
<td>Breaker Hill</td>
<td>Application/Appeal</td>
<td>9 x 86.5 m</td>
<td>11.40</td>
</tr>
<tr>
<td>77</td>
<td>Keirs Hill</td>
<td>Application/Appeal</td>
<td>17 x 149 m</td>
<td>11.61</td>
</tr>
<tr>
<td>78</td>
<td>Glenmount</td>
<td>Application/Appeal</td>
<td>19 x 130 m</td>
<td>11.65</td>
</tr>
<tr>
<td>79</td>
<td>Straid Farm</td>
<td>Application/Appeal</td>
<td>14 x 99.5 m</td>
<td>12.32</td>
</tr>
<tr>
<td>137</td>
<td>Knockskae</td>
<td>Scoping</td>
<td>12 x 125 m</td>
<td>1.99</td>
</tr>
<tr>
<td>138</td>
<td>Kirk Hill</td>
<td>Application/Appeal</td>
<td>8 x 110 m</td>
<td>5.66</td>
</tr>
<tr>
<td>139</td>
<td>Mark Hill (Ext)</td>
<td>Scoping</td>
<td>28 x 121.5 m</td>
<td>10.87</td>
</tr>
<tr>
<td>140</td>
<td>Knowside (re-submission)</td>
<td>Scoping</td>
<td>8 x 132 m</td>
<td>12.26</td>
</tr>
</tbody>
</table>

8.8.81 The potential for additional cumulative change, resulting from the effects of the proposed development in combination with other schemes has only been considered for those assets where the effects upon the setting from the Hadyard Hill Extension development, alone, have been judged in table 8.10 to be an effect of Minor-Moderate significance or greater. The setting of assets which would have an effect of less than Minor-Moderate significance (based on the Hadyard Extension alone) are unlikely to reach the EIA threshold of significance as defined in section 8.3 of the above. Predicted additional cumulative effects upon the settings of these monuments, resulting from the placing of the proposed development in relation to other wind farm schemes is summarised in Table 8.12 and discussed below.
### Table 8.12: Cumulative Effects

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Site Name</th>
<th>Designation</th>
<th>Hadyard Hill Extension Significance of Setting Effect</th>
<th>Relative Sensitivity</th>
<th>Magnitude of Cumulative Effects Resulting from the Placing of the Proposed Development Alongside the Cumulative Schemes</th>
<th>Level of Combined Cumulative Effects (<em>Significant Effect</em>)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Kilkerran</td>
<td>Inventoried Garden and Designed Landscape</td>
<td>Minor-Moderate</td>
<td>High</td>
<td>Low-</td>
<td>Minor-Moderate</td>
</tr>
<tr>
<td>25</td>
<td>Maxwellston Hill</td>
<td>Scheduled Monument</td>
<td>Minor-Moderate</td>
<td>Medium</td>
<td>Medium</td>
<td>Minor - Moderate</td>
</tr>
<tr>
<td>115</td>
<td>Drumburle</td>
<td>Category A Listed</td>
<td>Minor – Moderate</td>
<td>High</td>
<td>Low</td>
<td>Minor-Moderate</td>
</tr>
</tbody>
</table>

Visibility / Predicted Visibility with Proposed Development alongside other Operational / Proposed Wind Turbines listed in Table 8.11 For Predicted Visibility with proposed Development Alone see Table 8.10 Cumulative Effects are Discussed in Detail in the Paragraphs which Follow this Table

10 Kilkerran Inventoried Garden and Designed Landscape Minor-Moderate Figure 8.14; CH Viewpoint 8 shows 6 operational Hadyard (WF 1) turbines to be visible along with the consented turbines at Assel Valley (WF 34) and Tralorg (WF 35)

25 Maxwellston Hill Scheduled Monument Minor-Moderate Proposed turbines would appear to the rear of the operational Hadyard turbines (WF 1). Wireline (CH Viewpoint 2) indicates that further operational (WF 3) consented (WF’s 34-5) or application turbines (WF’s 72, 74-76 and 79) would also appear to the rear of the operational Hadyard (WF 1) turbines.

The application turbines at Kirk Hill (WF 138) would stand behind the northern ridge of the Girvan Valley, north, north-east of the proposed development.

115 Drumburle Category A Listed Minor – Moderate Wireline (CH Viewpoint 4) indicates that elements of nine operational Hadyard turbines (WF 1) are theoretically visible although only two could be seen during the site visit due to tree cover.

The cumulative ZTV submitted with the Kirk Hill application (WF 138) indicates
Chapter 8
Archaeology and Cultural Heritage

Hadyard Hill Extension Wind Farm
Environmental Statement

Table 8.12: Cumulative Effects
Site
No.

Site Name

Designation

Hadyard Hill
Extension
Significance of
Setting Effect

Visibility / Predicted Visibility with
Proposed Development alongside
other Operational / Proposed Wind
Turbines listed in Table 8.11
For Predicted Visibility with proposed
Development Alone see Table 8.10
Cumulative Effects are Discussed in
Detail in the Paragraphs which Follow
this Table
that between 3-5 turbines would be
theoretically visible from Drumburle
(Coriolis Energy 2014, Fig 13.3).

Relative
Sensitivity

Magnitude of
Cumulative
Effects Resulting
from the Placing
of the Proposed
Development
Alongside the
Cumulative
Schemes

Level of
Combined
Cumulative
Effects
(*Significant
Effect)

116

Dalquharran
Castle (18th
Century)

Category A
Listed

Moderate

CH Viewpoint 5 indicates that the extreme
tips of five of the operational Hadyard
turbines are theoretically visible in views
southeast from the castle. However only
one blade tip could be seen during the
site visit.

High

Medium

Moderate*

High

Low

MinorModerate

A photomontage supplied with the Kirk
Hill (WF 138) application shows that 5
Kirk Hill turbines would be visible, three
above hub height (Coriolis Energy 2014,
Viewpoint CH6c)
117

Dalquharran
Castle (15th
Century)

Category A
Listed

Minor-Moderate

The site visit demonstrated that tree cover
which shields the castle will completely
block visibility with the operational
Hadyard Turbines (WF 1)
The Kirk Hill turbines (WF 138), will
appear, at least in winter in views to the
north

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<table>
<thead>
<tr>
<th>Site No.</th>
<th>Site Name</th>
<th>Designation</th>
<th>Hadyard Hill Extension Significance of Setting Effect</th>
<th>Visibility / Predicted Visibility with Proposed Development alongside other Operational / Proposed Wind Turbines listed in Table 8.11 For Predicted Visibility with proposed Development Alone see Table 8.10 Cumulative Effects are Discussed in Detail in the Paragraphs which Follow this Table</th>
<th>Relative Sensitivity</th>
<th>Magnitude of Cumulative Effects Resulting from the Placing of the Proposed Development Alongside the Cumulative Schemes</th>
<th>Level of Combined Cumulative Effects (<em>Significant Effect</em>)</th>
</tr>
</thead>
<tbody>
<tr>
<td>133</td>
<td>Kilocan Castle</td>
<td>Category A Listed</td>
<td>Minor-Moderate</td>
<td>The proposed Kirk Hill turbines (WF 138) will not be visible (Coriolis Energy 2014, Fig 13.3) The combined Hadyard Hill/ Hadyard Hill ext ZTV (Fig 5.14), indicates that the operational Hadyard turbines are theoretically visible from the castle.</td>
<td>High</td>
<td>Low</td>
<td>Minor-Moderate</td>
</tr>
<tr>
<td>137</td>
<td>Blairquhan</td>
<td>Inventoried Garden and Designed Landscape</td>
<td>Minor-Moderate</td>
<td>The core of the GDL lies outwith the combined Hadyard Hill/ Hadyard Hill ext ZTV (Fig 14) ZTV. The Linfairn Farm (WF 73) and Knockskae (WF 137) schemes, to the south of Blairquhan are closer to the IGDL and any visibility with the proposed development will be through these turbines and not a significant cumulative effect</td>
<td>High</td>
<td>Low</td>
<td>Minor-Moderate</td>
</tr>
<tr>
<td>148</td>
<td>Bencallen Hill, The Druids Grave</td>
<td>Scheduled Monument</td>
<td>Minor-Moderate</td>
<td>21 of the operational Hadyard turbines are theoretically visible from the Bencallen Hill Chambered Cairn (Site 148, CH Viewpoint 7).</td>
<td>Medium</td>
<td>Medium</td>
<td>Minor-Moderate</td>
</tr>
</tbody>
</table>
Table 8.12: Cumulative Effects

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Site Name</th>
<th>Designation</th>
<th>Hadyard Hill Extension Significance of Setting Effect</th>
<th>Visibility / Predicted Visibility with Proposed Development alongside other Operational / Proposed Wind Turbines listed in Table 8.11 For Predicted Visibility with proposed Development Alone see Table 8.10 Cumulative Effects are Discussed in Detail in the Paragraphs which Follow this Table</th>
<th>Relative Sensitivity</th>
<th>Magnitude of Cumulative Effects Resulting from the Placing of the Proposed Development Alongside the Cumulative Schemes</th>
<th>Level of Combined Cumulative Effects (*Significant Effect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>171</td>
<td>Dinvin</td>
<td>Scheduled Monument</td>
<td>Minor-Moderate</td>
<td>The proposed development will stand behind the operational Hadyard turbines which are visible from Dinvin. The consented Tralorg (WF 34) and Assel Valley (WF 35) schemes to the north and north-east are located closer to the Dinvin than the operational Hadyard Wind Farm. Three schemes to the south are at the application stage (WF 75, 76 and 79), whilst a single turbine has been applied for to the east at High Troweir. All these schemes could potentially be visible from Dinvin</td>
<td>High</td>
<td>Low</td>
<td>Minor-Moderate</td>
</tr>
<tr>
<td>274</td>
<td>Barr Conservation Area</td>
<td>Conservation Area</td>
<td>Minor-Moderate</td>
<td>Wireline evidence (Figure 6.02 Viewpoint 6) suggests that seven operational Hadyard turbines are theoretically visible from the northern edge of the Barr Conservation Area. However the photograph accompanying the wireline shows that views of some of the turbines would be blocked by trees.</td>
<td>Medium</td>
<td>Medium</td>
<td>Minor Moderate</td>
</tr>
</tbody>
</table>
Table 8.12: Cumulative Effects

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Site Name</th>
<th>Designation</th>
<th>Hadyard Hill Extension Significance of Setting Effect</th>
<th>Visibility / Predicted Visibility with Proposed Development alongside other Operational / Proposed Wind Turbines listed in Table 8.11</th>
<th>For Predicted Visibility with proposed Development Alone see Table 8.10</th>
<th>Cumulative Effects are Discussed in Detail in the Paragraphs which Follow this Table</th>
<th>Relative Sensitivity</th>
<th>Magnitude of Cumulative Effects Resulting from the Placing of the Proposed Development Alongside the Cumulative Schemes</th>
<th>Level of Combined Cumulative Effects (&quot;Significant Effect&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>316</td>
<td>Dalquharran Castle</td>
<td>Non-Inventoried Designed Landscape</td>
<td>Minor-Moderate</td>
<td>CH Viewpoint 5 indicates that the extreme tips of five of the operational Hadyard turbines are theoretically visible in views southeast from the castle (Site 116). However only one blade tip could be seen during the site visit. A photomontage supplied with the Kirk Hill (WF 138) application shows that 5 Kirk Hill turbines would be visible, three above hub height (Coriolis Energy 2014, Viewpoint CH6c). However the two schemes are set on opposite sides of the valley and will not appear together in any of the key views identified between the two castles.</td>
<td>Medium</td>
<td>Medium</td>
<td>Minor Moderate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Kilkerran Inventoried Garden and Designed Landscape (Site 10)

8.8.82 Figure 8.14 CH Viewpoint 8, taken from the B741, shows the view southwards across the Kilkerran Inventoried Garden and Designed Landscape. The wireline shows that the extreme tips of six operational Hadyard turbines would be visible set behind three of the proposed development turbines, two of which would show above hub height. The consented turbines at Assel Valley (WF 34) and Tralorg (WF 35) would show, mostly above hub height to the west, although there would be a considerable degree of separation between them and either the existing Hadyard Hill wind farm or the proposed development. The wirelines show theoretical visibility of turbines when viewed from the north across the floor of the Girvan Valley, however it is likely that actual visibility will be further diminished by tree cover and it is possible that Assel Valley and Tralorg schemes would not be visible at all. Given this, the additional magnitude of change, resulting from the placing of the proposed development in relation to the cumulative schemes will not be elevated beyond the level of change predicted for the proposed development alone and consequently the cumulative effect on the ability of the IGDL to inform and be understood in its current landscape setting is not predicted to exceed the finding of Minor-Moderate and Not Significant predicted for the proposed development alone.

Maxwellston Hill, Fort (Site 25)

8.8.83 Both the existing Hadyard Hill (WF 1) and Mark Hill (WF 3) wind farms can be seen when viewed southwards from the scheduled hill fort (Site 25) on Maxwellston Hill at distances 0.39 km and 9.72 km respectively. Although the wireframe (CH Viewpoint 2) indicates that the operational wind farms at Arecleoch (WF 4), Arthfield Fell (WF 6), Balmurrie Fell (WF 7) are also theoretically visible at distances of 17.79 km, 29.08 km and 29.38 km respectively, these could not be seen during the site visit. As CH Viewpoint 2 illustrates, other schemes, either consented or at application stage, would appear within views southward from the hill fort. These include consented developments Tralorg (WF 34) and Assel Valley (WF 35) as well as three proposed wind farms; Millenderdale (WF 75), Breaker Hill (WF 76) and Straid Farm (WF 79) and two individual turbines at Penwhapple (WF 72) and High Troweir (WF 74) at application stage, within 15 km. Of these the single proposed turbine at Penwhapple will appear closest at 1.37 km. However as the viewpoint demonstrates, this turbine would visually appear entirely enclosed by the existing Hadyard Hill turbines and would be of similar height to them. Similarly the placing of the proposed development turbines behind the existing Hadyard Hill wind farm turbines would create the impression of a rearward extension to the operational wind farm, the rise in their height being masked by the greater distance in separation. This would mean that the additional magnitude of change resulting from the placing of the proposed development behind the existing Hadyard Hill Wind Farm will not substantially add to the effect predicted for the proposed development alone.

8.8.84 Whilst CH Viewpoint 2 shows a large number of turbines, including the proposed development as well as operation consented and proposed turbines relating to other schemes theoretically visible from the hill fort, they would be set within a wide panorama and five of the schemes are yet to receive consent. However as the settings assessment (Technical Appendix 8.4) has shown the fort was clearly deliberately placed at height so as to overlook the Girvan Valley immediately to its north. It commands views in that direction which extended as far as the coast and the Ailsa Craig and it is these views, which demonstrate why it was placed as it was and which contribute the most to our understanding and appreciation of the asset. Although, an application for an eight turbine scheme to the north of the Girvan at Kirk
Hadyard Hill Extension Wind Farm

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Hadyard Hill (WF 138) was submitted in January 2015, at present only five turbines (WF’s 1, 36 and 37) are consented or operational to the north of the Girvan. However the proposed development would not appear in views northwards from Site 25 and consequently would not disturb the critical relationship between the hill fort and the Girvan Valley. The potential for significant cumulative effects upon the setting of the hill fort resulting from the placing of the proposed development amongst the cumulative schemes are consequently restricted to the south, where views contribute less to our understanding of the asset. Both the proposed development and the other schemes would all appear set within a wide panoramic landscape where views extend to a great depth. The proposed turbines would appear as they are intended, as an extension to the operational wind farm and they would stand to its rear. As such they will not materially increase the effect of the operational Hadyard Hill. For these reasons it is clear that cumulative effects upon the setting of Site 25 would be Minor-Moderate and Not Significant as it would not materially diminish the observer’s ability to understand the relationship between the hill fort and the Girvan Valley.

Drumburle (Site 115)

8.8.85 Although CH Viewpoint 4 suggests that up to 11 of the proposed development turbines would be theoretically be visible from Drumburle (Site 115), tree cover along the intervening ridge suggests that only four of the turbines would be visible and views of these would also be diminished by the tree line. The site visit confirmed that although nine of the existing Hadyard turbines are theoretically visible, only two can be seen. Coriolis Energy has recently submitted an application for 8 x 110 m turbines north-west of Drumburle at Kirk Hill (WF 138). A cumulative ZTV submitted with the Kirk Hill application suggests that between three and five turbines would theoretically be visible from Drumburle. However, neither the existing Hadyard nor the proposed development turbines would appear in the same view as the Kirk Hill scheme, and none of the turbines, from any scheme, would impinge on Drumburle’s distinct north-east to south-west axis of alignment. For these reasons the additional magnitude of change resulting from the placing of the proposed development alongside the operational Hadyard and proposed Kirk Hill schemes would not be elevated beyond the level of change predicted for the proposed development alone and consequently the combined cumulative effects would not be elevated above the effect of Minor-Moderate and Not Significant predicted for the proposed development alone.

Dalquharran (Sites 116, 117 and 317)

8.8.86 This assessment has predicted a Moderate and Significant effect upon the setting of the 18th Century Category A Listed Dalquharran Castle (Site 116) (see 8.7.70 -4) based on the proposed development alone. Although CH Viewpoint 5 indicates that the extreme blade tips of five existing Hadyard Hill turbines are theoretically visible in views south-east from the castle, only one blade tip was seen in this view during the site visit. As such it is reasonable to argue that the cumulative effects of placing the proposed development alongside the existing Hadyard Hill wind farm would not exceed the effect of Moderate magnitude predicted for the proposed Hadyard extension alone. A photomontage, taken from the B741, supplied with the Kirk Hill (Site 138) application shows five turbines, three above hub height, extending above the hillslope to the north of the castle (Coriolis Energy 2014, Viewpoint CH6c). Dalquharran Castle was intended to appear conspicuous in views from the southeast across the Girvan and the Kirk Hill turbines will, to a degree at least, compete with the Castle in these views. However the proposed development turbines would not be present in this view. Whilst an allowance has to be made for the combined presence of both the proposed development and the Kirk Hill scheme within the landscape, the two schemes are set on opposite sides of the Girvan Valley and would not appear
together, in the key views identified or north-westwards from the valley floor. For these reasons the additional magnitude of change resulting from the placing of the proposed development in relation to the cumulative schemes would not elevate the combined effect beyond the level of Moderate and Significant found for the proposed development alone.

8.8.87 The site visit found visibility of the existing Hadyard Hill turbines from the 15th century Dalquharran Castle (Site 117) to be completely blocked by the trees around the castle and as a consequence the addition of the proposed development alongside the operational wind farm would not elevate the level of effect beyond the finding of Minor-Moderate and Not Significant predicted for the proposed development alone. Whilst the Kirk Hill turbines would appear at least in winter in a view north from the 15th century castle, which takes in its 18th century replacement, the proposed development would not intrude on this view and as a consequence the presence of the two proposals would not elevate the significance of effect.

8.8.88 The effect of the proposed development alone upon the setting of the non-designated designed landscape (Site 316) surrounding the castles at Dalquharran included on the Ayrshire Designed Landscapes Survey (Peter McGowan Associates and Dingwall 2009) has also been considered by this assessment. While both the proposed development and the Kirk Hill scheme would be present on the hills overlooking the Girvan Valley, the two schemes are set on opposite sides of the Girvan Valley. They would not appear together in the key views identified between the castles and along the wooded carriage ride, or north-westwards from the valley floor. For this reason the cumulative effect resulting from the placing of the proposed development alongside the cumulative schemes is not predicted to be above the level of Minor-Moderate and Not Significant predicted for the proposed development alone.

Kilochan Castle (Site 133)

Kilochan Castle (Site 133) falls outside the Kirk Hill ZTV (Coriolis Energy 2014, Figure 13.3) and as a consequence the placing of the proposed development in relation to it would not elevate the cumulative effect beyond that predicted for the proposed development alone. Whilst the castle lies within the combined ZTV for both the existing Hadyard Hill wind farm and the proposed development (Figure 5.14), intervening hills would limit visibility with the operational turbines and as a consequence the placing of the two schemes together would not result in a significant additional magnitude of change. For these reasons the placing of additional turbines to the rear of and to the extreme east of the existing Hadyard Hill wind farm would not elevate the level of effect beyond the finding of Minor-Moderate and Not Significant predicted for the proposed development alone.

Blairquhan (Site 137)

8.8.89 Any visibility of the proposed development from the Inventoried Garden and Designed Landscape at Blairquhan (Site 137), would be extremely limited and the core assets of the estate, most notably Category A Listed Blairquhan House itself all lie outwith the ZTV. Due to their closer proximity, it is possible that the proposal for 25x126.5m turbines at Linfairn Farm (WF 73) would have a greater degree of visibility and would as a result by themselves would result in an elevated magnitude of change potentially above the level predicted for the proposed development alone. However the placing of the proposed development into a landscape containing other wind energy schemes, would not in itself elevate the effect beyond that of Minor Moderate and Not Significant predicted for the proposed development alone, as any elevated effects would be as a consequence of the cumulative schemes.
Bencallen Hill Chambered Cairn (Site 148)

8.8.90 CH Viewpoint 7 shows that 21 of the existing Hadyard Hill turbines can theoretically be visible from the Bencallen Hill Chambered Cairn (Site 148), of which 14 can be seen above hub height. The site visit to the cairn confirmed the existing Hadyard Hill wind farm to be clearly visible. The proposed development would appear both in front of and to the east of the existing wind farm and would inevitably appear closer than the consented development, however given that the proposed development will stand forward of the existing wind farm and that it is has been assessed as such in Table 8.10, the continued presence of the operational wind farm in these views would not result in a significant additional magnitude of change and would not materially elevate the effect of Minor Moderate and Not Significant predicted for the proposed development alone.

Dinvin (Site 171)

8.8.91 Although the ground surrounding Dinvin (Site 171) lies outwith the ZTV, the monument itself sits upon the summit of a knoll which elevates the monument into the ZTV, the existing Hadyard Hill (WF 1) turbines come into view at this point and the proposed development would appear behind the operational turbines, although it would be set at a greater distance. The consented Assel Valley turbines (WF 35) would appear in front of the existing Hadyard turbines, as will the single turbine consented for High Troweir (WF 74). The consented development at Tralorg (WF 34) would stand to the north whilst three schemes have been applied for to the south (WF’s 75, 76 and 79). Given that the proposed development would stand behind both an operational (WF 1) and a permitted (WF 35) wind farm, the placing of the proposed development to the rear would not result in a significant additional magnitude of change and would not elevate the significance of the effect on Dinvin, beyond that of Minor Moderate and Not Significant predicted for the proposed development alone.

Barr Village Conservation Area (Site 274)

8.8.92 Viewpoint 6 Barr Village (Site 274), shows the proposed development extending eastwards from a viewpoint taken at the northern tip of the village, which corresponds approximately with the northern boundary of the conservation area. Although a small number of the existing Hadyard turbines appear in this view, they are not located forward of the proposed development and consequently the placing of the proposed development in relation to the operational turbines would not result in a significant additional magnitude of change and would not elevate the effect on the setting of the conservation area beyond that of Minor Moderate and Not Significant predicted for the proposed development alone.

8.9 Summary

8.9.93 This assessment has identified a number of assets of Regional, Local and Negligible Importance ranging in date from the prehistoric to post-medieval periods within the site. However the development layout and infrastructure have been finalised such as to avoid any direct impacts on these known sites and as a consequence no direct effects on these known assets are anticipated. In order to eliminate the risk of accidental damage, All known sites within 50 m of the proposed development (working areas) will be fenced off with a visible buffer under archaeological supervision prior to the start of construction work in order to avoid accidental damage by heavy plant movement.
8.9.94 Given the identification of known prehistoric and post-medieval sites and the peat-covered nature of parts of the site, there is a possibility that hitherto unknown buried archaeological remains survive within the site. Given the density of planting coupled with drainage within commercial plantations, it is unlikely that any previously undetected remains will survive within the forested areas. An archaeological watching brief would be undertaken during groundworks associated with the construction of turbines 30 and 31, the Milton Hill permanent met mast on Milton Hill and the access tracks which link between them due to the proximity of these works to the series of stone and turf wall dykes (Sites 235, 236 and 237) of Negligible Importance identified on Milton Hill during the walkover survey. Similarly a watching brief would be carried out to the south of Penwhapple Reservoir where a new access track would be required. The track would extend from the former quarry to turbine 27 and its adjacent permanent met mast. The watching brief would be required due to the proximity of these works to a possible cairn (Site 35) reported at The Lanes. The purpose of such archaeological works would be to identify any potential direct effects on archaeological remains, to assess their value and to mitigate any impact upon them either through avoidance or, if preservation in situ is not warranted, through preservation by record. Any requirement for archaeological works either during or preceding construction would be agreed with SAC.

8.9.95 Any archaeological field work commissioned in order to mitigate direct effects would result in the production and dissemination of a professional archive, which could add to our understanding of the site’s cultural heritage.

8.9.96 This assessment has identified 24 Scheduled Monuments, 11 Category A Listed Buildings, three Inventoried Gardens and Designed Landscapes and five Conservation Areas within 10 km of the proposed turbines site boundary and 15 Category B and 18 Category C Listed Buildings within 5km of the proposed turbines.

8.9.97 No Inventoried Historic Battlefields fall within 10 km of the site boundary.

8.9.98 Consideration has also been given to the settings of eight non-designated sites within 5km of the proposed turbines recorded as being of national importance on the Non-Statutory Register (NSR) formerly maintained by WoSAS and six non-designated gardens and designed landscapes recorded within 5km of the proposed turbines by the Ayrshire Designed Landscapes Survey (Peter McGowan Associates and Dingwall 2009).

8.9.99 This assessment has found a potential for an effect of Moderate Significance upon the setting of the Category A Listed 18th century Dalquharran Castle (Site 116). Effects of Moderate and above are deemed ‘significant’ in terms of the EIA regulations. Residual effects on the settings of all other statutory designated heritage assets within the 5 and 10 km heritage study areas were found to be less than significant. Indirect effects on the setting of Dalquharran Castle would cease following the decommissioning of the wind farm and the removal of the turbines.

8.9.100 The possibility of cumulative effects, the potential for additional cumulative change, resulting from the effects of the proposed development in combination with other operational, consented or proposed wind farms has also been considered. No additional Significant cumulative effects were found. The assessment predicted a ‘Moderate’ and Significant effect in terms of the EIA regulations upon the setting of the 18th century Dalquharran Castle (Site 116), resulting from the proposed development alone. The assessment of cumulative effects, has demonstrated that whilst the effect would remain ‘Moderate’ and consequently Significant, the effect would not be elevated by cumulative effects. Consequently, considering the additional
effect of the proposed development on a cumulative baseline, including other existing, consented and proposed development, does not elevate the degree of effect above the level predicted for the proposed development considered alone.

8.10 References


Cocking, 1789, Tour with Captain Grosse 1789 (contains illustration of Dalquharran)

Coriolis Energy, 2014, Kirk Hill Wind Farm Environmental Statement

Historic Scotland, n.d Scheduling Document Knockinculloch Enclosure Index No. 3357


Scottish Natural Heritage 2009 Siting and Designing Wind Farms in the Landscape, Paragraph 4.20.
South Ayrshire Local Plan (2007).

South Ayrshire Local Development Plan (Draft) (2013).


### 8.11 Glossary and Abbreviations

<table>
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<tr>
<th>Term</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>Aesthetics</td>
<td>The formal and rational recording of the physical parameters of the monument and its surrounding landform, including the observer’s emotional response to it, sets out the framework from within which an aesthetic appreciation can be developed. This approach is well established in critical artistic and architectural aesthetics attempts to avoid the biases of contemporary zeitgeist through contextualisation of works of art taking cognisance of criteria such as the social, economic, political, historical and technological backgrounds from which the work of art originated. Such an approach can be taken to heritage assets and the criteria applied where heritage assets are concerned are noted in Appendix 8.2.</td>
</tr>
<tr>
<td>AOC</td>
<td>AOC Archaeology Group</td>
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<tr>
<td>CEMP</td>
<td>Construction Environmental Management Plan</td>
</tr>
<tr>
<td>CH</td>
<td>Cultural Heritage</td>
</tr>
<tr>
<td>CIfA</td>
<td>Chartered Institute for Archaeologists</td>
</tr>
<tr>
<td>Cultural Significance</td>
<td>To have cultural significance a monument must have a particular 'artistic; archaeological; architectural; historic; traditional (factors listed in the 1979 Act); aesthetic; scientific; [or] social [significance] – for past, present or future generations’ (SHEP 2011, 71). Significance is defined in relation to an assets intrinsic, contextual and associative characteristics (SHEP 2011, Annex 1)</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>Heritage Asset</td>
<td>Those parts of the historic environment that have significance and are worthy of consideration in planning matters are referred to as heritage assets. Heritage assets include standing, buried or submerged remains, buildings, parks and gardens and areas, sites and landscapes including designated sites and those identified by the local planning authority. World Heritage Sites, Scheduled Monuments, Listed Buildings, protected wreck sites, Inventory Gardens and Designed Landscapes, Inventory Battlefields and Conservation Areas are all heritage assets.</td>
</tr>
<tr>
<td>Historic Environment</td>
<td>Scotland’s historic environment is the physical evidence for human activity that connects people with place, linked with the associations we can see, feel and understand. (SPP 2014)</td>
</tr>
<tr>
<td>HB No.</td>
<td>Historic (Listed Building) No.</td>
</tr>
<tr>
<td>HMSO</td>
<td>Her Majesty’s Stationary Office</td>
</tr>
<tr>
<td>HS</td>
<td>Historic Scotland</td>
</tr>
<tr>
<td>ICOMOS</td>
<td>International Council on Monuments and Sites</td>
</tr>
<tr>
<td>LVIA</td>
<td>Landscape and Visual Impact Assessment</td>
</tr>
<tr>
<td>NSR</td>
<td>WoSAS Non-Statutory Register</td>
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<tr>
<td>PAN</td>
<td>Planning Advice Note</td>
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</table>
### Glossary and Abbreviations

<table>
<thead>
<tr>
<th>Term</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>Relative Sensitivity</td>
<td>This refers to an asset's sensitivity to changes to its setting. Its capacity to retain its ability to inform this and future generations in the face of changes to its setting. For example, monuments with high sensitivity will be vulnerable to changes which affect their setting and even slight changes may reduce their information content. Less sensitive monuments will be able to accommodate fairly drastic changes which affect their setting, without losing their ability to inform.</td>
</tr>
<tr>
<td>SHEP</td>
<td>Scottish Historic Environment Policy</td>
</tr>
<tr>
<td>Setting</td>
<td>Is more than the immediate surroundings of a site or building, and may be related to the function or use of a place, or how it was intended to fit into the landscape of townscape, the view from it or how it is seen from areas round about, or areas that are important to the protection of the place, site or building. (SPP 2014)</td>
</tr>
<tr>
<td>WF</td>
<td>Wind Farm</td>
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<tr>
<td>WoSAS</td>
<td>West of Scotland Archaeology Service</td>
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9 Ecology

9.1 Introduction

9.1.1 This chapter considers the likely significant effects on ecological receptors associated with the construction, operation and decommissioning of the proposed Hadyard Hill Extension Wind Farm. The ecological receptors include terrestrial and aquatic habitats, flora and fauna of conservation concern that have the potential to be affected by the proposed development. The assessment of potential effects on ornithological receptors is provided in Chapter 10: Ornithology.

9.1.2 The specific objectives of this chapter are to:

- identify and describe the habitat types, flora and the presence of protected species across and immediately adjacent to the site through both desk studies and surveys;
- evaluate the nature conservation value of each ecological receptor;
- predict and assess potentially significant effects upon the ecological receptors;
- define mitigation measures to avoid, reduce and offset adverse effects; and
- predict and assess the level of residual effects, i.e. effects that include mitigation measures.

9.1.3 A summary of the baseline information collated for the study area is also provided in this chapter, with further information included within a set of technical appendices set out as follows:

- Technical Appendix 9.1: Biodiversity Legislation, Policies and Plans;
- Technical Appendix 9.2: Ecological Survey Methods;
- Technical Appendix 9.3: Desk Study Results;
- Technical Appendix 9.4: Habitat Survey Results;
- Technical Appendix 9.5: NVC Quadrat Data;
- Technical Appendix 9.6: Plant Species List;
- Technical Appendix 9.7: Protected Species Target Notes;
- Technical Appendix 9.8: Fish Habitat Suitability Survey Results;
- Technical Appendix 9.9: Results of the Bat Surveys;
- Technical Appendix 9.10: Habitat Loss Calculations; and
- Confidential Annex: Badger Survey Results.

9.1.4 Baseline ecological surveys and the assessment of the Hadyard Hill Wind Farm extension were undertaken by MBEC ecological consultants between 2012 and 2015. All relevant aspects of the proposed development, as described in Chapter 2: Proposed Development, form the basis of this assessment.
9.2 Scope of Assessment

Project Interactions

9.2.1 This chapter considers the potential for likely significant effects on habitats and non-avian protected species as a result of the proposed development. Potential impacts associated with construction, operation and decommissioning of a wind farm upon ecological receptors include habitat loss and fragmentation, habitat degradation (in particular, through changes in surface hydrology), pollution (particularly freshwater habitats), and noise and light disturbance. Indirect effects that may also occur; for example, pollution of surface waters during earthworks, could adversely affect food resources for species dependent upon aquatic prey. Whilst the operational phase of the proposed development may be associated with fewer adverse impacts on ecological receptors there are specific potential effects that require consideration such as the risk to bats from operating wind turbine blades.

Scoping

9.2.2 A scoping report, which included details of the proposed scope of, and methodological approach to, the assessment of effects on ecological receptors, was issued for consultation in February 2014. A formal scoping opinion was provided by the Scottish Ministers in April 2014. The list of consultees along with a summary of the consultation responses received is summarised in Technical Appendix 1.1: Consultation Register, which also describes how this ES addresses each of the issues raised.

9.2.3 Consultation responses relating to ecological issues were received from the following consultees:

- Scottish Ministers which incorporates comments from non-statutory consultees such as RSPB Scotland, 16 April 2014; and
- Scottish Natural Heritage, 12 March 2014.

9.2.4 The key issues regarding ecological receptors outlined in the scoping responses include:

- identifying designated sites for nature conservation in the area and therefore any potential for an appropriate assessment to be undertaken by Scottish Government;
- identifying any woodlands on the ancient woodland inventory that could be affected by the proposals;
- undertaking habitat and protected species (mammal, amphibian, reptile) baseline surveys following best practice across the site (including forestry);
- undertaking bat activity surveys, including surveys at height, in order to establish which species use the site and how activity is distributed relative to landscape / habitats and height above ground level (agl);
- undertaking baseline surveys of fish and other freshwater aquatic species; and
- undertaking a baseline survey of invertebrates present on the site and in the waterbodies and watercourses on and around the site throughout the year.
**Issues Scoped Out**

9.2.5 Table 9.1 below summarises the issues scoped out of the ecology assessment. This takes account of the mitigation measures both incorporated into the design and standard construction and decommissioning mitigation measures, as described in Chapter 2: Proposed Development, and Technical Appendix 2.4: Construction Environmental Management Plan.

<table>
<thead>
<tr>
<th>Issue Scoped out</th>
<th>Potential Effect</th>
<th>Rationale for Scoping Out</th>
</tr>
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<tbody>
<tr>
<td>A baseline survey to demonstrate the species and abundance of fish present in still and running waterbodies</td>
<td>Restricting and blocking passage for fish across the site</td>
<td>A fish habitat survey has been undertaken to assess the quality and extent of suitable habitat for fish (with a particular focus on salmonids) on watercourses where construction work is proposed within 50 m. Previous surveys carried out by the Ayrshire Rivers Trust (ART) have established the presence of trout populations in small headwater streams on the existing Hadyard Hill wind farm. The presence of salmonid populations and important spawning and juvenile fish habitat are reasonably well known and characterised through annual monitoring carried out by the ART in the Girvan and Stinchar catchments. With the existing baseline information, supplemented by an assessment of habitat types and quality within the proposed development, there is considered to be sufficient information available to provide a robust assessment of the potential significant effects as well as to inform appropriate mitigation measures and management / monitoring plans to ensure that significant adverse effects on all fish species, other aquatic fauna and their supporting habitats are avoided.</td>
</tr>
<tr>
<td>A baseline survey of invertebrates present on the site and in the waterbodies and watercourses</td>
<td>Extirpation of a rare and/or priority conservation invertebrate species</td>
<td>The findings of the desk study did not indicate that the site was likely to support any nationally rare invertebrates and/or priority species for conservation, with the exception of historical records of small heath (Coenonympha pamphilus) which has been recorded in the area again since 2010. Additionally, external to the south-east of the site, a record of a hoverfly Melanogaster aerosa which might have habitat on-site. The potential for significant effects on any invertebrate population from the proposed development is considered to be very low because of the limited suitable habitat on-site and, as a consequence, baseline surveys for these species were not considered to be necessary to inform this EIA. Freshwater pearl mussel (FWPM, Margaritifera margaritifera) populations are known to be present in river catchments, but upstream, and there is no suitable habitat for migratory salmonids (which host FWPM for part of their lifecycle) within the site.</td>
</tr>
</tbody>
</table>
Table 9.1: Issues Scoped Out of the EIA

<table>
<thead>
<tr>
<th>Issue Scoped out</th>
<th>Potential Effect</th>
<th>Rationale for Scoping Out</th>
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<tbody>
<tr>
<td>FWPM is a European protected invertebrate and UK BAP priority species; best practice construction methods are proposed to avoid significant impacts on all surface waters. Therefore, baseline surveys for FWPM were not considered to be necessary to inform this assessment.</td>
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<tr>
<td>An assessment of how the proposed development would affect deer movements and use of the site, plus a fit-for-purpose deer management plan</td>
<td>Intensity of deer grazing changing, and having an adverse impact on vegetation in different areas</td>
<td>Professional and informal stalking arrangements currently exist for areas of the forestry on site.</td>
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<td></td>
<td></td>
<td>It is proposed that during operation of the wind farm, this stalking be coordinated between the landowners in order to ensure that a balance is found between a sustainable level of deer control and sufficient culling to avoid habitat degradation.</td>
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<tr>
<td></td>
<td></td>
<td>A collaborative approach would be adopted to provide a deer management plan for the site, balancing the requirements of landowners both internal to site, those of the neighbouring forests, as well as farming interests.</td>
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<tr>
<td></td>
<td></td>
<td>No significant effects associated with deer have been identified, and as such no further assessment is considered necessary.</td>
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</table>

Final Scope

9.2.6 Based on the consultation responses and the known environmental sensitivities, this assessment therefore considers the following:

- designated sites for nature conservation, and areas of ancient woodland;

- habitats of conservation value such as those identified within the Local Biodiversity Action Plan and /or on Annex I of Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora - this includes the identification of habitats considered to be potential Groundwater Dependent Terrestrial Ecosystems (GWDTEs) as listed in SEPA (2014) as well as the risk of spread from any non-native invasive plant and animal species which may be present in the area;

- non-avian fauna (“protected species”) subject to special legal protection, for example, through their inclusion on Schedule 5 of the Wildlife & Countryside Act 1981 (as amended), Schedule 2 of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), and the Badger Act 1992 - and this includes surveys following best practice;

- protected species identified within the Joint Ayrshire Biodiversity Action Plan or Scottish Biodiversity Strategy as requiring species conservation measures; and

- plant species of conservation value or special legal protection, e.g. plant species listed on Schedule 8 of the Wildlife & Countryside Act 1981, as amended, Schedule 4 of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) or identified within the local Biodiversity Action Plan or Scottish Biodiversity Strategy as requiring species conservation measures.
9.2.7 The full list of legislation, policies and plans that inform which habitats and species are considered legally protected is provided in Technical Appendix 9.1: Biodiversity Legislation, Policies and Plans.

9.3 Assessment Methodology

Baseline Characterisation

9.3.1 The desk study and field survey methods used to inform the assessment are outlined in this section.

Desk Study and Survey Areas

9.3.2 The desk study and the survey areas are shown on Figure 9.1, excluding the bat activity survey transects. The desk study extended to 10 km from the site boundary for designated sites and in relation to requests for bat records. Desk study records for other species were requested for a study area using the site boundary plus a 2 km zone around it.

9.3.3 During 2012 and 2013, Phase 1 habitat and protected species surveys were undertaken, extending 500 m beyond the site boundary. This ‘core study area’, along with the desk study area, is shown on Figure 9.1. However, none of the forestry associated with the existing operational wind farm was surveyed.

9.3.4 In late summer 2014, a National Vegetation Classification (NVC) survey and an update of the protected species surveys were undertaken within 250 m of all infrastructure of the emerging wind farm layout (as defended at that time). This is also shown on Figure 9.1.

Desk Study

9.3.5 Information on all international, national and local designated sites were obtained through Scottish Natural Heritage’s (SNH) Sitelink website (www.gateway.snh.gov.uk/) and the South Ayrshire Council’s website (www.south-ayrshire.gov.uk/documents/$).  

9.3.6 The latest version of the SNH Ancient Woodland Inventory was used to identify areas with ancient woodland, both semi-natural and planted.

9.3.7 The following organisations were also contacted with requests for notable biological records:

- Ayrshire Bat Group;
- Scottish Badgers; and
- Botanical Society of Britain and Ireland (BSBI) vice county recorder.

9.3.8 The National Biodiversity Network website (the “NBN Gateway”) was used to look for records of notable species. The NBN Gateway collates data provided by a large number of individuals and nature conservation organisations and can be viewed at http://www.nbn.org.uk. Appropriate permissions were obtained from all data providers before including reference to any records from the NBN Gateway within this chapter or associated technical appendices. Additionally, information was obtained from the Ayrshire Rivers Trust and the River Stinchar District Salmon Fishery Board websites.
Additionally, annual reports for the post-construction breeding bird surveys of the existing Hadyard Hill Wind Farm for the years between 2006 and 2011 were also examined (Ecology UK / RPS / MacArthur Green [2007-2012]) for any mention of non-ornithological species.

Field surveys

Various baseline surveys were completed to provide data to inform this assessment. The detailed methodology of each of the baseline surveys undertaken is provided in Technical Appendix 9.2: Ecological Survey Methods. They follow standard best practice methods and were undertaken by suitably experienced ecologists. These include:

- a Phase 1 habitat survey (summer 2013);
- a NVC survey (late summer 2014);
- a bat roost assessment survey (summer 2012);
- bat activity surveys, including monitoring activity ‘at height’ (summer 2012 & summer 2014);
- otter (*Lutra lutra*) surveys (summer 2013 & autumn 2014);
- water vole (*Arvicola amphibius*) surveys (summer 2013 & autumn 2014);
- a red squirrel (*Scirurus vulgaris*) survey (autumn 2014);
- badger (*Meles meles*) surveys (summer 2013 & autumn 2014); and
- a fish habitat suitability assessment for the proposed watercourse crossing locations (autumn 2014).

No systematic pine marten (*Martes martes*) survey was undertaken because the site has low potential for pine marten habitat. However, whilst undertaking other surveys, any signs of pine marten were recorded and habitat suitability for this species was assessed within the survey area.

No systematic reptile surveys were undertaken because it was felt that recording all reptile sightings and signs (e.g. sloughed skin) whilst undertaking other ecological surveys or site visits (e.g. changing of the automated bat recorders) would be enough to determine the distribution and abundance of each of these species across the site. The habitats on-site have potential to support populations of adder (*Vipera berus*) and common lizard (*Zootoca vivipara*) which occur in suitable habitats across mainland Scotland.

No potentially suitable breeding ponds for great crested newt (*Triturus cristatus*) were found within 500 m of the proposed development. Terrestrial habitat suitability is generally poor within the site, therefore no detailed surveys for this species were considered to be necessary.

Assessment of Effects

Sensitivity Criteria

The EIA process involves applying specific criteria to systematically evaluate the impacts on 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 ecologists with specific experience of wind farm EIAs.
9.3.15 Evaluating the sensitivity of ecological receptors to development is an established concept for which there is standard guidance provided by CIEEM (2006) and SNH (2013). However, assigning a level of receptor sensitivity relies upon a combination of the application of standard criteria in combination with the informed professional judgement of the ecologist undertaking the assessment. Definitions of ecological receptor sensitivity are outlined in Table 9.2.
Table 9.2: Defining Ecological Receptor Sensitivity

<table>
<thead>
<tr>
<th>Receptor Sensitivity</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>International</strong></td>
<td>Habitats or species that form part of the cited interest within an internationally protected site or candidate site (for example, Special Area of Conservation (SAC), Special Protection Area (SPA), or Ramsar site). This includes European protected habitats and species, and internationally important wetlands. A habitat or species which is either unique or sufficiently unusual (in terms of distribution and/or abundance) to be considered as being an area or population of the highest quality example in an international/national context that the site is likely to be designated as an SAC/SPA.</td>
</tr>
<tr>
<td><strong>National</strong> (i.e. at the Scottish or UK level)</td>
<td>Habitats or species that form part of the cited interest within a nationally designated site (for example, a Site of Special Scientific Interest (SSSI) or a National Nature Reserve (NNR). A habitat which is either unique or sufficiently unusual (in terms of distribution and/or abundance) to be considered as being one of the highest quality examples in a national context for which the site could potentially be designated as an SSSI. This includes Annex 1 habitats and UK BAP priority habitats. A population of a species which is either unique or sufficiently unusual (in terms of distribution and/or abundance) to be considered as being of nature conservation value at up to a country context. This includes European protected species, Wildlife and Countryside Act Schedule 5 species, 'Nationally Scarce' species (i.e. occurring in between 16 and 100 10 km OS grid squares, and priority UK BAP species.</td>
</tr>
<tr>
<td><strong>Regional</strong> (e.g. Natural Heritage Zone or Local Authority Area)</td>
<td>Viable areas of internationally or nationally important habitats (i.e. Annex I habitats and priority UK BAP habitats) present in quality and extent at a regional (e.g. biogeoclimatic zone as partially defined by the SNH Natural Heritage Futures) level of importance. Sites supporting a regularly occurring, regionally significant number of internationally or nationally important species. This includes European protected species, 'Nationally Scarce' species and priority UK BAP species.</td>
</tr>
<tr>
<td><strong>Local (High)</strong></td>
<td>Sites that are a Local Nature Reserve or Wildlife Site (including those that are provisionally designated). Sites containing viable area(s) of any priority UK BAP habitat or presence of species identified in the UK BAP or Local BAP. Sites supporting viable breeding populations of species known to be Scottish Local Authority rarities and/or supplying critical elements of their habitat requirements. Habitats which provide locally important semi-natural habitats within an approximate radius of 15-20 km from the site. Populations of any species of conservation importance in the context of the local area within an approximate radius of 15-20 km from the site.</td>
</tr>
</tbody>
</table>
Table 9.2: Defining Ecological Receptor Sensitivity

<table>
<thead>
<tr>
<th>Receptor Sensitivity</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local (Medium)</td>
<td>Habitats which are not considered extensive and/or of good enough quality to qualify for non-statutory designation but which provide locally important semi-natural habitats within an approximate radius of 15-20 km from the site. Populations of any species of conservation importance in the context of the local area within an approximate radius of 15-20 km from the site. However, any such population would not be of a significant size to deem it as being of 'regional' importance.</td>
</tr>
<tr>
<td>Local (Low)</td>
<td>Habitats 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.</td>
</tr>
<tr>
<td>Negligible</td>
<td>Commonplace habitat or species with little or no significance, the loss of which would not be seen as detrimental to the ecology of the area.</td>
</tr>
</tbody>
</table>

Effect Magnitude

9.3.16 The impacts, both adverse and beneficial, of each aspect of the construction, operation and decommissioning phases of the proposed development are systematically assessed for their potential to result in changes to receptors, which is termed “the effect”. The magnitude of the effect is determined by the systematic consideration of a range of interacting variables carefully considered using professional experience informed by scientific literature.

9.3.17 To assess any potential effect magnitude upon each ecological receptor, details of the proposed development, including the size and location of proposed infrastructure, nature, timing and duration of the proposed work are considered.

9.3.18 Based on the CIEEM ecological impact assessment guidelines (2006), where appropriate, the level of confidence in the accuracy of a predicted impact (before mitigation measures and after mitigation measures) is stated as follows:

- Certain / near-certain: probability estimated at 95% chance or higher;
- Probable: probability estimated above 50% but below 95%;
- Unlikely: probability estimated at above 5% but less than 50%; and
- Extremely unlikely: probability estimated at less than 5%.

9.3.19 In this assessment, the effect magnitude is categorised into five: total, high, medium, low and negligible. The duration of an effect (i.e. the number of years) is also considered. These categories are described in Table 9.3.
### Table 9.3: Defining Effect Magnitude

<table>
<thead>
<tr>
<th>Effect magnitude</th>
<th>Description of the resultant effect on the ecological receptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total/Near Total</td>
<td>Would cause the loss of a major proportion or whole feature/population, or cause sufficient damage to a feature to immediately affect its viability.</td>
</tr>
<tr>
<td>High</td>
<td>Major effects on the feature/population, which would have a sufficient effect to alter the nature of the feature in the short-long term and affect its long-term viability. For example, more than 20% habitat loss or damage.</td>
</tr>
<tr>
<td>Medium</td>
<td>Effects that are detectable in short and long-term, but which should not alter the long-term viability of the feature/population. For example, between 10 - 20% habitat loss or damage.</td>
</tr>
<tr>
<td>Low</td>
<td>Minor effects, either of sufficiently small-scale or of short duration to cause no long-term harm to the feature/population. For example, less than 10% habitat loss or damage.</td>
</tr>
<tr>
<td>Negligible</td>
<td>Minimal change on a very small scale.</td>
</tr>
</tbody>
</table>

**Duration definitions**

- Long-term (5 - 25 years or longer, and refers to operations)
- Short-term (<5 years, and refers to construction or decommissioning)

### Determining Likely Significant Effects

9.3.20 The process of determining the significance of an effect can be illustrated by a simple matrix which shows the interaction between receptor sensitivity and the magnitude of effect as illustrated in Table 9.4. In practice, the determination of significance involves the careful application of informed professional judgment and consideration of a range of parameters, as outlined above. If the likely effect is assessed as being moderate or above, the effect on the ecological receptor is judged to be ‘significant’.

### Table 9.4: Determining the Significance of Effect on Ecological Receptors, with those Highlighted in Grey regarded as ‘Significant’

<table>
<thead>
<tr>
<th>Receptor sensitivity</th>
<th>Effect Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total/near total</td>
</tr>
<tr>
<td>International</td>
<td>Major</td>
</tr>
<tr>
<td>National</td>
<td>Major</td>
</tr>
<tr>
<td>Regional</td>
<td>Major</td>
</tr>
<tr>
<td>Local (High)</td>
<td>Major-Moderate</td>
</tr>
<tr>
<td>Local (Medium)</td>
<td>Moderate</td>
</tr>
<tr>
<td>Local (Low)</td>
<td>Moderate – Minor</td>
</tr>
<tr>
<td>Negligible</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

April 2015 Page 10 of Chapter 9
9.3.21 Where potentially significant effects are predicted, mitigation measures are recommended in order to reduce the severity. Mitigation measures are actions to prevent, reduce or compensate for any likely significant effect on ecological receptors. The impact assessment therefore considers the potential effects after mitigation measures have been outlined, in order to determine the significance of the residual effect.

9.3.22 The avoidance or reduction of impact achieved through the wind farm design process is an important form of mitigation. However, design changes are incorporated into the development at an early stage and are therefore not considered as mitigation measures in the context of the assessment of residual effects. How the development design considered ecological receptors in this process is provided in Chapter 3: Design Evolution and Alternatives.

Limitations of the Assessment

9.3.23 The following is a brief summary of limitations with respect to site-specific constraints experienced during the baseline surveys.

9.3.24 Less than 2% of the NVC survey area (which was within 250 m of proposed infrastructure) was not surveyed as a result of having no access or because of minor design changes occurring after the optimal period for vegetation surveys. These small areas are shown on Figures 9.5a-h.

9.3.25 Most of the NVC surveys were undertaken between August and September 2014. Following minor wind farm design changes in autumn 2014, partly in response to habitat constraints identified during the NVC survey, a further 112 ha (11.5% of the NVC area) were surveyed in October and November outside of the optimal period for undertaking NVC surveys. However, this was not considered to be significant because the new areas did not contain any NVC communities not already characterised during the earlier surveys, with the key diagnostic plant species still remaining visible and identifiable.

9.3.26 Due to the difficulty of entering areas of dense conifer plantation, access was limited during habitat and protected species surveys, although accessible areas within coniferous plantations were surveyed, and any vegetated rides included in the habitat surveys.

9.4 Baseline Conditions

Desk Study Results

9.4.1 A summary of the desk study results is presented below. Further details are provided in Technical Appendix 9.3: Desk Study Results.

9.4.2 Data provided by Scottish Badgers are provided in a separate confidential annex to the ES.

Statutory and Non-Statutory Sites for Nature Conservation

9.4.3 Sites designated for nature conservation up to 10 km from the site boundary are shown on Figure 9.2. These include internationally, nationally and locally designated sites as well as ancient woodland inventory sites. Due to the large number of Wildlife Sites and Ornithological Sites, only those within 2 km of the site boundary have been included on Figure 9.2 and listed in Technical Appendix 9.3.
9.4.4 There are no statutory designated sites, such as Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Sites of Special Scientific Interest (SSSI) within the proposed development, with the nearest statutory designated site 2.8 km north-east of the site boundary (Auchalton Meadows SSSI). Therefore, there are no potential impacts predicted for any statutory designated site as a consequence of this proposed development.

9.4.5 There are four Wildlife Sites adjacent to the site boundary which encroach into the site to varying degrees. Wildlife Sites are non-statutory sites that are referred to in the latest Local Development Plan (2014), although no detail other than their location and extent is provided. The previous Local Development Plan referred to the same sites as Provisional Wildlife Sites. Three of these are watercourses and one is an open water body. A fifth site extends into the 2 km site boundary buffer, along Penwhapple Burn and is also associated with a watercourse. There is no information currently available as to why these areas have been identified as Wildlife Sites. However, any impact upon such sites is included in this assessment by considering watercourses and associated aquatic and terrestrial species.

Ancient Woodland Inventory Sites

9.4.6 There are no ancient woodland inventory sites within the site. Those within 2 km of the site boundary are discrete woodland areas with no connectivity to the site (see Figure 9.2).

Aquatic Habitats and Water Quality

9.4.7 The proposed development is located on a watershed between the Water of Girvan and the River Stinchar catchments. The Water of Girvan supports populations of Atlantic salmon (*Salmo salar*), brown trout (*Salmo trutta*), European eel (*Anguilla anguilla*), sea lamprey (*Petromyzon marinus*) and brook lamprey (*Lampetra planeri*). Fish population monitoring carried out annually by the ART also shows that the River Stinchar consistently supports the highest population densities of juvenile salmon and trout of all the major rivers in Ayrshire (Ayrshire Rivers Trust, 2013). Other fish species present in the River Stinchar also include European eel, sea lamprey, brook lamprey, minnow and stickleback.

9.4.8 The main tributaries of the Water of Girvan that drain the site northwards are (from east to west) Dobbingstone Burn and Penwhapple Burn. Three sections of the Water of Girvan (upstream, close to the site and downstream) are classified as having an overall status of Moderate to Good (SEPA, 2013). The main tributaries of the River Stinchar that drain the site southwards are (from east to west) Auchengairn Burn and Milton Burn. The Stinchar (at locations upstream, close to the site and downstream) is classified as having an overall status of Good (SEPA, 2013). Further detail is provided in Technical Appendix 7.1: Hydrological and Hydrogeological Research and Technical Appendix 9.8: Fish Habitat Suitability Survey Results.

Biological Records

9.4.9 Records of notable species were searched for on the NBN Gateway in April 2013 and February 2015.

9.4.10 Data for the relevant study areas was also provided by the Ayrshire Bat Group, Butterfly Conservation, Scottish Badgers, the Botanical Society of Britain and Ireland (BSBI) and Tilhill Forestry.
9.4.11 The locations of the notable non-confidential biological records are presented on Figure 9.3a (invertebrates and plants), Figure 9.3b (mammals - excluding bats, reptiles, amphibians and fish) and Figure 9.3c (bats). Apart from Figure 9.3c, these figures do not include records only provided at the 10 km OS grid square scale; however, these records have been considered in the assessment and are included in Technical Appendix 9.3.

9.4.12 The annual reports for the post-construction breeding bird surveys of the existing Hadyard Hill Wind Farm for the years between 2006 and 2011 did not report any dead bats (Ecology UK / RPS / MacArthur Green, 2007-2012). After this time, carcass surveys have been undertaken on a monthly basis by SSE staff as well as reporting of carcass finds by staff during routine work. On 26 August 2013, one soprano pipistrelle bat was recorded by a worker on the existing operational wind farm site, but no location was provided in the report.

Phase 1 Habitat Survey and NVC Survey Findings

9.4.13 The site is approximately 1,837 ha in total and is predominately comprised of commercial conifer plantation and open, upland modified bog and marshy grassland used for both sheep and cattle grazing. The coniferous plantations have open rides and grassy glades and are also used for deer stalking.

9.4.14 Figure 9.4 shows the Phase 1 habitat types within the core study area. The full habitat descriptions and target notes are presented in Technical Appendix 9.4: Habitat Survey Results. The following is a brief summary.

9.4.15 The majority of the site comprises commercial coniferous plantation (about 43% of the area, including recently felled areas), modified bog about 23%, marshy grassland about 19% and grasslands, mainly acidic, comprise 5% (see Table 9.5).

| Table 9.5: Approximate Areas of the Phase 1 Habitats Present Within the Site Boundary |
|---------------------------------|------------------|------------------|
| Phase 1 Habitat Type            | Area (ha)        | % of the Site    |
| Coniferous plantation woodland  | 672.80           | 36.63            |
| Wet modified bog                | 385.78           | 21.00            |
| Marsh/marshy grassland          | 351.82           | 19.15            |
| Recently-felled coniferous woodland | 119.52       | 6.51             |
| Not surveyed                    | 97.12            | 5.29             |
| Semi-improved acid grassland    | 59.29            | 3.23             |
| Road/track                      | 22.24            | 1.21             |
| Dry modified bog                | 19.12            | 1.04             |
| Semi-improved neutral grassland | 15.77            | 0.86             |
| Scattered broad-leaved trees    | 14.41            | 0.78             |
| Unimproved acid grassland       | 13.39            | 0.73             |
| Continuous bracken              | 11.75            | 0.64             |
| Blanket bog                     | 10.58            | 0.58             |
| Improved grassland              | 8.19             | 0.45             |
| Dry heath/acid grassland mosaic | 7.66             | 0.42             |
Table 9.5: Approximate Areas of the Phase 1 Habitats Present Within the Site Boundary

<table>
<thead>
<tr>
<th>Phase 1 Habitat Type</th>
<th>Area (ha)</th>
<th>% of the Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unimproved neutral grassland</td>
<td>5.86</td>
<td>0.32</td>
</tr>
<tr>
<td>Broad-leaved semi-natural woodland</td>
<td>5.46</td>
<td>0.30</td>
</tr>
<tr>
<td>Wet dwarf shrub heath</td>
<td>5.06</td>
<td>0.28</td>
</tr>
<tr>
<td>Acid dry dwarf shrub heath</td>
<td>3.44</td>
<td>0.19</td>
</tr>
<tr>
<td>Wet heath/acid grassland mosaic</td>
<td>2.12</td>
<td>0.12</td>
</tr>
<tr>
<td>Broad-leaved plantation woodland</td>
<td>1.34</td>
<td>0.07</td>
</tr>
<tr>
<td>Swamp</td>
<td>1.29</td>
<td>0.07</td>
</tr>
<tr>
<td>Running water</td>
<td>1.28</td>
<td>0.07</td>
</tr>
<tr>
<td>Other (yard/garden)</td>
<td>0.43</td>
<td>0.02</td>
</tr>
<tr>
<td>Dense/continuous scrub</td>
<td>0.41</td>
<td>0.02</td>
</tr>
<tr>
<td>Acid/neutral scree</td>
<td>0.20</td>
<td>0.01</td>
</tr>
<tr>
<td>Tall ruderal</td>
<td>0.17</td>
<td>0.01</td>
</tr>
<tr>
<td>Standing water</td>
<td>0.15</td>
<td>0.01</td>
</tr>
<tr>
<td>Non-ruderal</td>
<td>0.13</td>
<td>0.01</td>
</tr>
<tr>
<td>Poor semi-improved grassland</td>
<td>0.10</td>
<td>0.01</td>
</tr>
<tr>
<td>Bare ground</td>
<td>0.05</td>
<td>0.00</td>
</tr>
<tr>
<td>Buildings</td>
<td>0.02</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>1836.93</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

9.4.16 Many of the plant communities are highly modified as a result of commercial forestry, artificial drainage of both forestry and blanket bog communities, and relatively high levels of sheep and cattle grazing with associated trampling and nutrient enrichment from dunging. The most important habitat within the survey area, from a nature conservation perspective, is blanket bog. However, 97% of the bog habitats are degraded as a result of the long-term effects of such land-use and management. The effects of grazing are particularly evident on the forestry side of some fences adjacent to conifer plantations, which exclude sheep and cattle grazing, where heather (*Calluna vulgaris*) has regenerated.

9.4.17 Due to the degradation of the bog communities, such communities have a discontinuous cover, or absence, of bog mosses and heather. Purple moorgrass (*Molinia caerulea*) and acid grassland species cover the hummocks of hare’s-tail cottongrass (*Eriophorum vaginatum*), superficially making areas look like acid grassland. Therefore, the majority of the bog habitats were not a perfect fit with the NVC but were close to M19 *Calluna vulgaris-Eriophorum vaginatum* blanket mire, and was therefore mapped as wet modified bog on the Phase 1 habitat map (Figure 9.4). The M19 closest-fit NVC community comprises 21% of the NVC survey area and is the most extensive NVC community. About 0.6% of the site (10.7 ha of 1836.9 ha) relatively unmodified blanket bog. This is, probably due to higher water levels and remaining general wetness of peat discouraging grazing and trampling by sheep and cattle. These areas are considered to fit best within the NVC communities M19 and some M17 *Trichophorum cespitosus-Eriophorum vaginatum* blanket mire and are therefore mapped as blanket bog on the phase 1 habitat map.
9.4.18 M25 *Molinia caerulea-Potentilla erecta* mire (predominantly the *Erica tetralix* sub-community), dominated by thick tussocks of purple moor-grass, is typically found in areas of shallower peat on the site and is indicative of former wet heath and bog which has been subject to intensive drainage, grazing, trampling and, possibly, burning.

9.4.19 Marshy grassland communities, dominated by M23 *Juncus effusus/acutiflorus-Galium palustre* rush-pasture, also exist in extensive swathes on shallow slopes, particularly adjacent to plantation forestry and on areas with drier peat deposits. Much of this community has developed as a result of the long-term effects of grazing on former wet heath and bog communities, but also as result of a drying effect from the growth of forestry trees. Therefore, most of the M23 community is degraded bog. However, 0.1% of the NVC survey area was identified as species-rich marshy grassland associated with watercourses.

9.4.20 Other areas of marshy grassland have been mapped as NVC communities MG10 *Juncus effusus* rush pasture which includes species indicative of agricultural improvement and therefore a more neutral environment. However, species indicative of slightly acidic conditions are also present within these swards, e.g. bent grasses (*Agrostis* spp.) and mat-grass (*Nardus stricta*), indicating their origin from acidic peat habitats. This also occurs within some of the MG6 *Lolium perenne-Cynosurus cristatus* grasslands.

9.4.21 The rides between forestry coupes, however, contain vegetation that do not always fit any NVC community but contain an eclectic mix of species indicative of blanket bog, wet heath and marshy grassland communities. Target notes were made of any bog pools and flushes occurring within the survey area. Several bog pools occur north of the access track between turbines 30 and 31, although there are very few pools in most of the other bog areas across the site. There are also some examples of base-rich flushes, which are mainly wet muddy patches with species indicative of more localised base-rich conditions (see target notes 2, 19 and 26 on Figure 9.4).

9.4.22 The map of NVC communities is shown in Figure 9.5 which shows the NVC communities within 250 m of the proposed development.

9.4.23 The full list of NVC communities identified within the survey area, as well as lists of plant species within each NVC community, are provided in Technical Appendix 9.5: NVC Quadrat Data.

9.4.24 A combined list of plant species recorded during the Phase 1 and NVC surveys is provided in Technical Appendix 9.6: Plant Species List.

9.4.25 The approximate total extent of each NVC community within the survey area is provided in Table 9.6 below.

| Table 9.6: Approximate Areas of each NVC Community within 250 m of Infrastructure |
|---------------------------------|-----------------|-----------------|
| Habitat / NVC community       | Area (Ha) | % of total |
| Coniferous plantation         | 422.88     | 43.60        |
| M19 *Calluna vulgaris-Eriophorum vaginatum* blanket mire (closest fit) | 202.01 | 20.83 |
| M23a *Juncus effusus/acutiflorus-Galium palustre* rush-pasture, *Juncus acutiflorus* sub-community | 94.76 | 9.77 |
## Table 9.6: Approximate Areas of each NVC Community within 250 m of Infrastructure

<table>
<thead>
<tr>
<th>Habitat / NVC community</th>
<th>Area (Ha)</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-NVC: recently felled conifer plantation</td>
<td>45.65</td>
<td>4.71</td>
</tr>
<tr>
<td>M25a <em>Molinia caerulea-Potentilla erecta</em> mire, <em>Erica tetralix</em> sub-community</td>
<td>26.17</td>
<td>2.70</td>
</tr>
<tr>
<td>U4 <em>Festuca ovina-Agrostis capillaris-Galium saxatile</em> grassland</td>
<td>23.55</td>
<td>2.43</td>
</tr>
<tr>
<td>MG10 <em>Holcus lanatus-Juncus effusus</em> rush-pasture</td>
<td>22.11</td>
<td>2.28</td>
</tr>
<tr>
<td>M25b <em>Molinia caerulea-Potentilla erecta</em> mire, <em>Anthoxanthum odoratum</em> sub-community</td>
<td>19.27</td>
<td>1.99</td>
</tr>
<tr>
<td>Not surveyed</td>
<td>18.04</td>
<td>1.86</td>
</tr>
<tr>
<td>MG6 <em>Lolium perenne-Cynosurus cristatus</em> grassland</td>
<td>15.79</td>
<td>1.63</td>
</tr>
<tr>
<td>M25 <em>Molinia caerulea-Potentilla erecta</em> mire</td>
<td>9.70</td>
<td>1.00</td>
</tr>
<tr>
<td>M23 <em>Juncus effusus/acutiflorus-Galium palustre</em> rush-pasture</td>
<td>7.23</td>
<td>0.75</td>
</tr>
<tr>
<td>U1/U4/U5 upland grassland mosaic</td>
<td>6.32</td>
<td>0.65</td>
</tr>
<tr>
<td>U20 <em>Pteridium aquilinum-Galium saxatile</em> community</td>
<td>5.20</td>
<td>0.54</td>
</tr>
<tr>
<td>M15 <em>Scirpus cespitosus-Erica tetralix</em> wet heath</td>
<td>5.06</td>
<td>0.52</td>
</tr>
<tr>
<td>U6 upland grassland dominated mosaic</td>
<td>3.99</td>
<td>0.41</td>
</tr>
<tr>
<td>U4/MG6/M23a upland grassland with rushes mosaic</td>
<td>3.36</td>
<td>0.35</td>
</tr>
<tr>
<td>M19a <em>Calluna vulgaris-Eriophorum vaginatum</em> blanket mire, <em>Erica tetralix</em> sub-community (closest fit)</td>
<td>2.55</td>
<td>0.26</td>
</tr>
<tr>
<td>M23a/M25b rush-pasture/purple moorgrass mire mosaic</td>
<td>2.50</td>
<td>0.26</td>
</tr>
<tr>
<td>H12 <em>Calluna vulgaris-Vaccinium myrtillus</em> heath</td>
<td>2.07</td>
<td>0.21</td>
</tr>
<tr>
<td>U5 <em>Nardus stricta-Galium saxatile</em> grassland</td>
<td>1.68</td>
<td>0.17</td>
</tr>
<tr>
<td>U5/M25 upland grassland/purple moorgrass mire mosaic</td>
<td>1.39</td>
<td>0.14</td>
</tr>
<tr>
<td>MG6/MG10 improved pasture/<em>Juncus effusus</em> rush pasture mosaic</td>
<td>1.23</td>
<td>0.13</td>
</tr>
<tr>
<td>Non-NVC: Planted deciduous trees</td>
<td>1.13</td>
<td>0.12</td>
</tr>
<tr>
<td>MG9 <em>Holcus lanatus-Deschampsia cespitosa</em> grassland</td>
<td>1.00</td>
<td>0.10</td>
</tr>
<tr>
<td>M23a species-rich version of <em>Juncus effusus/acutiflorus-Galium palustre</em> rush-pasture, <em>Juncus acutiflorus</em> sub-community</td>
<td>0.93</td>
<td>0.10</td>
</tr>
<tr>
<td>U6 <em>Juncus squarrosus-Festuca ovina</em> grassland</td>
<td>0.67</td>
<td>0.07</td>
</tr>
<tr>
<td>U6/M25 upland grassland/purple moorgrass mire mosaic</td>
<td>0.55</td>
<td>0.06</td>
</tr>
</tbody>
</table>
Table 9.6: Approximate Areas of each NVC Community within 250 m of Infrastructure

<table>
<thead>
<tr>
<th>Habitat / NVC community</th>
<th>Area (Ha)</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>U4/MG10 upland grassland/Juncus effusus rush pasture mosaic</td>
<td>0.21</td>
<td>0.02</td>
</tr>
<tr>
<td>H21 Calluna vulgaris-Vaccinium myrtillus-Sphagnum capillifolium heath</td>
<td>0.21</td>
<td>0.02</td>
</tr>
<tr>
<td>U20/U4 Bracken/upland grassland mosaic</td>
<td>0.18</td>
<td>0.02</td>
</tr>
<tr>
<td>Non-NVC: hardstanding</td>
<td>0.17</td>
<td>0.02</td>
</tr>
<tr>
<td>S9a Carex rostrata swamp, Carex rostrata sub-community</td>
<td>0.17</td>
<td>0.02</td>
</tr>
<tr>
<td>M17 Scirpus cespitosus-Eriophorum vaginatum blanket mire</td>
<td>0.11</td>
<td>0.01</td>
</tr>
<tr>
<td>M20 Eriophorum vaginatum blanket and raised mire</td>
<td>0.11</td>
<td>0.01</td>
</tr>
<tr>
<td>H18 Vaccinium myrtillus-Deschampsia flexuosa heath</td>
<td>0.09</td>
<td>0.01</td>
</tr>
<tr>
<td>S11c Carex vesicaria swamp, Carex rostrata sub-community</td>
<td>0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>Open water</td>
<td>0.04</td>
<td>0.00</td>
</tr>
<tr>
<td>W1 Salix cinerea-Galium palustrum woodland</td>
<td>0.03</td>
<td>0.00</td>
</tr>
<tr>
<td>S9b Carex rostrata swamp, Menyanthes trifoliata-Equisetum fluviatile sub-community</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Grand Total (excluding existing tracks)</td>
<td>969.94</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Groundwater-Dependent Terrestrial Ecosystems

9.4.26 GWDTEs are a Water Framework Directive consideration and are therefore assessed in Chapter 7: Hydrology. The NVC survey data is used to outline where there is a potential for groundwater presence. GWDTEs are not necessarily regarded as ecologically sensitive receptors because habitat sensitivity is defined by a number of factors, including rarity, the type of constituent species and sometimes species richness. This is summarised in Table 9.2. For example, a species-poor marshy grassland may indicate groundwater presence but is a common habitat. Extensive areas of the marshy grassland community M23a Juncus effusus/acutiflorus-Galium palustre rush pasture occur adjacent to the forestry on-site. It is believed that this is the result of the blanket bog/mire communities drying as a result of the forestry, as well as being grazed over a long period. In these locations M23a (and M23b in some areas) it is considered to be the result of rush incursion of hydrologically disturbed ground as well as the effects of long-term over-grazing and are not considered groundwater-dependent but rain-fed.

9.4.27 This chapter therefore assesses whether any hydrologically-sensitive habitats, which includes rain-fed (also called ‘ombrotrophic’) habitats such as blanket bog, may be impacted in any way, such that there may be a reduction in extent and/or species richness but does not assess direct hydrological impacts.

Non-native Invasive Plant Species

9.4.28 A stand of the non-native and highly invasive species Japanese knotweed (Fallopia japonica) was noted along the south side of the road, south of Penwhapple reservoir. This lies just out with the site boundary and is target note 38 on Figure 9.4.
Results of the Protected Species Surveys

9.4.29 The non-confidential results of the protected species surveys are summarised below and are shown on Figure 9.6. Target notes refer to Figures 9.6 and are provided in detail in Technical Appendix 9.7: Protected Species Target Notes.

9.4.30 The badger survey results are provided in a separate confidential annex.

Otter

9.4.31 One active otter resting site was noted in a culvert on the existing Hadyard Hill wind farm site, not far from Penwhapple reservoir (target note 43). An otter was also observed along the edge of Penwhapple reservoir (target note 46). Two other potential otter resting sites were found to the north of Delamford, associated with Dobbingstone Burn and its tributaries (target notes 23 and 25). The closest resting site to the proposed development is target note 25, which is a potential resting site and is 198 m from the new track to turbine 1 (202 m from turbine 1). Spraints were also found along the edge of Penwhapple reservoir, Dobbingstone Burn, Milton Burn, and also to the east of the site along Ferly Burn.

Water vole

9.4.32 No evidence of water vole was recorded during any of the surveys carried out in 2013 or 2014. There were a number of areas that appeared to provide potentially suitable habitat for this species although grazing and heavy poaching by livestock has reduced the suitability of sections of several watercourses.

Pine marten

9.4.33 No potential pine marten dens were noted although a survey focused on this species was not considered to be necessary to inform this assessment due to the poor quality of habitat present within the survey area. However, a pine marten scat was found at the existing forestry entrance site to the plantation north of Doughty Hill (target note 28), and was confirmed as pine marten through DNA analysis. No other evidence of this species was found.

Red squirrel

9.4.34 The coniferous plantations across the site were identified as having low to moderate potential to support red squirrel. Large areas of the Mull of Miljoan forestry are either under 15 years of age or have been felled and are therefore considered to be currently unsuitable. One sighting of red squirrel was made, at the entrance to the Mull of Miljoan forestry area (the Glengennet entrance to the Hadyard Hill wind farm) (target note 37). No dreys were noted during the red squirrel survey in 2014. Only two squirrelled cones were found during the 2014 survey, adjacent to the entrance to the forestry north of Doughty Hill, but it is not possible to distinguish whether this was red or grey squirrel. Grey squirrel (Sciurus carolinensis) is known to be present in the area and, further to the desk study records, were observed in the Blair Farm area (woodland near Cairn Hill) to the north-east of the proposed development.

9.4.35 Red squirrel are likely to be present in very low densities and habitat suitability within the majority of the plantation areas is considered to be relatively poor (Figure 9.7).

Common lizard

9.4.36 Common lizard was recorded from east of Delamford Hill, Daljedburgh Hill, and the Doughty Hill-Pinverains area (target notes 38, 42, 29, 30, 31 and 36). However, most
open moorland habitat, with the exception of areas adjacent to Penwhapple reservoir, is suitable for common lizard.

**Great crested newt**

9.4.37 No suitable breeding ponds for great crested newt were identified within the survey area.

**Fish habitat suitability**

9.4.38 The results of the fish habitat suitability survey are briefly summarised below. Further detail is provided in Technical Appendix 9.8: Fish Habitat Suitability Survey Results.

9.4.39 Most of the proposed crossing locations were found to have no or very limited suitable in-stream habitat for any fish species of conservation interest. Most of the watercourses, at the location of the proposed crossings, are either very minor headwater streams, generally less than 1 m width and which are likely to become dry during periods of low rainfall, or are wet (generally acid) flushes with poorly defined channels. Several of the proposed crossings are also located within densely shaded conifer plantations with pole-stage trees planted right up to the bankside. The proposed crossings with the Milton Burn catchment are upstream of an impassable natural obstruction to migratory salmonids. There are two locations, on slightly larger minor watercourses, where there is considered to be some potential for resident brown trout to be present in the vicinity of the crossing.

**Bat - potential roosts & habitat quality**

9.4.40 No bat roosts were found within the survey area. Potential roosting opportunities across the site are generally lacking due to the dominance of extensive coniferous plantation, with trees that do not provide any potentially suitable roosting opportunities, and extensive upland moorland habitats with very small watercourses. One mature tree adjacent to the entrance leading into Dal Jedburgh Forest (target note 48, Figure 9.6) had some potentially suitable features but there was no evidence of use by bats. There were no other potentially suitable natural or man-made roosting sites identified within 500 m of the proposed infrastructure.

9.4.41 Habitat quality for foraging across the site is relatively low because of the dominance of extensive coniferous plantation and open upland moorland. In contrast, the surrounding lowland farmland, larger watercourses (such as the Rivers Stinchar and Girvan), parkland and mature broadleaved woodland outside the site boundary provide moderate to high quality habitat for a range of bat species, both in relation to roosting opportunities and foraging habitat. The distinction between the low quality upland nature of the site and the medium/high quality of the surrounding lower, more heterogeneous areas is shown on Figure 9.8.

9.4.42 To the north of Barony Hill there are disused lime kilns with deep voids accessible between gaps in the stonework. Nearby there is also a disused limestone mine with large underground voids opening to a sheltered cleugh with scattered trees and a small watercourse. Survey and monitoring during 2012 and 2014 (including targeted monitoring during the autumn) was carried out at these sites. However, subsequent to changes to the wind farm layout in late 2014 they are now located well outside of the site and some 2 km north of the nearest proposed wind turbine.
Bat survey results

9.4.43 The results of the 2012 and 2014 bat activity surveys are summarised below. In summary, these indicate that there is relatively higher bat activity outside the site although there are still good commuting routes across the site.

9.4.44 Figure 9.9a shows the locations where the automated bat detectors were deployed as well as the bat activity transect routes in 2012, and Figure 9.9b shows these for bat activity surveys undertaken in 2014.

9.4.45 Figures 9.10 (for 2012) and 9.11 (for 2014) only show the results for Nyctalus species, i.e. noctules (Nyctalus noctula) and Leisler’s bat (Nyctalus leisleri), because these are considered to be at relatively high risk of mortality from wind turbines, especially at higher elevations above ground level in open upland landscapes, and are relatively rare in Scotland, restricted to the south (BCT, 2014). However, full details of the bat survey results, including figures showing the results in relation to all bats species, are provided in Technical Appendix 9.9: Results of the Bat Surveys.

Bats – A summary of the bat activity results from 2012

9.4.46 Six species of bat were recorded during transect and automated bat detector surveys during 2012. These were, in decreasing order of occurrence: soprano pipistrelle (Pipistrellus pygmaeus), common pipistrelle (Pipistrellus pipistrellus), noctule, Leisler’s bat, Daubenton’s bat (Myotis daubentonii) and Natterer’s bat (Myotis nattereri). The highest levels of bat activity were recorded outside the site boundary and were associated with woodland edges and watercourses.

9.4.47 The highest levels of general bat activity were obtained from the A2 Dobbingstone Hill automated bat detector which is now external to the site. Apparent concentrations of Nyctalus species activity were noted at the W2 Cairn Hill transect to the north-east and W1 Brockloch Farm transect to the south-east of the 2012 survey area. Both of these locations are now well outside of the site.

9.4.48 The lowest level of bat activity during a transect was along the D3 Daljedburgh Plantation transect where only one bat pass was recorded throughout the whole survey period. All records within the forestry areas were of pipistrelle bats except for 14 Myotis passes recorded at the eastern end of the D2 Doughty Plantation transect where the forestry track joins the public road.

9.4.49 Automated bat detectors connected to ultrasonic microphones attached to the meteorological masts on Daljedburgh Hill and Doughty Hill at 50 m agl returned the lowest number of passes among the automated recording locations, with only two bats at each location throughout the whole survey. Both these masts are situated in typical locations for wind turbines outside of the plantation areas, i.e. on high ground in open moorland and some distance from the edge of any woodland or significant watercourse.

Bats – A summary of the bat activity results from 2014

9.4.50 As was the case in 2012, the three surveys along the driven transect indicated that soprano and common pipistrelles were the most frequently recorded species, with high concentrations of calls recorded within lowland woodland and farmland with generally much lower levels of activity in open upland moorland and plantation edges within the site. Myotis species activity, probably Daubenton’s bat, was recorded near Dalquhairn during the July dusk survey, associated with the Ferly/Auchengairn/Dalquhairn watercourse which leads into the Stinchar just outside
of the site boundary. *Nyctalus* species passes were recorded during the July and August driven transect surveys, but not in September. Activity levels showed a pattern of a greater concentrations of activity in lower-lying areas in comparison to levels recorded at the altitude of the proposed development. The highest concentrations of calls recorded were associated with the River Stinchar and lines of mature deciduous trees external to the site that line the roads, particularly so in the August dusk survey. However, some calls (attributed to noctule bats) were recorded on the section of the transect near to turbine 30 at an altitude of c. 215 m.

9.4.51 From the automated bat detector surveys, the most frequently recorded species was soprano pipistrelle followed by common pipistrelle. *Nyctalus* species were recorded at almost every sampling location, including in the open moorland areas, as well as along the forestry edges and plantation rides, except on Daljedburgh Hill and in Daljedburgh Forest. There was an apparent concentration of activity in the Cairn Hill area, similar to the results of the 2012 surveys. There was also a relatively high number of *Nyctalus* passes recorded at a detector deployed in an area of young thicket plantation in Glengennet plantation (near turbine 29).

9.4.52 With the exception of the Cairn Hill area (which is now well outside of the site), the results of the 2014 survey confirmed that bat activity as a whole was relatively low at sampling locations in open unenclosed moorland in comparison to linear features such as watercourses and woodland edges and more open locations within the conifer plantations (e.g. watercourses and clearfell-thicket plantation stages).

9.4.53 At a number of locations a 15 m high mast was used to sample bat activity at a greater height than the standard 2 m pole deployment. Generally lower levels of bat activity were recorded from the microphones placed at 15 m above ground level (agl) than at 2 m agl, although this difference was less clear for *Nyctalus* species in comparison to *Myotis* and *Pipistrellus* species. This is not unexpected given the open-adapted wing morphology and hunting behaviour of *Nyctalus* bats in comparison to the other species present in the area.

9.4.54 On three separate nights in late summer 2014, an aerostat device (Helikite™) was used to sample bat activity at approximately 60 m agl at Cairn Hill, which is now located outside of the site. The results from this limited survey yielded similar results from the monitoring at 50 m agl from met masts in 2012, with very low levels of bat activity recorded in comparison to concurrent recording at ground level. However, the results were inconclusive with respect to assessing vertical differences in activity by *Nyctalus* species because none were recorded from the ground-based or 60 m agl bat detectors on any of the three occasions this equipment was deployed in 2014.

**Evaluation of Ecological Receptors**

**Species Excluded from further Consideration in the Assessment**

9.4.55 One pine marten scat was found during surveys in 2014. This species is likely to be present in the area but at very low densities and the potential for important supporting habitat or resting sites to be affected by the proposed development is considered to be very low. Based on the available evidence, any effect upon pine marten is likely to be negligible. Consequently, potential impacts on this species are not considered in any detail at this time. However, pre-felling and pre-construction surveys for this species are proposed to ensure that any active resting sites that are present, or present at that time, are identified and fully considered with respect to the legal protection afforded to this species.
9.4.56 Similarly, the red squirrel population is very likely to be of low density. There is no evidence that the conifer plantation areas currently support a viable population. Given the relatively low quality of habitat for this species within the site any effect upon red squirrel is also likely to be negligible. Pre-felling surveys for this species are also proposed to ensure that they are taken into full consideration, as species with special legal protection, should the current baseline situation change ahead of the construction of the proposed development.

9.4.57 The populations of freshwater pearl mussel in the Water of Girvan catchment occur upstream from the site (ART website, March 2015). Therefore, the watercourses draining the site meet the Water of Girvan downstream from any freshwater pearl mussel population. There is therefore no potential for effects on these populations from the construction of the proposed development.

9.4.58 The hoverfly *Melanogaster aerosa* (a Nationally Scarce species) has been recorded adjacent to the site (details are provided in Technical Appendix 9.3: Desk Study Results). The larvae of this species live beneath the surface of semi-liquid mud, typically in acid bogs and flushes and around small moorland streams (Falk, 1992). These habitat types have been identified and mapped and considered as constraints from an early stage in the development of the wind farm infrastructure layout. The potential for significant effects on this species is considered to be low and would be reduced further through proposed micro-siting of infrastructure during construction to minimise impacts on all bog / wetland habitats.

9.4.59 The small heath butterfly (a UK BAP priority species, which is also Near Threatened) has been recorded in the vicinity of the proposed development since 2010 although most records are from the 1990s (see Figure 9.3a). The typical larval food plants of this species (notably fescues, meadow-grasses and bent grasses, especially in dry, well-drained situations where the sward is short) are present on the site, but are not that extensive. Habitats occupied by this species are, however, quite wide ranging including well-drained grassland and heathland but also areas of wet grassland and bog (Futter *et al*., 2006). This butterfly is widely distributed in south-west Scotland and there is no evidence to indicate that the site is more likely to host a greater density of this species than other similar upland habitats in the region.

9.4.60 Yellowish fork-moss (a Nationally Scarce species) has been recorded adjacent to the site (details are provided in Technical Appendix 9.3: Desk Study Results). This species is associated with gravel and silted rocks by streams and rivers, but also in a range of other wet or damp habitats, perhaps most frequently where there is some base-enrichment (Atherton *et al*., 2010). These habitat types have been preferentially avoided during the development of the wind farm infrastructure layout. Therefore, the potential for significant effects on this species is considered to be low and would be reduced further through proposed micro-siting of infrastructure during construction to minimise impacts on all bog / wetland habitats.

9.4.61 Orange-bud thread-moss (*Pohlia flexuosa*) is a nationally scarce species noted during the desk study. However, the record occurs in a 10 km grid square external to the north of the site. According to Smith (2004) the most likely variant to occur in western and northern Britain is *Pohlia flexuosa var. pseudomuyldemansii*, occurring on shallow soil, gravel and fragmenting rocks in sheltered rocky places by waterfalls and streams which do not occur on the site.
Receptors Included in the Assessment

9.4.62 The ecological receptors identified as present or potentially present for which an impact assessment has been undertaken are listed in Table 9.7.

<table>
<thead>
<tr>
<th>Ecological Receptor</th>
<th>Comments on the Evaluation</th>
<th>Receptor sensitivity (defined in Table 9.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants and Habitats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watercourses</td>
<td>Headwaters of sub-catchments to the River Stinchar and Water of Girvan are located within the site. These wider catchments are associated with important populations / habitats for fish species such as Atlantic salmon, which are located downstream of the proposed development (there is very limited suitable fish habitat within the site).</td>
<td>Local (high)</td>
</tr>
<tr>
<td>Blanket/modified bog</td>
<td>EC Habitats Directive Annex I habitat, habitat of conservation interest in the Scottish Biodiversity Strategy, UK BAP and Local BAP priority habitat. Whilst blanket bog is recognised as an internationally important habitat, almost 98% of the blanket bog on-site is highly modified by artificial drainage, over-grazing and the drying effects of forestry. However, there are small areas of active blanket bog that have been avoided for turbine base construction through alterations to the wind farm layout during the design phase. With a total of almost 423 ha on-site (including modified bog, blanket bog and wet heath), amounts to 1.3% of the estimated 31,329 ha of blanket bog/wet heath within Ayrshire (Ayrshire LBAP 2007-2010).</td>
<td>Regional</td>
</tr>
<tr>
<td>Species-rich marshy grassland</td>
<td>LBAP habitat within ‘Farmland’. Species-rich marshy grasslands currently account for 0.1% of the NVC survey area, but includes species such as heath-spotted orchid (<em>Dactylorhiza maculata</em>). These are small, scattered areas of species-rich M23a <em>Juncus effusus/acutiflorus-Galium palustre</em> rush pasture, <em>Juncus acutiflorus</em> subcommunity, adjacent to small watercourses, usually in seepage valleys.</td>
<td>Local (high)</td>
</tr>
<tr>
<td>Wet &amp; Dry Heaths</td>
<td>EC Habitats Directive Annex I habitats, UK BAP and LBAP habitat as ‘upland heathland’. There are small areas of heath, about 0.5% on-site, and predominantly in locations where livestock have been excluded. It is likely that there would have been much more extensive heath and that most of this has been lost to</td>
<td>Local (high)</td>
</tr>
</tbody>
</table>
### Table 9.7: Evaluation of Ecological Receptors Included in the Assessment

<table>
<thead>
<tr>
<th>Ecological Receptor</th>
<th>Comments on the Evaluation</th>
<th>Receptor sensitivity (defined in Table 9.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>grassland. With 10.62 ha on site (including heath with grassland mosaic), accounts for 0.04% of the estimated 25,364 ha of upland heath in Ayrshire (Ayrshire LBAP 2007-2010). The extent and the quality of heath is considered well below an international or even regional level.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purple moor-grass and rush pasture</td>
<td>Scottish Biodiversity Strategy and the UK BAP priority habitat and Local BAP. This habitat is defined by the M25 <em>Molinia caerulea-Potentilla erecta</em> mire NVC community, including the M25 a and b subcommunities, and covers approximately 5% of the NVC survey area. It is likely to be the result of overgrazing and drainage of wet heath and mire communities. It is also species-poor.</td>
<td>Local (high)</td>
</tr>
<tr>
<td>Protected species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Otter</td>
<td>Listed on Annexes II and IV of the EC Habitats Directive. Otter is also a UK BAP priority species and on the LBAP. Otter appears to only be present periodically and in specific locations associated with a small number of the watercourses within the site.</td>
<td>Local (high)</td>
</tr>
<tr>
<td>Common lizard</td>
<td>Listed on Schedule 5 of the Wildlife and Countryside Act (1981) Scotland (as amended), protected against killing or injuring and selling etc. UK BAP priority species. It is present in the area, although in low numbers.</td>
<td>Local (medium)</td>
</tr>
<tr>
<td>Badger</td>
<td>Protected under the Badger Act 1992. Present in the area, albeit in low numbers, parts of the plantation areas within the site are used for foraging, elsewhere within the site habitat quality is relatively low for this species.</td>
<td>Local (low)</td>
</tr>
<tr>
<td>Atlantic salmon &amp; sea trout</td>
<td>Atlantic salmon is listed on Annex II Habitats Directive (non-priority species). There is no suitable habitat for migratory salmonids, within the site. However, there are headwaters of sub-catchments of important salmonid rivers located within the site. Juvenile salmon are present in the River Stinchar in densities greater than all other major rivers in Ayrshire. The Water of Girvan is also an important salmon river.</td>
<td>Regional</td>
</tr>
<tr>
<td>European eel</td>
<td>This species is of international conservation concern, on the Scottish Biodiversity List and UK BAP priority species, populations are known to</td>
<td>Local (high)</td>
</tr>
</tbody>
</table>
### Table 9.7: Evaluation of Ecological Receptors Included in the Assessment

<table>
<thead>
<tr>
<th>Ecological Receptor</th>
<th>Comments on the Evaluation</th>
<th>Receptor sensitivity (defined in Table 9.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamprey species</td>
<td>Sea lamprey is listed on Annex II of the EC Habitats Directive, the Scottish Biodiversity List and is a UK BAP Priority Species. Brook lamprey is also listed on Annex II of the EC Habitats Directive and on the Scottish Biodiversity List. Both sea and brook lamprey populations occur in the River Stinchar and Water of Girvan catchments.</td>
<td>Local (high)</td>
</tr>
<tr>
<td>Bats</td>
<td>All of Britain’s bat species are listed on Annexes II and IV of the EC Habitats Directive. All bat species present are also UK BAP. The LBAP lists whiskered bat, noctule, common pipistrelle and soprano pipistrelle only. The site as a whole is considered, on a precautionary basis, to be of regional importance because of the presence of Leisler’s and Noctule bats which are relatively rare species in Scotland, additionally the South-west region is the main stronghold for Leisler’s in Scotland.</td>
<td>Regional</td>
</tr>
</tbody>
</table>

#### 9.4.63 To simplify the list of the ecological receptors above, the following impact assessment is undertaken combining ‘purple moorgrass and rush pasture’ with dry and wet heaths as ‘other habitats’. Similarly, Atlantic salmon, sea trout, European eel and lamprey species) are collated as ‘fish’. Therefore, the assessment for fish is undertaken for Atlantic salmon and sea trout given that these are assessed as having a Regional status, which therefore ensures the protection of European eel and lamprey species that have been given a Local (high) status.

**Future Baseline**

#### 9.4.64 Under a ‘do nothing’ scenario, the future baseline would be expected to be:

- ongoing degradation of bog habitats as a result of agricultural and forestry operations (e.g. drainage and additional fertiliser) and grazing by sheep and cattle;
- continuation of existing commercial forestry operations and typical harvesting / replanting regimes; and
- similar distributions of existing broad habitat types and presence / density of protected species populations to the current baseline.

#### 9.5 Likely Significant Effects

#### 9.5.1 This section describes the potential likely significant effects which might occur as a result of the proposed development (as described in Chapter 2), including the direct,
indirect, secondary, cumulative, short term, medium and long term, permanent and temporary, beneficial and adverse effects on each ecological receptor.

9.5.2 Potentially significant adverse effects during the construction phase include:
- habitat loss of habitat as well as fauna supported by those habitats, including consideration of any effects on habitat connectivity;
- a change in the species composition of habitats as a result of alterations in the existing hydrological regime due to earthworks etc.;
- pollution from hydrocarbons and/or chemical spillages (including silt run-off during forestry activities should large areas of plantation be felled within a short space of time) into aquatic habitats affecting water quality, the aquatic ecosystem and species dependent upon the aquatic habitats; and
- noise and artificial light disturbance to protected species (e.g. otter, badger).

9.5.3 Potential significant adverse effects during the operational phase include:
- bat collision / barotrauma from the operational wind turbines.

9.5.4 Potential adverse impacts that might occur during the decommissioning phase are the same as those that might occur during the construction phase, but are usually smaller in magnitude.

9.5.5 An assessment of adverse effects upon each ecological receptor (as identified in Table 9.7) for each phase of the development is provided below.

**Construction Effects**

**Potential Terrestrial Habitat Loss / Degradation**

9.5.6 The details of the methodology and results of the estimates of habitat loss that would occur during the construction of the proposed development are set out in Technical Appendix 9.10: Habitat Loss Calculations. Tables within the appendix detail the potential habitat loss to Phase 1 habitat types and NVC communities for each element of wind farm infrastructure. The calculations are based on the infrastructure dimensions and construction methods detailed in Chapter 2: Proposed Development. All the access tracks have been assumed to be ‘cut’ although in reality it is expected that about 1 km of new access track would be floated over areas of deeper peat.

9.5.7 The habitat loss calculations encompass two parts:
- direct habitat loss due to the infrastructure construction, that is, the area covered by the infrastructure footprint plus an assumed zone for earthworks associated with construction disturbance, such as embankments, cuttings, bunds and drainage ditches; and
- combined direct and indirect habitat loss - “indirect habitat loss” is defined as disturbance to hydrologically-sensitive habitats as a result of adjacent earthworks, and is termed ‘degraded habitat’ in the text below because of changes from species indicative of wet conditions to species indicative of drier conditions.

9.5.8 For these calculations, a precautionary additional 10 m zone of potential hydrological disturbance was added to the direct habitat loss area described above. Hydrologically-sensitive habitats include GWDTEs (e.g. flushes) and rain-fed or ‘ombrotrophic’
habitats (e.g. blanket or modified bog). Table 9.8 summarises the estimated direct, indirect and ‘combined’ (direct + indirect) habitat losses for the Phase 1 habitat types, and highlights those considered to be hydrologically-sensitive.

### Table 9.8: Estimated Combined Direct and Indirect Habitat Loss Due to the Construction of the Wind Farm Infrastructure. (Hydrologically-sensitive, both groundwater-dependent and ombrotrophic, habitats are highlighted in grey).

<table>
<thead>
<tr>
<th>Phase 1 Description</th>
<th>Direct habitat loss (ha)</th>
<th>Indirect habitat loss (ha)</th>
<th>Combined direct &amp; indirect habitat loss (ha)</th>
<th>Area of habitat within site boundary (ha)</th>
<th>'Combined' habitat loss as % of habitat type within site boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coniferous plantation</td>
<td>32.14</td>
<td>23.74</td>
<td>55.88</td>
<td>672.80</td>
<td>8.31</td>
</tr>
<tr>
<td>Wet modified bog</td>
<td>8.73</td>
<td>9.25</td>
<td>17.98</td>
<td>385.78</td>
<td>4.66</td>
</tr>
<tr>
<td>Marsh/marshy grassland (species-poor)</td>
<td>6.39</td>
<td>7.05</td>
<td>13.44</td>
<td>351.82</td>
<td>3.82</td>
</tr>
<tr>
<td>Recently felled coniferous plantation</td>
<td>1.11</td>
<td>1.17</td>
<td>2.28</td>
<td>119.52</td>
<td>1.91</td>
</tr>
<tr>
<td>Semi-improved acid grassland</td>
<td>1.05</td>
<td>1.13</td>
<td>2.18</td>
<td>59.29</td>
<td>3.67</td>
</tr>
<tr>
<td>Wet dwarf shrub heath</td>
<td>0.82</td>
<td>0.73</td>
<td>1.55</td>
<td>5.06</td>
<td>30.69</td>
</tr>
<tr>
<td>Semi-improved neutral grassland</td>
<td>0.46</td>
<td>0.32</td>
<td>0.78</td>
<td>15.77</td>
<td>4.97</td>
</tr>
<tr>
<td>Road/track</td>
<td>0.46</td>
<td>0.26</td>
<td>0.72</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Blanket bog</td>
<td>0.20</td>
<td>0.47</td>
<td>0.67</td>
<td>10.58</td>
<td>6.37</td>
</tr>
<tr>
<td>Acid dry dwarf shrub heath</td>
<td>0.09</td>
<td>0.20</td>
<td>0.29</td>
<td>3.44</td>
<td>8.41</td>
</tr>
<tr>
<td>Continuous bracken</td>
<td>0.04</td>
<td>0.06</td>
<td>0.10</td>
<td>11.75</td>
<td>0.87</td>
</tr>
<tr>
<td>Improved grassland</td>
<td>0.01</td>
<td>0.05</td>
<td>0.06</td>
<td>8.19</td>
<td>0.73</td>
</tr>
<tr>
<td>Total (sensitive habitats only)</td>
<td>16.14</td>
<td>17.50</td>
<td>33.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (all habitats)</td>
<td>51.51</td>
<td>44.43</td>
<td>95.94</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.5.9 Table 9.8 shows that the direct habitat loss to the development would be about 51.5 ha. About 65% of this would be coniferous plantation + recently felled plantation, about 17% would be wet modified bog, at most 12% would be species-poor marshy grassland (because the design has avoided the species-rich marshy grassland areas), 1.6% of wet dwarf shrub heath and 0.3% of blanket bog.

9.5.10 As a potential worst-case scenario, by considering the potential degradation of any hydrologically-sensitive habitat as a result of adjacent earthworks, Table 9.8 shows that the combined habitat loss might be 34 ha of potentially hydrologically-sensitive habitats (in comparison to a direct loss of 16.14 ha). Considering only the hydrologically-sensitive habitats in the context of the site (1837 ha), the combined
habitat loss equates to about 31% (0.8 ha direct; 1.5 ha combined) of the wet dwarf shrub heath habitat on-site, about 6% (0.2 hectares direct; 0.7 ha combined) of blanket bog, 5% (8.7 ha direct; 18 ha combined) of wet modified bog, and almost 4% (6.4 ha direct; 13.4 ha combined) of species-poor marshy grassland.

**Blanket/modified bog**

9.5.11 Without consideration of any further mitigation, the direct loss of wet modified bog + blanket bog is estimated to be 8.9 ha (0.5% of the site) and, as a worst-case scenario of potential degradation due to potential hydrological disturbance, about 18.7 ha (about 1% of the site). Out of the total resource of 396.4 ha on-site, the direct loss is estimated to be about 2% and, as a worst-case scenario degradation, about 4.7%. This is a low impact, resulting in a moderate-minor adverse effect (not significant).

9.5.12 Without mitigation, potential pollution impacts from spillages etc. would be expected to be low, with a moderate-minor adverse effect (not significant).

**Species-rich marshy grassland**

9.5.13 There will be no direct loss of species-rich marshy grassland which has already been avoided by the wind farm design. However, there is a risk of pollution from spillages which could potentially affect sensitive species associated with this habitat.

9.5.14 Without mitigation, there would be no direct habitat loss of species-rich marshy grassland. This is a negligible impact, resulting in a negligible effect (not significant).

9.5.15 Without mitigation, potential pollution impacts from spillages etc. would be expected to be medium, with a moderate-minor adverse effect (not significant).

**Other terrestrial habitats**

9.5.16 Table 9.8 shows that an estimated 0.8 ha of wet heath would be lost directly. Technical Appendix 9.10: Habitat Loss Calculations shows an estimated direct loss of about 2 ha of M25 *Molinia caerulea-Potentilla erecta* mire (the purple moorgrass and rush pasture habitat), including the M25 subcommunities.

9.5.17 Without mitigation, taking into consideration the estimated extent of loss of these habitats is likely to result in a low impact, resulting in a minor adverse effect (not significant).

9.5.18 Without mitigation, potential pollution impacts from spillages etc. would be expected to be medium, with a moderate-minor adverse effect (not significant).

**Otter**

9.5.19 Without mitigation, loss of habitat and/or connectivity is very unlikely to be a significant effect on otter because of the low levels of otter activity in the area and otter activity being associated with watercourses although otter may move across and forage within wetland habitats away from watercourses at certain times of the year. Loss of terrestrial habitats is likely to result in a negligible impact, resulting in a negligible adverse effect (not significant).

**Common lizard**

9.5.20 Without mitigation, loss of habitat (e.g. removal of hummocky moorland vegetation, log piles etc.) is likely to place common lizard at risk of injury and death, particularly in winter refuges but, with the small scale of habitat loss in comparison to unaffected
suitable contiguous habitat in the surrounding area and a low density lizard population, this would potentially be a low impact resulting in a minor adverse effect (not significant).

**Badger**

9.5.21 Without mitigation, loss of habitat, given the low level of badger activity in the area, would be no greater than a low impact resulting in a minor adverse effect (not significant).

**Bats**

9.5.22 Given the absence of potentially suitable features for roosting bats in the commercial conifer plantations on-site, there is considered to be negligible loss of roosting resource as a result of the proposed tree felling.

9.5.23 Without mitigation, there would be a negligible impact regarding bat roost loss resulting in a negligible effect (not significant).

9.5.24 The bat activity survey results show that a high proportion of bat passes (per night) were along forestry edges for *Pipistrellus* and *Nyctalus* species. With the loss of coniferous plantation, bats will lose some commuting habitat associated with the plantation edges and, for the *Nyctalus* species, the tree canopy.

9.5.25 Without mitigation, and considering the general limitations of bat activity surveys, the loss of forestry edge habitat that is useful for commuting bats would have a medium impact on bats commuting, resulting in a moderate adverse effect (significant).

9.5.26 Although the site provides low quality foraging habitat in comparison to habitats outside of the site boundary, there will be some foraging habitat lost associated with the loss of forestry riparian zones and forestry edges.

9.5.27 Without mitigation, this would be a negligible impact, resulting in a negligible effect (not significant).

**Potential Freshwater Pollution / Aquatic Habitat Loss & Degradation**

9.5.28 There are many very small watercourses present within the site which are unmarked on OS maps (i.e. at the 1:25,000 scale), particularly on Daljedburgh Hill. There are a total of eight locations where new access tracks are proposed to cross watercourses which are marked on OS maps (see Technical Appendix 7.1: Hydrological and Hydrogeological Research as well as Technical Appendix 9.8: Fish Habitat Suitability Survey Results).

9.5.29 Without mitigation, installation of these crossings would have the potential to result in direct habitat loss and mobilisation of fines and silt into the watercourse. The potential surface run-off from construction areas, storage compounds and engineering works such as accidental chemical pollution (for example, from concrete, oils or fuels) can also significantly affect freshwater habitats directly. Freshwater habitats can also be affected from the silt-laden run-off arising from earthworks (such as excavation of foundations, temporary storage of excavated spoil), dust from aggregate brought in to create access tracks and concrete for turbine foundations.

9.5.30 The upper River Stinchar is a catchment identified as being at risk to acidification from the effects of afforestation (Forestry Commission, 2014). Clear-felling can also result in silitation and acidification effects from an increase in nitrogen mineralisation and
nitrification which, in turn, can promote nitrate leaching and enhance acidity and aluminium solubility in waters draining some soils, particularly peaty soils. The effect usually lasts for two to five years after felling, depending upon the rate at which vegetation re-establishes (Forestry Commission, 2011). Research shows that the effects of harvesting on surface water acidity are difficult to discern when 20% or less of a catchment is felled within any three-year period.

**Watercourses**

9.5.31 Without any further mitigation in addition to the design mitigation, surface water pollution is assessed as potentially having a medium impact collectively on the minor watercourses within the site, taking into consideration the potential for effects to be spread downstream and into more sensitive sections of various tributaries to the Water of Girvan and the River Stinchar, resulting in a moderate-minor adverse effect *(not significant)*.

**Otter**

9.5.32 Without mitigation, taking into consideration the potential adverse effect on prey species (fish and amphibian populations), freshwater pollution is assessed as potentially having a medium impact on otter resulting in a moderate-minor adverse effect *(not significant)*.

**Fish**

9.5.33 Any major freshwater pollution incidents arising from the construction works, including silt and acidification arising from felling, have the potential to effect fish species of conservation concern supported by aquatic habitats downstream of the proposed development. Whilst there is some spatial separation from the more sensitive lower-lying reaches, the steep topography of some of the locations where earthworks would be undertaken means that rapid run-off could quickly effect these sensitive aquatic areas. However, Chapter 7: Hydrology and Hydrogeology concludes that there would be a low or negligible effect on the tributaries to the Water of Girvan and River Stinchar from leakages and spillages, sediment entrained run-off and acidification. This is because potential pollutants would be situated at least 52 m away from the nearest tributary channel, practices outlined in the SEPA Pollution Prevention Guidelines PPG5 (SEPA, 2007) would be followed, suitable sediment management measures would be implemented during felling, and that the effects of harvesting on surface water acidity are difficult to discern when 20% or less of a catchment is felled within any three-year period (Forestry Commission, 2011).

9.5.34 Without any further mitigation to that within the development design, freshwater pollution is assessed as potentially having a low impact on fish, resulting in a moderate-minor adverse effect *(not significant)*.

9.5.35 Potential for new watercourse crossings to result in significant barriers to movement of migratory fish (including consideration of within-catchment movements by species such as brown trout) is considered to be very low given the very small size of the watercourse channels affected and absence of suitable spawning habitat / juvenile fish habitat generally upstream of the proposed crossings. Also a best practice approach to crossing design will ensure that new barriers to fish movement are avoided (see Technical Appendix 2.5 Water Crossing Design).

9.5.36 Without mitigation, fish habitat loss due to inaccessibility is assessed as having a negligible impact resulting in a negligible effect *(not significant)*.
Bats

9.5.37 Without mitigation, taking into consideration the potential adverse effect on prey species (aquatic invertebrates) of any watercourse pollution, and given that there are few suitable watercourses for bat foraging on-site, freshwater pollution is assessed as potentially having a negligible impact on bats resulting in a negligible effect (not significant).

Noise and Light Disturbance to Protected Mammal and Reptile Species

Otter

9.5.38 Otters are highly mobile and can move away from the immediate vicinity of sources of disturbance associated with the construction works. However, prolonged disturbance to otter habitat may displace animals from suitable foraging habitat which may affect body condition and breeding success.

9.5.39 The only confirmed resting site is a culvert on the existing Hadyard Hill wind farm which is not a part of this proposal, and no site is considered likely to be suitable as a natal holt (i.e. breeding site). Additionally, any spraint sites are away from the proposed development.

9.5.40 Without considering mitigation, and notwithstanding the legal protection afforded to otters and their resting sites, disturbing construction activities are assessed as having a low impact resulting in a minor adverse effect (not significant).

Common lizard

9.5.41 During the summer, in particular during warm sunny days, common lizards are highly mobile and will typically move away from sources of disturbance, although their tendency to move into vegetation for cover does potentially place them at risk from vegetation clearance and soil stripping works. During cold wet weather lizards are slow (or stationary) and are at greater risk of harm from construction works. Therefore, reptiles are at a greater risk from disturbance during the winter or cold weather.

9.5.42 Without considering mitigation, and notwithstanding the legal protection afforded to lizards, and assuming works may be undertaken during the winter, disturbing construction activities on common lizard are assessed as having medium impact resulting in a minor adverse effect (not significant).

Badger

9.5.43 The site is currently used mainly for foraging, and all infrastructure is at least 420 m from any known setts.

9.5.44 Without considering mitigation, and notwithstanding the legal protection afforded to badgers and their setts, disturbing construction activities on badger are assessed as having a negligible impact resulting in a negligible effect (not significant).

Bats

9.5.45 As no bat roost has been identified within 500 m of the proposed development, construction activities are not predicted to have any disturbance upon roosting bats. However, unrestricted working hours and associated lighting may potentially affect commuting and/or foraging bats.
9.5.46 Without considering mitigation, and notwithstanding the legal protection afforded to bats and their roosts, potentially disturbing construction activities on bats are assessed conservatively as having a low impact resulting in a moderate-minor effect (not significant).

**Operational Effects**

*Potential Freshwater Pollution / Aquatic Habitat Degradation*

9.5.47 There is the potential for run-off from an operational windfarm to include accidental chemical pollution (for example, oils or fuels) and for spills to occur directly into watercourses. However, the potential for such incidents would be expected to be much more limited in extent, duration and frequency in comparison to the construction phase.

9.5.48 As a result of clear-felling of conifer plantation, there may be some ongoing acidification of watercourses as a result of medium to long-term soil changes.

**Watercourses**

9.5.49 Without mitigation, freshwater pollution during the operational phase is assessed as potentially having a low impact on watercourses, resulting in a minor adverse effect (not significant).

**Otter**

9.5.50 Without mitigation, freshwater pollution during the operational phase is assessed as potentially having a low impact on otter, resulting in a minor adverse effect (not significant).

**Fish**

9.5.51 Without mitigation, freshwater pollution during the operational phase is assessed as potentially having a low impact on fish, resulting in a moderate-minor adverse effect (not significant).

**Noise and Light Disturbance to Protected Mammal and Reptile Species**

9.5.52 Maintenance during the operational phase includes visits by engineers to the site, which includes noise from vehicles, people’s voices and of tools being used. Artificial lighting may also be required, particularly during the winter months. However, such incidences would be limited in extent, duration and frequency.

**Otter**

9.5.53 Without considering mitigation, disturbing activities during the operational wind farm on otter are assessed as having a negligible impact resulting in a negligible effect (not significant).

**Common lizard**

9.5.54 Without considering mitigation, disturbing activities during the operational wind farm on common lizard are assessed as having a negligible impact resulting in a negligible adverse effect (not significant).
Badger

9.5.55 Without considering mitigation, disturbing activities during the operational wind farm on badger are assessed as having a negligible impact resulting in a negligible effect (not significant).

Bats

9.5.56 Without considering mitigation, disturbing activities during the operational wind farm on bats are assessed as having a negligible impact resulting in a negligible effect (not significant).

Collision Risk and Barotrauma for Bats

9.5.57 Bat fatalities at wind farms have been attributed to both direct collision and barotrauma. Barotrauma involves tissue damage to air-containing structures caused by rapid or excessive pressure change which occurs near to rotating turbine blades. Due to the long life span and slow reproductive rate of UK bats, a possible increase in mortality due to wind turbines has the potential to have a significant effect on the size of the local population.

9.5.58 Recent studies of bat mortality on wind farms in north-west Europe have revealed that the estimated number of bats killed annually per turbine was lower on flat, open farmland away from the coast, higher in more complex agricultural landscapes, and highest at the coast and on forested hills and ridges (Rydell et al., 2010). The species most affected were pipistrelles, Leisler's and noctule because these species are adapted for foraging in open areas. Additionally, mortality was associated with low wind speeds in late July to early October, with mortality increasing with turbine tower height and rotor diameter but not associated with distance from the ground of the lowest rotor or the number of turbines. However, there is currently a paucity of scientific studies considering the issue of the effect of large onshore wind turbines on bats in the UK. Only a small number of fatalities have been documented and these have been found either during surveys for bird fatalities or on an ad hoc basis.

9.5.59 During the 2012 and 2014 surveys, there was comparatively low bat activity across open upland moorland habitats, with slightly higher activity along watercourses and forestry edges, and also an association with pipistrelle species within clear-felled / pre-thicket plantation (see Technical Appendix 9.9: Results of the Bat Surveys). The 15 m ‘at height’ surveys indicated that there was little differentiation been activity levels by Nyctalus species between the lower and higher elevations sampled.

9.5.60 The proposed development avoids watercourses and would also clear-fell all coniferous plantation on the site ensuring that no forestry edges would occur within several hundred meters of any of the proposed wind turbines. There is the possibility that this may create a temporary habitat (e.g. felled trees and brash) shown to be associated with an increase in activity of pipistrelle species, and to a lesser degree Nyctalus species, at this site.

9.5.61 However, taking into the consideration on-going research gaps and uncertainties about the long-term effects of onshore wind farms in the UK on sensitive bat populations and the presence of species of bat considered to be at relatively high risk from wind turbine mortality, a precautionary approach to this assessment has been followed in line with guidance from Natural England (2014).

9.5.62 Without considering mitigation, the potential for collision risk/barotrauma of bat species with turbine blades, in particular Nyctalus and considering the importance of
the region for Leisler’s bat (*Nyctalus leisleri*) which is otherwise uncommon in Scotland, it is assessed on a precautionary basis as having a medium impact resulting in a moderate adverse effect (**significant**).

**Decommissioning Effects**

9.5.63 Decommissioning would involve secondary earthworks with the removal of structures, such as turbine foundations with potential long-term adverse effects on habitats and habitats for protected species, additional to disturbance to protected species. Further, there is a potential temporary effect from pollution arising from hydrocarbons spillages from vehicles and machinery, associated with a resultant pollution of terrestrial and freshwater habitats.

9.5.64 Dismantling wind turbines and access tracks, the scale and nature of effects would be similar to the construction phase, with the type of access and working methods (such as for wind turbine and foundation removal) being critical to determining the level of effects.

9.5.65 It is therefore assumed that the general effects from decommissioning would be no greater than those during the construction phase.

**9.6 Mitigation and Best Practice**

9.6.1 This section describes best practice measures for impacts that are not assessed as significant as well as mitigation required to address likely significant effects. Significant adverse effects, identified in Section 9.5, include the removal of commuting / foraging routes for bats with the clear-felling of coniferous plantation, and during the operational phase, turbine collision risk for commuting bats. The pre-mitigation assessment of effects includes all known elements of the design, as set out in Chapter 2: Proposed Development and the supporting technical appendices. The measures described in this section are in addition to the mitigation measures incorporated into the design and have not been considered as part of the assessment above.

**General Best Practice Measures during the Construction Phase**

**Best Practice Measures for Habitats**

9.6.2 A suite of best practice measures would be outlined in a Construction and Environmental Management Plan (CEMP). The outline content of the CEMP is provided in Technical Appendix 2.4. The CEMP would be prepared following the determination of the application and would include an outline of the proposed approach to construction methods and environmental protection during all aspects of construction works. The CEMP would be agreed in consultation with SEPA, SNH and South Ayrshire Council.

9.6.3 Damage to sensitive habitats would be reduced, as far as possible, through the application of such best practice measures prior to, during and following construction works. These would include measures outlined in the publication 'Good Practice during Windfarm Construction' by Scottish Renewables *et al.* (2013) and the latest edition of the Forestry & Water Guidelines (Forestry Commission, 2011).

9.6.4 A suitably qualified and experienced Ecological Clerk of Works (ECoW) would be employed to oversee the implementation of ecological mitigation measures during construction. The precise role of the ECoW would be defined in consultation with SNH and SEPA in advance of the works commencing on site and the ECoW being
appointed. The ECoW would be impartial and have the authority to stop works should any environmental issues arise.

9.6.5 The CEMP would therefore include Method Statements based on best practice for:

- pollution prevention measures, site drainage, water monitoring and sensitive habitat protection (including buffers around GWDTEs), as outlined in Technical Appendix 7.1: Hydrological and Hydrogeological Research;
- phasing of clear-felling to reduce any further acidification of freshwater from acidic episodes and associated aluminium solubility draining from peaty soils, will also include replanting, as part of compensatory replanting obligations, of native riparian woodland adjacent to watercourses where there would naturally be such woodland (details of the phases of the clear-felling and compensatory planting are outlined in Technical Appendix 2.3: Forestry);
- instructions on how to use and store excavated peat/soils and translocated vegetation turfs for site road verges and batters, wind turbine bases and crane pad batters, as well as restoration techniques, monitoring methods; and
- preventing the spread of invasive non-native plant species.

9.6.6 The ECoW would be integral in the implementation of the CEMP.

**Best Practice Measures for Protected Species**

9.6.7 Habitat protection measures outlined in the CEMP would help to further protect sensitive habitats for a number of protected species. However, the CEMP would also outline species protection plans to ensure the protection of sensitive species as well as reducing disturbance of protected species during construction.

9.6.8 The CEMP would therefore detail:

- the need for pre-construction surveys to be undertaken, a minimum of six months prior to construction followed by pre-works checks (including species such as red squirrel and pine marten), to ensure that the baseline information for all potentially-affected protected species is up-to-date;
- the pre-construction surveys to be undertaken up to 200 m around proposed turbine locations, access tracks and other wind farm infrastructure; and
- measures, outlined below, to minimise disturbance to each potentially-affected protected species.

**Otter**

9.6.9 A pre-construction survey would be undertaken for otter by a suitably experienced ecologist within c. 6 months of the start of construction. Otter breeding is largely non-seasonal and a holt may contain a nursing female and young at any time of the year. If active resting sites are identified within 100-200 m of a construction area, micro-siting the works would be considered, particularly if there was a possibility of a breeding holt, or waiting until it is certain that there are no cubs.

9.6.10 If construction were to be undertaken within 30 m of any otter shelter and there was no likelihood of this being a breeding holt and the site could not be avoided by a suitable buffer zone, SNH would be approached for an EPS disturbance licence which
would outline specific measures to prevent disturbing otter and damaging the otter shelter.

9.6.11 Water crossing 3 would have a box or arch culvert to allow otters to access upstream safely, as outlined in Technical Appendix 2.5: Watercourse Crossing Design.

9.6.12 Additional best practice measures would be undertaken where construction occurs in areas that the ECoW believes are at risk of otter presence (e.g. in the area adjacent to water crossing 3). These would include: no activity to be undertaken until two hours after sunrise and ceasing two hours before sunset, no lighting adjacent to watercourses, and covering open excavations and pipes, and any other measures outlined on the SNH website.

Common lizard

9.6.13 Should common lizard be found to be more prevalent during the construction phase than during the baseline surveys, measures would include the ECoW briefing construction workers upon the potential presence of common lizard so that any lizard discovered would be relocated to a previously determined site a safe distance from the works but within its likely home range. If required, works would be undertaken away from potential refugia or potential refugia within the footprint of works to be hand-searched and removed by a suitably qualified ecologist before works.

Badger

9.6.14 A pre-felling survey and pre-construction survey would be undertaken for badger by a suitably experienced ecologist within 2-3 months of the start of construction in order to identify the location of any new badger sett within 30 m of any infrastructure, or 100 m of any borrow pit where rock blasting would be undertaken. Due to the potential for persecution of badgers, any map or details of these setts would be dealt with confidentially.

9.6.15 If felling or construction were to be undertaken within 30 m of any badger sett (100 m for borrow pits) and could not be avoided, SNH would be approached to agree a method statement for a disturbance licence which would outline specific mitigation measures to protect badgers during construction activities.

Bats

9.6.16 No bat roosts have been identified within 500 m of the proposed development although at least one tree has features with the potential to support roosting bats (target note 46, Figure 9.6). The potential for any roosts to be present in areas which could be directly affected by the proposed wind turbines is considered to be very low. However, a preconstruction survey would be completed at least 6 months ahead of the proposed works to identify any potential bat roost within approximately 50 m of any works. Works would preferentially be micro-sited to avoid any confirmed roost site. If works have to be undertaken within 30 m of any roost SNH would be approached for an EPS licence which would outline specific mitigation measures to protect that bat roost during construction activities.

Fish

9.6.17 Phasing clear-felling would reduce the potential for freshwater acidification (Forestry Commission, 2011). Additionally the proposed compensatory planting of native riparian woodland can help with this and would also improve habitat for fish, as long
as shading is no more than 50%. Details of the phases of the clear-felling and compensatory planting are outlined in Technical Appendix 2.3: Forestry.

**Mitigation Measures**

**Mitigation Measures for Bats**

9.6.18 Compensatory planting for the loss of the commuting corridors along the edges of conifer plantation would be undertaken largely off-site and no woodland edges will be retained (or allowed to develop) within an appropriate distance from any wind turbine. The limited proposed planting on-site would be of suitable native trees along riparian zones in the lower reaches of upland watercourses where the watercourse has an identifiable topographical incision (i.e. avoiding inappropriate planting on open bog/moorland). Where forestry would be cleared (e.g. to the east of Dalijedburgh Forest on the steep slopes down to Auchengairn Burn as well as in the other plantations) the watercourses have been denuded of natural vegetation. This riparian planting would in time help to ensure that bats are guided away from turbine locations and be connected to existing woodlands further downhill. Tree species would include alder (*Alnus glutinosa*), willow (*Salix* spp.) and rowan (*Sorbus aucuparia*), with birch (*Betula* spp.) in the drier areas. This would also help to fulfil the Joint Ayrshire LBAP objective to restore and enhance available foraging habitats which provide commuting routes between bat roosts and feeding sites.

**Best Practice and Mitigation Measures during the Operational Phase**

**General Best Practice Measures during the Operational Phase**

9.6.19 During the operation of the wind farm, general maintenance would be required on the wind turbines and tracks. All access to areas requiring maintenance would be confined to areas previously used for construction activities with no new access tracks constructed. Method statements for all potential maintenance and emergency maintenance works would be developed in accordance with best practice for both terrestrial and freshwater habitats and therefore protected species.

**Mitigation Measures for Bats**

9.6.20 Clear-felling during the construction phase would remove plantation edges, used by commuting and foraging bats, and this would be completed before turbines become operational. However, this would not necessarily discourage species that are adapted to passing over open areas, like noctule and Leisler’s bat, from commuting and foraging over areas that were once conifer plantation (Entwistle *et al.*, 2001). Therefore, post-construction monitoring, specifically to detect bat carcasses, would be undertaken following best practice methods. In the event of significant bat mortality, a mitigation plan would be implemented. The post-construction monitoring method and the definition of 'significant bat mortality' would be developed in consultation with SNH. If required, a mitigation plan would be developed in consultation with SNH.

9.6.21 Additionally, the planting of native trees along riparian zones further downhill during the construction phase would be designed to encourage commuting and foraging bats away from turbine locations. The effectiveness of the trees would increase as they increase in size, but it is unlikely that they would benefit from this until the trees have attained a certain height, which may take 10-15 years.
**General Best Practice Measures during the Decommissioning Phase**

9.6.22 The potential effects on habitats and protected fauna from decommissioning the wind farm is difficult to assess with certainty due to the potential for ecological baseline conditions to have changed over the estimated 25 year operational life of the proposed development. However, given the existing site, it would be expected that the ecological constraints would be similar in 25 years. As such, the decommissioning mitigation would be similar to the construction mitigation.

9.6.23 Surveys of habitats and protected species would be undertaken in order to update the baseline to inform decisions on detailed mitigation following the protected species legislation requirements that may apply at that time. The extent of each of these surveys would follow the guidance at that time.

**9.7 Residual Effects**

9.7.1 The resultant effect (the residual effects) are summarised in Table 9.9. All effects are negative unless otherwise stated.

9.7.2 In summary, residual effects are negligible or minor adverse (not significant).

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Overall level of effect without mitigation (significant effects shown in bold)</th>
<th>Best Practice / Mitigation measures</th>
<th>Overall residual effect / level of confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction phase</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watercourses</td>
<td>Moderate-minor – pollution</td>
<td>Pollution prevention measures, including silt management and spillage procedures, as outlined in Technical Appendix 7.1: Hydrological and Hydrogeological Research.</td>
<td>Minor Near-certain</td>
</tr>
<tr>
<td>Blanket/ modified bog</td>
<td>Moderate-minor - habitat loss/degradation</td>
<td>Micro-siting during detailed design to further avoid sensitive habitats. To follow the best practice measures outlined within the CEMP. This includes, floating tracks to be used where peat depth exceeds 1m and, where cutting is necessary, soil/peat stored with the topsoil and subsoil are kept distinct, and protected by turfs placed over them vegetation side up.</td>
<td>Minor Near-certain</td>
</tr>
<tr>
<td>Species-rich marshy grassland</td>
<td>Negligible - habitat loss/degradation Moderate-minor - pollution</td>
<td>Best practice as per blanket/modified bog.</td>
<td>Negligible Near-certain</td>
</tr>
<tr>
<td>Receptor</td>
<td>Overall level of effect without mitigation (significant effects shown in bold)</td>
<td>Best Practice / Mitigation measures</td>
<td>Overall residual effect / level of confidence</td>
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</tr>
<tr>
<td>Other terrestrial habitats</td>
<td>Minor - habitat loss/degradation Moderate-minor - pollution</td>
<td>Best practice as per blanket/modified bog.</td>
<td>Negligible Near-certain</td>
</tr>
<tr>
<td>Otter</td>
<td>Negligible – habitat loss Moderate-minor – freshwater pollution Minor – disturbance from construction activities</td>
<td>Best practice as per watercourses. Additionally, preconstruction surveys to provide an updated description of locations of populations and shelters to advise micro-siting of stream crossing points. Should construction be undertaken within 30 (non-breeding shelter) or 100-200 m (breeding holt) and cannot be avoided, an SNH licence would be required. Other protection measures as outlined on the SNH website to be incorporated, such as no activity to be undertaken within 30 m of an otter shelter until two hours after sunrise and ceasing two hours before sunset, and covering open excavations and pipes, where advised by the ECoW.</td>
<td>Minor/Negligible Certain</td>
</tr>
<tr>
<td>Common lizard</td>
<td>Minor – habitat loss Minor – disturbance from noise and lighting</td>
<td>Protection of the habitat by following the relevant measures detailed in the CEMP. Pre-works check for tracks and turbine locations for hibernacula.</td>
<td>Negligible Near-certain</td>
</tr>
<tr>
<td>Badger</td>
<td>Minor - habitat loss Negligible - disturbance from noise and lighting</td>
<td>Not required unless baseline change occurs in which case, if required, infrastructure should be micro-sited to ensure that works are at least 30 m away from any sett (100 m in the case of high noise/high vibration activities).</td>
<td>Negligible Certain</td>
</tr>
<tr>
<td>Receptor</td>
<td>Overall level of effect without mitigation (significant effects shown in bold)</td>
<td>Best Practice / Mitigation measures</td>
<td>Overall residual effect / level of confidence</td>
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<td>---------------------------------------------------------------------------</td>
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</tr>
</tbody>
</table>
| Fish     | Negligible - habitat loss  
Moderate-minor - freshwater pollution | Best practice measures include following SEPA guidelines for working near watercourses as well as ensuring that no more than 20% of the main catchments of the Water of Girvan and River Stinchar are felled within any three-year period, and replanting riparian trees. | Minor  
Near-certain |
| Bats     | Moderate - habitat loss for commuting and foraging  
Negligible - roosting habitat loss  
Negligible – freshwater pollution  
Moderate-minor - disturbance from noise and lighting | Planting of native riparian trees to provide commuting/foraging routes to connect to lowland good quality habitat, and away from turbines.  
A preconstruction roost survey to be undertaken. Appropriate mitigation to be implemented, if roosts are present.  
No lighting near to known commuting routes. | Negligible  
Near-certain |

**Operational phase**

| Watercourses | Minor - pollution | Confining maintenance vehicles to existing roads.  
Spillage emergency procedures. | Negligible  
Near-certain |
| Otter       | Low - freshwater pollution  
Negligible - disturbance | Best practice as per watercourses.  
Additionally, no lighting within 30m of the watercourses. | Negligible  
Near-certain |
| Common lizard | Negligible - disturbance | Not required. | Negligible  
Near-certain |
| Badger      | Negligible - disturbance | Not required. | Negligible  
Certain |
| Fish        | Minor - freshwater pollution | Best practice as per watercourses. | Negligible  
Near-certain |
| Bats        | Negligible - disturbance | Clear-felling of coniferous plantation would remove the greatest risk of attracting commuting and foraging bats, | Negligible - disturbance  
Probable |
### Table 9.9: A Summary of Residual Effects for Habitats and Protected Species during the Construction, Operation and Decommissioning Phases

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Overall level of effect without mitigation (significant effects shown in bold)</th>
<th>Best Practice / Mitigation measures</th>
<th>Overall residual effect / level of confidence</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td></td>
<td><strong>Moderate</strong> – turbine collision risk/barotrauma</td>
<td>and would be completed before turbines become operational. However, post-construction monitoring of mortality using best practice methods would be undertaken and, if required, a mitigation plan would be developed in consultation with SNH. The planting of riparian trees during the construction phase, carefully designed to steer bats away from turbines and towards lowland routes, would become increasingly effective.</td>
<td><strong>Minor</strong> – turbine mortality Probable</td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Decommissioning Phase</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Watercourses | Minor- habitat loss/degradation  
Minor - pollution                       | Retention of buried structures and equipment, roads and water crossings. Confining maintenance vehicles to existing roads. Pollution prevention measures, as outlined in Technical Appendix 7.1: Hydrological and Hydrogeological Research. | Negligible Probable |
| Blanket / modified bog | Minor- habitat loss/degradation  
Minor - pollution                       | Best practice as per watercourses. | Negligible Probable |
| Species-rich marshy grassland | Minor- habitat loss/degradation  
Minor - pollution                       | Best practice as per watercourses. | Negligible Probable |
| Other terrestrial habitats | Minor- habitat loss/degradation  
Minor - pollution                       | Best practice as per watercourses. | Negligible Probable |
| Otter | Negligible – habitat loss  
Minor – disturbance  
Minor – freshwater pollution | Pre-decommissioning surveys to determine the location of populations and shelters to determine the new baseline. As per the construction phase. | Negligible Probable |
### Table 9.9: A Summary of Residual Effects for Habitats and Protected Species during the Construction, Operation and Decommissioning Phases

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Overall level of effect without mitigation (significant effects shown in bold)</th>
<th>Best Practice / Mitigation measures</th>
<th>Overall residual effect / level of confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common lizard</td>
<td>Minor – habitat loss Minor – disturbance</td>
<td>Protection of the habitat by following similar measures outlined in the CEMP. Retention of buried structures and equipment, road and water crossings.</td>
<td>Negligible Probable</td>
</tr>
<tr>
<td>Badger</td>
<td>Negligible – habitat loss Minor/negligible – disturbance</td>
<td>Pre-decommissioning surveys to determine the location of populations and setts to determine the new baseline.</td>
<td>Negligible Probable</td>
</tr>
<tr>
<td>Fish</td>
<td>Major-moderate - freshwater pollution</td>
<td>Mitigation as per watercourses. In addition, to avoid any works adjacent to watercourses, e.g. watercourse crossings, during the spawning season.</td>
<td>Minor Probable</td>
</tr>
<tr>
<td>Bats</td>
<td>Negligible - habitat loss Minor - disturbance Minor – freshwater pollution</td>
<td>A pre-decommissioning roost survey to be undertaken. No lighting, noise near to known roost sites. Where disturbance to a roost site cannot be avoided a mitigation plan and licence would be required for work to proceed lawfully.</td>
<td>Negligible Probable</td>
</tr>
</tbody>
</table>

### 9.8 Summary

9.8.1 This chapter assessed the likely effects on ecological receptors predicted to arise from the proposed development, in order to identify likely significant effects. Following consideration of a range of best practice and mitigation measures for the construction, operational and decommissioning phases of the development, the residual (mitigated) effects for all receptors combined would be not greater than minor/negligible and would therefore not be significant.

9.8.2 The planting of native riparian tree species at appropriate places along watercourses would, in time, reinstate commuting and foraging habitat for bats. This would, in certain areas, also help to maintain water quality by reducing acidified run-off from adjacent conifer plantation clearance and therefore protect the freshwater habitat for fish.

9.8.3 Post-construction monitoring to detect bat carcasses would be undertaken to determine whether there is any significant bat mortality. Should there be significant
bat mortality, a mitigation plan would be developed and implemented. The methods
would be agreed with SNH.

9.9 References

Ayrshire Local Biodiversity Action Plan (2007-2010) Upland Habitat Action Plan:
Blanket Bog http://www.south-ayrshire.gov.uk/documents/lbap7.pdf. Note that the
extent of blanket bog is combined with wet heath in this document and is provided for
Ayrshire, not South Ayrshire.

Ayrshire Local Biodiversity Action Plan (2007-2010) Upland Habitat Action Plan:
Upland Heath http://www.south-ayrshire.gov.uk/documents/lbap7.pdf. Note that the
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Hepburn I. and Johnston J. (2001) Habitat Management for Bats a Guide for Land
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Council.


Futter, K., Sutcliffe, R., Welham, D. Welham, R. Rostron, A.J., Mackay, J., Gregory,
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Winchester: Institute of Ecology and Environmental Management.

Joint Ayrshire LBAP (2007-2010) http://www.south-ayrshire.gov.uk/sustainable-


### 9.10 Glossary/Abbreviations

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<th>Term</th>
<th>Description of term</th>
</tr>
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<tbody>
<tr>
<td>ART</td>
<td>Ayrshire Rivers Trust.</td>
</tr>
<tr>
<td>Barotrauma</td>
<td>Damage to the body (such as for bats), usually tissue damage to the lungs due to excessive pressure changes which may occur near to rotating turbine blades.</td>
</tr>
<tr>
<td>BRC</td>
<td>Biological Records Centre.</td>
</tr>
<tr>
<td>Collision risk</td>
<td>How likely the bat is to collide with the turbines.</td>
</tr>
<tr>
<td>Designated site</td>
<td>Areas of land given special protection due to their nature conservation or landscape value.</td>
</tr>
<tr>
<td>Disturbance</td>
<td>A temporary change in environmental conditions that negatively affects an organism, such as noise or light.</td>
</tr>
<tr>
<td>Ecological Receptor</td>
<td>Any living organism other than humans, the habitat which supports such organisms, or natural resources which could be adversely affected by the proposed development.</td>
</tr>
<tr>
<td>ECoW</td>
<td>Ecological Clerk of Works.</td>
</tr>
<tr>
<td>Foraging area / habitat</td>
<td>An area / habitat that supports prey species / food resources for a particular animal.</td>
</tr>
<tr>
<td>GWDTE</td>
<td>Groundwater-dependent terrestrial ecosystem is an ecosystem reliant upon groundwater, in contrast to habitats reliant upon rainwater (termed ‘ombrotrophic’).</td>
</tr>
<tr>
<td>Habitat</td>
<td>Ecological or environmental area inhabited by particular species. This is the place where an organism lives, including all living and non-living organisms within that area.</td>
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<tr>
<td>Hibernacula</td>
<td>Area or refuge used during the winter months.</td>
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<tr>
<td>Holt</td>
<td>Similar to a den – typically an underground structure where otters inhabit/ live, such as in a hole under tree roots close to a river. May be used as breeding site by a female to give birth to an raise young (see natal site below)</td>
</tr>
<tr>
<td>IEEM/CIEEM</td>
<td>Institute of ecology and Environmental Management, now Chartered Institute of Ecology and Environmental Management.</td>
</tr>
<tr>
<td>JNCC</td>
<td>Joint Nature Conservation Committee.</td>
</tr>
<tr>
<td>LBAP</td>
<td>Local Biodiversity Action Plan (the local authorities’ contribution to the UK Biodiversity Action Plan / Scottish Biodiversity Strategy).</td>
</tr>
<tr>
<td>Linear feature</td>
<td>Prominent feature in the landscape, for example a row of trees, watercourse, woodland edge, hedge or wall, which is used as a commuting route by bats.</td>
</tr>
<tr>
<td>Natal site</td>
<td>A location associated with an animal’s birth / parental-rearing phase.</td>
</tr>
<tr>
<td>NBN Gateway</td>
<td>National Biodiversity Network Gateway.</td>
</tr>
<tr>
<td>NNR</td>
<td>National Nature Reserve - a reserve designated by statutory nature conservation organisations which, in Scotland, is Scottish Natural Heritage at the country scale.</td>
</tr>
<tr>
<td>Term</td>
<td>Description of term</td>
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<tr>
<td>NVC</td>
<td>National Vegetation Classification.</td>
</tr>
<tr>
<td>Ombrotrophic</td>
<td>Habitat / vegetation which receives all of its water and nutrients from precipitation, rather than from groundwater sources such as streams or springs.</td>
</tr>
<tr>
<td>Poaching</td>
<td>Poaching is the damage caused to turf or sward and / or soil by the feet of livestock.</td>
</tr>
<tr>
<td>Receptor sensitivity</td>
<td>The sensitivity of a species or habitat (i.e. a receptor) typically reflecting its relative rarity and its vulnerability to alterations in its supporting environment.</td>
</tr>
<tr>
<td>Refuge</td>
<td>Place where an organism can find shelter and protection from the prevailing environmental conditions (e.g. reptiles and amphibians may use various terrestrial refugia to rest at night during the summer or for longer periods during the winter).</td>
</tr>
<tr>
<td>Riparian</td>
<td>Habitat / vegetation located on the bank of a natural watercourse or water body.</td>
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<tr>
<td>SAC</td>
<td>Special Areas of Conservation (an area which has been given special protection for non-bird species under the EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora which is otherwise known as the 'Habitats Directive').</td>
</tr>
<tr>
<td>SEPA</td>
<td>Scottish Environmental Protection Agency.</td>
</tr>
<tr>
<td>Shelter</td>
<td>When referring to animals, this is any refuge where it may find shelter, and is a collective term for dens, holts, couches, dreys, setts etc.</td>
</tr>
<tr>
<td>SNH</td>
<td>Scottish Natural Heritage.</td>
</tr>
<tr>
<td>Species population</td>
<td>A population is a summation of all the organisms of the same group or species which live in a particular geographical area and have the capability of interbreeding.</td>
</tr>
<tr>
<td>SSSI</td>
<td>Site of Special Scientific Interest (an area which has been designated under the UK’s legislation The Countryside and Wildlife Act 1981 to protect areas of biological and/or geological interest)</td>
</tr>
<tr>
<td>UK BAP</td>
<td>UK Biodiversity Action Plan. The first UK BAP was published back in 1994 as a response by the UK Government’s to the 1992 Convention on Biological Diversity (CBD) in Rio de Janeiro. This provides a national framework of plans and targets for conservation priority species and habitats, and for the local authority BAPs.</td>
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- Technical Appendix 10.2: Desk Study Results
- Technical Appendix 10.3: All Bird Species Recorded and their Status
- Technical Appendix 10.4: Details of Flight Activity Survey Effort and Results
- Technical Appendix 10.5: Details of Collision Risk Analysis
- Technical Appendix 10.6: Breeding Bird Survey Results
- Technical Appendix 10.7: Winter Walkover Survey Results
- Technical Appendix 10.8: Ad hoc Records

Confidential Annex Ornithology (issued separately)
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Figure 10.2  Vantage Point Locations and Viewsheds
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Figure 10.5  Flight Activity Survey Observation Effort (April 2012 – Sept 2012)
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Figure 10.7  Flight Activity by Target Species (May 2011 – Sept 2011)
Figure 10.8  Flight Activity by Secondary Species (May 2011 – Sept 2011)
Figure 10.9  Flight Activity by Target Species (Oct 2011 – Mar 2012)
Figure 10.10  Flight Activity by Secondary Species (Oct 2011 – Mar 2012)
Figure 10.11  Flight Activity by Target Species (April 2012 – Sept 2012)
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Figure 10.19  Breeding Bird Survey Results 2012 (Area B)
Figure 10.20  Breeding Bird Survey Results 2012 (Area C)
Figure 10.21  Black Grouse Survey Records (2011-2012)
Figure 10.22  Non-Confidential Breeding Raptor Results (2011-2012)
Figure 10.23  Winter Walkover Survey Results (Winter 2011-2012)
Figure 10.24  Winter Walkover Survey Results (Winter 2012-2013)
10 Ornithology

10.1 Introduction

10.1.1 This chapter provides a description of the avifauna of the proposed Hadyard Hill Extension wind farm site, based upon data derived from desk study and extensive fieldwork, and a systematic assessment of the potential effects of the proposed development on bird populations of conservation concern and their supporting habitats.

10.1.2 The specific objectives of the assessment as detailed in this chapter are to:

- set out the methodology used in completing the impact assessment;
- describe and evaluate the ornithological receptors with a particular focus on species of conservation concern which are considered to be relatively susceptible to the effects of wind farm development;
- identify the potential effects, including direct, indirect and cumulative;
- assess potentially significant effects associated with the construction, operation/maintenance and decommissioning of the proposed wind farm;
- define mitigation measures, where appropriate, to avoid, reduce and offset adverse effects; and
- determine the level of residual effect taking into consideration the proposed mitigation measures.

10.1.3 A summary of the baseline data is provided in this chapter, with further detail and background information presented in the Ornithological Technical Appendices. A separate Confidential Ornithological Annex (issued to the Scottish Ministers and Scottish Natural Heritage (SNH)) includes details of nesting and roosting locations of species at risk from persecution (raptor species listed on Schedule 1 to the Wildlife & Countryside Act 1981) in accordance with the guidance provided by SNH (2009).

10.1.4 The ornithological baseline studies, evaluations and assessments presented in this chapter were carried out by MBEC (ecological consultants), on behalf of the Applicant. All surveys and assessments have been completed by suitably experienced ornithologists and ecologists.

10.2 Scope of Assessment

10.2.1 This chapter considers the potential for likely significant effects on ornithological receptors as a result of the proposed development. The proposed development, including the construction, operation and decommissioning details, is described in Chapter 2: Proposed Development.

Scoping and Consultation

10.2.2 A scoping report, outlining the proposals and the range of potential effects that would be assessed as part of the EIA, was published in February 2014.

10.2.3 Consultation with SNH, the Royal Society for the Protection of Birds (RSPB) and the South Strathclyde Raptor Study Group was undertaken at that time. A formal scoping opinion was provided by the Scottish Ministers in April 2014. The list of
consultees along with a summary of the consultation responses received is summarised in Technical Appendix 1.1: Consultation Register, which also describes how the ES addresses each of the issues raised.

10.2.4 The key issues, regarding ornithological receptors, outlined in the scoping responses include:

- response from SNH:
  - an assessment should be made of the flight lines of breeding birds and birds whose migrations or other seasonal distributions traverse or are in close proximity to the site; and
  - collision risk analyses should be carried out for species which regularly pass through the site at any time of year.

- from the Scottish Ministers:
  - the ES should include an assessment of the potential impacts that the various treatments of the woodland would have on the presence of birds on the site and on their use of the site.

- from RSPB Scotland:
  - of particular note are the relatively high number of breeding curlew within the site, the current concern regarding declines in numbers of breeding curlew and the subsequent need to consider ways to reduce and mitigate these impacts.

Potentially Significant Effects

10.2.5 Based on the findings of the consultation, EIA scoping responses and professional judgement, this assessment considers effects associated with construction, operation and decommissioning of the proposed development.

10.2.6 The main potential effects during the construction phases are summarised as follows:

- potential disturbance to breeding, passage and wintering birds arising from tree felling and construction works (for example, through human presence, vehicle movements, noise, vibration, light);

- potential short to medium-term loss and change to habitats through construction-related habitat damage (for example, from plant trafficking); and

- potential cumulative construction effects arising from additive, synergistic and/or antagonistic effects with other existing and proposed developments.

10.2.7 The main potential operational effects are summarised as follows:

- long-term direct loss of and change to habitats associated with built structures and new permanent access tracks;

- risk of mortality from collision with wind turbines and other structures;

- behavioural displacement from important supporting habitats due to the presence of the wind turbines;

- potential effects on free movement to and from roosting, feeding, nesting habitats;
disturbance during maintenance and emergency activities;
potential effects from changes to forest structure and management within the wind farm area; and
potential cumulative operational effects arising from additive, synergistic and/or antagonistic effects with other existing and proposed developments.

10.2.8 Potential decommissioning phase effects are summarised as follows:
- works associated with the dismantling of the scheme infrastructure resulting in physical damage to habitats supporting bird species of conservation concern;
- disturbance to breeding birds arising from the dismantling works; and
- potential cumulative decommissioning effects arising from additive, synergistic and/or antagonistic effects with other existing and proposed developments.

**Key Ornithological Receptors**

10.2.9 This assessment focuses on bird species that have been identified in guidance and from the scientific literature as being of moderate to high conservation importance and sensitivity to the effects from construction and/or operation of onshore wind farms. Particular consideration has been given to those species whose populations are also of conservation concern in the UK and/or Europe, such as:

- species listed on Annex I of European Council Directive 2009/147/EC on the conservation of wild birds (i.e. 'Annex I' species), 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 (i.e. 'Schedule 1' species); and
- species of national conservation concern, not included within the above categories, but that are potentially present within the study area in nationally or regionally important numbers.

10.2.10 Breeding raptors (e.g. peregrine, merlin and goshawk), wintering raptors (e.g. hen harrier), breeding wader species and potential overflights by wintering / passage wildfowl have been the focus of the baseline surveys and of this assessment.

10.2.11 The potential effects on birds arising from the connection of the proposed development to the national grid are not assessed within this ES as it is unknown at this stage whether this would be underground or overhead. If the grid connection is through an overhead line, the potential effects (including cumulative effects) will be fully assessed as part of the routeing studies and subsequent environmental assessment that will be required for the application to the Scottish Government under Section 37 of the Electricity Act 1989, for consent to build and operate a grid connection.

**Issues Scoped Out**

10.2.12 The scope of this assessment takes account of the committed mitigation measures both incorporated into the design and standard construction and decommissioning mitigation measures incorporated into the proposed development, as described in Chapter 2: Proposed Development, and Technical Appendix 2.4: Construction
Environmental Management Plan. Table 10.1 summarises the issues scoped out of the assessment.

<table>
<thead>
<tr>
<th>Potential Effect</th>
<th>Basis for scoping out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects on qualifying species of SPAs</td>
<td>The distance between the proposed development and the SPA(s) is greater than the accepted ranging distance of any qualifying species of Special Protection Areas in the wider region (e.g. Glen App and Galloway Moors SPA). See the SNH guidance on connectivity of wind farms and SPAs (SNH, July 2013).</td>
</tr>
<tr>
<td>Effects associated with the construction and/or operation of the grid connection</td>
<td>The potential effects on birds arising from the connection of the wind farm to the national grid are not assessed within this ES. Any overhead line grid connection would require consent from the Scottish Ministers under section 37 of the Electricity Act 1989. The section 37 application would be supported by relevant environmental assessment information.</td>
</tr>
<tr>
<td>Effects on non-target species</td>
<td>This assessment does not formally consider potential effects on bird species that are not listed as focal species for the assessment (i.e. key ornithological receptors, see Table 10.11 below).</td>
</tr>
</tbody>
</table>

### 10.3 Assessment Methodology

10.3.1 The baseline survey, receptor evaluation and assessment methods comply with current best practice guidance and relevant national and local policy requirements. Please refer to Technical Appendix 9.1 Biodiversity Legislation Policies and Plans for further details on relevant legislation, guidance and policy.

### Study Areas

10.3.2 The study areas referred to within this report are shown on Figure 10.1 and are based on application boundary for the proposed development. Bird surveys commenced in May 2011, since that time the site has been progressively reduced in extent in response to emerging engineering and environmental constraints. The ornithological study areas have therefore also been altered to reflect the reduced extent of the proposed development. The original survey areas are shown on Figure 10.1.1 (within Technical Appendix 10.1 Survey Methodologies).

10.3.3 The area to the north of the site, near Maxwellston Hill, was excluded from further consideration in August 2012 and all surveying ceased in this area from September 2012. The area to the south-west of the B734 and proposed turbines on Cairn Hill to the north-east of the site, Pinverains and Auchengairn to the south-east were also excluded from further consideration during the development of the detailed wind farm design in autumn 2014. Further exclusions in the final design phase include Barony and Cairn Hill, and the area to the south-west of the Mull of Miljoan.

10.3.4 References in this chapter to 'the site' refers to the area enclosed by the application boundary. The various survey / study areas referred to in this chapter are defined as follows:

- "breeding bird study area' or 'core study area' boundaries are co-incident and are defined by the application boundary, as defined at the time of the survey, plus an additional 500 m wide strip;
• 'black grouse study area' refers to the site boundary, as defined at the time of the survey, plus an additional 1.5 km wide strip;
• 'raptor study area' refers to the site boundary, as defined at the time of the survey, and up to an additional 2 km wide strip depending on the focal species; and
• the 'desk study area' included the site and up to a 10 km wide zone around the site.

Desk Study Method

10.3.5 A desk study was carried out early on in the project and has been updated on several occasions to date (most recently in autumn 2014) in order to collate existing available information from a range of sources for key species of interest. The initial desk study, completed in spring 2011, included searches of available online data sources, for example for designated sites such as the SNH Sitelink Website (http://gateway.snh.gov.uk/sitelink/). 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 existing 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.

10.3.6 Requests for records of species of conservation concern for the site and an approximate area of 10 km wide margin around the site boundary were placed with a range of organisations, as follows:
• Royal Society for the Protection of Birds (RSPB);
• British Trust for Ornithology (BTO);
• Scottish Ornithologist Club (SOC) local recorder;
• South Strathclyde and Dumfries & Galloway Raptor Study Groups (RSG); and
• Forestry Commission Scotland.

10.3.7 Information on key species of interest was also collated from the Environmental Statement for the existing Hadyard Hill wind farm (EnviroCentre 2003) and from various reports detailing the results of post-construction ornithological monitoring.

Field Survey Methods

10.3.8 Full details of survey methods are provided in Technical Appendix 10.1: Survey Methodologies. Details of survey effort and weather conditions for Flight Activity Surveys are also provided in Technical Appendix 10.4: Details of Flight Activity Survey Effort and Results.

10.3.9 The following is a summary of the surveys completed between May 2011 and August 2013 which have provided the majority of the data used to inform the wind farm design process and this impact assessment:
• flight activity surveys were carried out between May 2011 and March 2013;
• breeding bird surveys - range of surveys completed to determine the presence and approximate location of breeding territories/sites within the core and wider study areas (see Figure 10.1);
wintering bird surveys, involving walkovers to assess the use of the site by passage and wintering birds, supplementing observations from the flight activity survey, regular counts of waterbirds at waterbodies in the wider survey area (i.e. Penwhapple Reservoir) and hen harrier roost surveys:

- wintering bird surveys of the core study area were completed between December 2011 and February 2012 between October 2012 and February 2013;
- waterbody counts were completed between December 2011 and April 2012 and between July 2012 and March 2013; and
- hen harrier winter roost surveys between October 2012 and March 2013 in the raptor study area.

**Flight Activity Surveys (2011-2013)**

10.3.10 Bird flight activity data (i.e. flight behaviour, direction and estimated height above ground level by key species) was collected from strategically located vantage points (VPs) during timed watches, following the methods described in Band et al. (2007) and SNH (2010). Flight activity data was collected continuously from May 2011 to March 2013.

10.3.11 The data from these surveys was used to provide estimates of the frequency of flight activity, by certain target species, at wind turbine height across the survey area. Key species were divided into target and secondary species groups. Target species were recorded in preference to secondary species if both a target and secondary species were in view at the same time. A list of target species is given in Table 10.2.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Schedule 1 i / Annex 1 ii</th>
<th>UK BoCC Status iii</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whooper swan</td>
<td>Cygnus cygnus</td>
<td>Sch1 / Anx1</td>
<td>Amber</td>
</tr>
<tr>
<td>Pink-footed goose</td>
<td>Anser brachyrhynchus</td>
<td></td>
<td>Amber</td>
</tr>
<tr>
<td>Greylag goose</td>
<td>Anser anser</td>
<td></td>
<td>Amber</td>
</tr>
<tr>
<td>Hen harrier</td>
<td>Circus cyaneus</td>
<td>Sch1 / Anx1</td>
<td>Red</td>
</tr>
<tr>
<td>Goshawk</td>
<td>Accipiter gentilis</td>
<td>Sch1</td>
<td>Green</td>
</tr>
<tr>
<td>Merlin</td>
<td>Falco columbarius</td>
<td>Sch1 / Anx1</td>
<td>Amber</td>
</tr>
<tr>
<td>Peregrine</td>
<td>Falco peregrinus</td>
<td>Sch1 / Anx1</td>
<td>Green</td>
</tr>
<tr>
<td>Black grouse</td>
<td>Tetrao tetrix</td>
<td></td>
<td>Red</td>
</tr>
<tr>
<td>Golden plover</td>
<td>Pluvialis apricaria</td>
<td>Anx1</td>
<td>Amber</td>
</tr>
<tr>
<td>Curlew</td>
<td>Numenius arquata</td>
<td></td>
<td>Amber</td>
</tr>
<tr>
<td>Short-eared owl</td>
<td>Asio flammeus</td>
<td>Anx1</td>
<td>Amber</td>
</tr>
</tbody>
</table>

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


iii. Birds of Conservation Concern (BoCC) in the UK (Eaton et al. 2009).
10.3.12 The height above ground level of the bird(s) in flight was estimated by the observer and placed within one of several height bands. Following the SNH 'Band method' (Band et al. 2007) this data can be used to estimate bird collision risk from the proposed wind turbines (SNH, 2000; SNH, 2006).

10.3.13 A total of 17 VPs were established in 2011 for the original study area and in excess of 36 hours of observation, as recommended under SNH guidance, was completed at each VP for each survey period (i.e. May to September 2011; October 2011 to March 2012, April to September 2012 and October 2012 to March 2013). The number of VPs was reduced to seven for the assessment of the final design following reduction in size of the site (further details are provided in Technical Appendix 10.4: Details of Flight Activity Survey Effort and Results).

10.3.14 The VP locations, along with the other survey areas, are shown on Figure 10.1. Figure 10.2 shows VP locations along with their corresponding viewsheds (i.e. area in view from the VP as defined by certain criteria relative to the observer and the operating height of the proposed wind turbines). Further details of monthly observation effort from each of the VPs and maps showing the extent of the individual VP viewsheds are provided in Technical Appendix 10.4: Details of Flight Activity Survey Effort and Results.

Breeding Birds

10.3.15 Moorland breeding bird surveys of the core study area, following an adapted version of the upland wader survey method described by Brown and Shepherd (1993), were completed in 2011 and 2012. The method was modified to include moorland passerines in order to provide an estimate of their breeding densities. The survey included all moorland; that is unenclosed and un-forested upland, within the area shown on Figure 10.1. Further details of the moorland breeding bird survey methodology are provided in Technical Appendix 10.1: Survey Methodologies.

10.3.16 Walked transect and point count surveys of conifer plantation woodland, along the plantation edges, dominant forestry rides and tracks where the plantation was too dense to walk within, were completed in 2011 and 2012. All birds seen or heard exhibiting breeding behaviour were recorded following the Common Bird Census methodology outlined in Gilbert et al. (1998). Further details of the woodland breeding songbird methodology are provided in Technical Appendix 10.1: Survey Methodologies.

Breeding Raptor Surveys

10.3.17 Surveys were undertaken in 2011 and 2012 to determine the presence and location of breeding raptors and owls. The extent of the survey areas are shown on Figure 10.1. Focal surveys for the following species were completed: hen harrier, goshawk, merlin, peregrine and barn owl. Potentially suitable nesting habitat and historical nest sites were surveyed, depending on species (see Appendix 10.1 for further details). The surveys carried out followed species-specific methods described in Hardey et al. (2009).

10.3.18 Any behaviour indicative of breeding by Annex I/Schedule 1 raptors and owls observed during the course of the flight activity surveys and other site surveys was also taken into consideration and used to assist in targeting the breeding raptor survey effort.
Peregrine Ranging Survey

10.3.19 A breeding peregrine ranging survey was carried out between April and August 2013 focusing on known nesting locations within the raptor survey area. Two known breeding sites, referred to as site PE1 and site PE2 were surveyed throughout the 2013 breeding season between April and August 2013. Peregrine activity was monitored from carefully selected vantage points to ensure that there was good visibility of, but no risk of disturbance to, nest sites. The purpose of this survey was to provide data on the ranging behaviour of breeding adult birds, and later in the breeding season fledged juvenile birds, relative to the proposed development. See the Confidential Annex for further details.

Forest Owl, Woodcock and Nightjar Surveys

10.3.20 The determination of the occupation of suitable breeding habitat by forest owl species was undertaken between May and June 2011 and between March and July 2012 within the core survey area. Specific surveys for woodcock and nightjar were carried out in May-June 2011 and June 2012. For further details of survey methodology see Technical Appendix 10.1: Survey Methodologies.

Black Grouse Survey

10.3.21 Black grouse reconnaissance and lek surveys were undertaken in Spring 2011 and 2012. Areas considered to provide suitable habitat for black grouse, and where there were historical records within the study area (as shown on Figure 10.1), were searched for evidence of black grouse lekking and for any signs indicating their presence including droppings and moulted feathers. In locations where lekking activity was identified during the reconnaissance survey a follow-up survey to record lekking birds was undertaken following the method described in Gilbert et al. (1998).

Raptor Prey Transect Surveys

10.3.22 Transect surveys to sample the density of key moorland raptor prey species, principally short-tailed field vole (Microtus agrestis) and moorland songbird densities such as meadow pipit (Anthus pratensis), were undertaken in June and August 2011 and repeated in May and July 2012. Surveys to provide an estimate of the relative abundance of short-tailed field vole were completed along the same five transects over two visits using an activity based index, developed from methods described by Hansson (1979), Redpath et al. (1995) and Madders (2003). The five transect locations are shown on Figure 10.1.

Non-breeding/Wintering Birds

10.3.23 In addition to flight activity surveys during the winter period a walkover survey was completed within the core study area (see Figure 10.1) during the period from November 2011 to February 2012 and between October 2012 and February 2013. Two visits were undertaken during this period and a different route was used on each visit to enable fine-scale coverage of the entire site over the survey period. Waterbody counts were also carried out at Penwhapple reservoir between December 2011 and April 2012 and between July 2012 and March 2013. Methods followed those used for the UK Wetlands Bird Survey (as detailed in Gilbert et al. 1998).

10.3.24 Although a specific goose/swan grazing survey was not undertaken, surveyors were instructed to record the presence of any geese or swans in fields or other habitat observed at any time within the core and wider survey areas. This comprised
observations made on moving between vantage points, during winter walkover surveys and waterbody counts.

**Hen Harrier Roost Survey**

10.3.25 Hen harrier winter roost surveys were carried out at known or suspected winter roost sites between October 2012 and March 2013. The methods followed those detailed in Clarke & Watson (1990) and Gilbert *et al.* (1998).

**Survey Constraints**

10.3.26 There are considered to be no significant limitations or gaps to the surveys undertaken in 2011, 2012 and 2013. The survey methods and levels of survey effort over the various survey periods are considered to be robust and appropriate to the baseline reporting and assessment of the potential effects of the proposed development and there are no significant data shortfalls.

10.3.27 There is approximately 86% viewshed coverage of the proposed wind turbine area for the flight activity surveys (assuming a 2 km viewshed radius). The main gap in coverage is an area of conifer plantation from Daljedburgh Hill for c. 2 km north between Doughty Hill and Craiginmoddie (see Figure 10.2). Complete coverage (i.e. to within 2 km radii from all vantage points) was not achievable due to the constraints of topography and the screening effect of the mature conifer plantations. The results from two years of breeding bird surveys demonstrate that areas which are outside of the 2 km combined viewshed coverage of the site do not provide important supporting habitat for any of the key ornithological receptors. Due to the generally poor quality of habitat in these plantation areas for most of the key species considered in this assessment this is not considered a significant limitation in the baseline data. Any gaps in complete viewshed coverage are fully accounted for in the collision risk modelling and assessment process.

10.3.28 All seasonally dependant surveys were undertaken during an appropriate time of the year and under appropriate weather conditions. For all surveys where weather conditions were a consideration, observations were suspended when conditions deteriorated beyond an agreed acceptable threshold (further details are provided in Technical Appendix 10.1: Survey Methodologies). Further discussion of generic and specific survey limitations is included within Technical Appendix 10.1: Survey Methodologies.

**Evaluation and Impact Assessment Methods**

10.3.29 A combination of expert professional judgement and specific guidance from the SNH 'A Handbook on Environmental Impact Assessment' (2009) and from the Chartered Institute of Ecology and Environmental Management (CIEEM) 'Guidelines for Ecological Impact Assessment' (2006), provide a framework for the methodology adopted to assess potential effects on bird receptors and their likely level of significance.

10.3.30 The EIA process involves the application of specific, standardised criteria to evaluate impacts and receptors. However, because of the complexities of species interactions with their environment and the potential uncertainty of some effects and the efficacy of mitigation measures, experienced professional judgement plays a key role in the evaluation of receptors and in the determination of the significance of residual effects.
Receptor Evaluation

10.3.31 Assigning a nature conservation value to bird receptors involves the consideration of a range of the criteria. Because in practice rarity is often the most important criterion, the receptor conservation values described in Table 10.3 are primarily defined by rarity within different geographical units. This geographical distinction is also useful in placing the values in the context of nature conservation designations, which tend to be ranked according to geographical importance.

<table>
<thead>
<tr>
<th>Value</th>
<th>Typical Example Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>Habitats or species that form part of the cited interest of an internationally protected site or candidate site (for example, SPA, SPA, Ramsar site). Bird species listed on Annex I of the EC Birds Directive if present in qualifying numbers/proportions of national/international population.</td>
</tr>
<tr>
<td>National</td>
<td>A nationally designated site (SSSI, ASSI, NNR, MNR) and the habitats and species that form its cited interest. Regularly occurring rare 1 bird species (for example, &lt; 300 breeding pairs in the UK). Birds present in nationally important numbers (for example, &gt; 1% of the UK population). A site that provides critical habitat for any regularly occurring bird population of national importance which is rare in the UK.</td>
</tr>
<tr>
<td>Regional (for example, NHZ or Local Authority Area)</td>
<td>A Local Nature Reserve, some local-level designated sites depending on specific site conditions. Any regularly occurring population of a nationally important bird species which is threatened or rare in the region (for example, &gt; 1% of the regional population or Natural Heritage Zone population where reliable estimates are available). Regularly occurring regionally important population of bird species listed on the current UK Red list, presence of regionally important habitats critical to such species. Regionally important populations of National and Local Biodiversity Action Plan species.</td>
</tr>
<tr>
<td>Local</td>
<td>High Local: Sites with an identified ornithological interest meeting the criteria for Council area designation (such as Site of Importance for Nature Conservation), Wildlife Sites, which may include amenity and educational criteria in urban areas. Designated Local Nature Reserves. Sites supporting viable breeding populations of species known to be Council rarities (for example, included in the LBAP), and/or supplying critical elements of their habitat requirements. Any regularly occurring, locally significant population of bird species.</td>
</tr>
</tbody>
</table>

1 Species with fewer than 300 pairs breeding in Britain are described as nationally rare
Table 10.3: Conservation Value Levels and Summary Criteria

<table>
<thead>
<tr>
<th>Value</th>
<th>Typical Example Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium Local:</td>
<td>A population of a species or assemblage of species which are not considered to qualify for non-statutory designation but which are considered locally important (i.e. approx. 10 km radius from the site). Populations and supporting habitats of any bird species conservation importance in the context of the local area (i.e. approx. 10 km radius from the site).</td>
</tr>
<tr>
<td>Low Local:</td>
<td>A population of a species or assemblage of species which are not considered to qualify for non-statutory designation but which are considered locally important in the context of the immediate surrounding area. Populations and supporting habitats of any bird species of conservation importance in the context of the immediate surrounding area.</td>
</tr>
<tr>
<td>Negligible</td>
<td>A commonplace bird population of little or no conservation significance at a local scale. Habitats of negligible value to any bird population.</td>
</tr>
</tbody>
</table>

10.3.32 Although there are a range of factors to be considered, for the purposes of this assessment the evaluation of importance in relation to population size is based on the estimated proportion of a population that a site supports in comparison to the wider geographical population. Where 1% of the bird population for a given geographical scale is regularly present within the site, then that site is considered to be important for that species and scale. For example, where more than 1% of the national population of a target species is regularly present within the site, the site would be considered to be of national and thus high importance. The 1% criterion for importance is well established and can be applied at the regional, sub-regional or local scales, providing there is sufficiently accurate information available about population sizes within these geographical units.

10.3.33 Current and accurate information on population sizes below the national level is frequently unavailable for many species. The evaluation of regional, sub-regional, and local importance must therefore often be based on the available information and professional judgement. Breeding population estimates, based on Natural Heritage Zone (NHZ) boundaries which divide Scotland into a number of distinct biogeographical areas, have been published recently for some key species (SNH 2012, the proposed development is located within the ‘West Central Belt’ NHZ). These estimates are used in this assessment, for the relevant species (e.g. peregrine, hen harrier), to assist in informing judgements on the nature conservation value of the populations present within the study area and their supporting habitats.

10.3.34 The level of confidence in any evaluation is dependent on the accuracy of data currently available. In this assessment, where there is uncertainty about nature conservation value a precautionary approach has been adopted to minimise the risk of under-valuing any receptor.
Assessment of Effects

Magnitude of Effect

10.3.35 The effects, both adverse and beneficial of each aspect of the construction, operation and decommissioning phases of the proposed development are systematically assessed for their potential to result in changes to receptor populations.

10.3.36 The magnitude of change is determined by the systematic consideration of a range of interacting variables carefully considered using professional experience informed by relevant information from the scientific literature. Relevant parameters to consider may include the interaction between species-specific vulnerability to the impact (e.g. relative morphological / behavioural propensity of a receptor species to collide with wind turbines), the scale of the effect relative to the receptor population unit, frequency and persistence of the effect over time, the reversibility of the effect and the capacity of the receptor population to absorb and rebound from adverse effects. Table 10.4 outlines the differences between the effect magnitude levels, derived from consideration of these variables.

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>Would cause the loss of a major proportion of a regional population, or cause sufficient damage to a feature to immediately affect its viability/conservation status</td>
</tr>
<tr>
<td>High</td>
<td>Major effects on the population, which would have a sufficient effect to alter the nature of the feature in the short-long term and affect its long-term viability/conservation status (for example, detectable long-term effects on the regional population)</td>
</tr>
<tr>
<td>Medium</td>
<td>Effects that are detectable in short and medium-term but which should not alter the long-term viability of the population (for example, detectable short to medium-term effects on the regional population)</td>
</tr>
<tr>
<td>Low</td>
<td>Minor effects, either of sufficiently small-scale or short duration to cause no long-term harm to the population (for example, no long-term detectable effect on the regional population)</td>
</tr>
<tr>
<td>Negligible</td>
<td>Minimal change on a very small-scale</td>
</tr>
<tr>
<td>Neutral</td>
<td>A potential effect that is not expected to affect the population in any way (or to have no measurable effect); therefore no effects are predicted</td>
</tr>
<tr>
<td>Duration</td>
<td>Long-term (15-25 years or longer) &lt;br&gt;Medium-term (5-15 years) &lt;br&gt;Short-term (&lt;5 years)</td>
</tr>
</tbody>
</table>

Vulnerability to Wind Farm Development

10.3.37 Certain species are considered to be of relatively greater vulnerability to the impacts of wind farm development than others. Relative vulnerability can summarised by broad criteria and which are assigned to each species based on aspects of their ecology, sensitivity to disturbance, biometrics and flight behaviour (illustrated in Table 10.5.). Consideration of species-specific vulnerability to wind farm development, as it is defined here, is considered within the impact assessment.
process (i.e. one of the factors considered in determining the level of effect magnitude) and does not form part of the determination of receptor nature conservation value which is undertaken without reference to the development-type and parameters (see Table 10.3 above).

10.3.38 For individual species the criteria have been derived, in part, from a literature review completed by Bright et al. (2008). It is important to note that these criteria are only presented here to illustrate intra-specific differences in potential responses to wind farm development (see also Table 10.11). Such categorisation is an aid to assessment but is not a substitute for the detailed consideration and assessment of effects. They are applied very broadly and do not necessarily reflect variation in vulnerability between individuals, sexes and age-groups in the same population, and in the same individual over time (e.g. seasonal changes) or other influencing factors such as habitat type and condition, wind farm size and layout, topography etc.

Table 10.5: Categorisation of Species Vulnerability to Wind Farm Development

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Species or populations that are considered to be particularly vulnerable to human-related disturbance generally but to wind farm development specifically, e.g. with a relatively high risk of collision (based on, e.g. behaviour, morphology, typical flight altitude, twilight/nocturnal activity and manoeuvrability) and that can potentially exhibit behavioural responses to sources of disturbance at greater distances (e.g. &gt; 300 m).</td>
</tr>
<tr>
<td>Medium</td>
<td>Species or populations that are considered to be moderately vulnerable to human-related disturbance generally, but to wind farm development specifically, e.g. with a moderate risk of collision (based on behaviour, morphology and manoeuvrability) and that can potentially exhibit behavioural responses to sources of disturbance at lesser distances (e.g. 100 – 300 m).</td>
</tr>
<tr>
<td>Low</td>
<td>Species or populations that are relatively invulnerable to human-related disturbance and that are considered to have a low risk of collision or significant long-term disturbance from operating wind farms.</td>
</tr>
</tbody>
</table>

Assessment of Impact Significance

10.3.39 The assessment of the significance of an effect is determined through informed professional judgement and careful consideration of the severity of influence of an effect on an evaluated receptor taking into account each of the following parameters:

- direction of effect: whether the effect benefits (positive) or detracts (adverse) from net biodiversity value of the receptor;
- magnitude: level of severity of influence on the receptor;
- extent: number affected as percentage of total receptor population;
- complexity: direct or indirect effect;
- reversibility: reversible or irreversible (can the effect be reversed, whether this is planned or not?);
- frequency: constant or intermittent;
duration: measured time interval for the activity and predicted duration of the
effect on receptor; and
confidence: certain/near certain, probably, unlikely or extremely unlikely.

10.3.40 Where appropriate in the assessment the level of confidence in the accuracy of a
predicted effect is stated as follows, based on the CIEEM EcIA guidelines (2006):
• Certain / near-certain: probability estimated at 95% chance or higher;
• Probable: probability estimated above 50% but below 95%;
• Unlikely: probability estimated at less than 50%; and
• Extremely unlikely: probability estimated at less than 5%.

10.3.41 The process of determining the significance of an effect can be illustrated by a simple
matrix which shows the interaction between the nature conservation value of an
ecological receptor and the magnitude of the predicted effect, as the primary effect
parameter (see Table 10.6). This matrix is provided for illustrative purposes only. In
practice the determination of effect significance involves the careful application of
informed professional judgment and consideration of a range of parameters, as
outlined above; a process that is not readily summarised by a simple table.

Table 10.6: Significance Matrix Illustrating the Relationship between Effect
magnitude and Nature Conservation Value with those highlighted as grey as
being regarded as ‘significant’

<table>
<thead>
<tr>
<th>Receptor Value</th>
<th>Total/near total</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>Negligible</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>Major</td>
<td>Major</td>
<td>Major</td>
<td>Major-Moderate</td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>Major</td>
<td>Major</td>
<td>Major-Moderate</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>Regional</td>
<td>Major</td>
<td>Major-Moderate</td>
<td>Moderate</td>
<td>Moderate-Minor</td>
<td>Negligible</td>
</tr>
<tr>
<td>High Local</td>
<td>Major-Moderate</td>
<td>Moderate</td>
<td>Moderate-Minor</td>
<td>Minor</td>
<td></td>
</tr>
<tr>
<td>Medium Local</td>
<td>Moderate</td>
<td>Moderate-Minor</td>
<td>Minor</td>
<td>Minor</td>
<td></td>
</tr>
<tr>
<td>Low Local</td>
<td>Moderate-Minor</td>
<td>Minor</td>
<td>Minor</td>
<td>Minor</td>
<td></td>
</tr>
<tr>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10.3.42 Only where the assessment has concluded with effects of a moderate to major level
are they considered to be significant in terms of the EIA Regulations. If significant
effects have been predicted the need for further mitigation measures is considered.
Although lesser effects may also need to be addressed, depending on specific
circumstances. The proposed mitigation measures are then assessed in relation to
their potential to reduce the effect on the receptor, following exactly the same
methodology as the assessment of potential adverse effects. Following this, the
residual effect significance is determined and reported taking into consideration any
uncertainties about the time required for the mitigation to take effect, its efficacy or practicality.

10.3.43 Also, any potential cumulative effects associated with other proposals in the relevant wider area (for onshore wind farm ornithological assessment this is typically defined by the NHZ) that have the potential to act additively on the same populations / receptors, are assessed for their potential to result in significant effects to the relevant receptor populations.

**Approach to Mitigation**

10.3.44 Mitigation of potentially significant effects has been a key consideration throughout the design development and the assessment of the proposed development. Mitigation of potentially significant adverse effects on the key ornithological receptors have been addressed in two main ways:

- by avoiding/minimising effects through alterations in the scheme layout design based on available baseline data; and
- by avoiding/minimising effects through programming and the approach to construction.

10.3.45 The benefits of design mitigation (e.g. avoidance of sensitive locations by altering the layout of a wind farm, programming works to avoid sensitive times of year for particular receptors) are considered as part of the initial assessment of effects. Any additional measures are considered based on the conclusion of this initial stage of the assessment. Details of specific proposed measures are provided within the impact assessment, Section 10.6.

**Collision Risk Assessment**

10.3.46 Wind turbine collision risk for key species has been estimated following a method developed by Band *et al.* 2007. The calculations and parameters involved in the collision risk assessment are detailed in Technical Appendix 10.5: Details of Collision Risk Analysis. In summary, the process involves three stages:

- Stage one is the estimation of the number of transits through the proposed rotor swept volume per year based on observed flight activity data and parameters of the wind farm and wind turbine design.
- Stage two involves the estimation of the predicted proportion of transits through the rotor swept volume that would result in a collision between the bird and a wind turbine blade. All predicted collisions are assumed to be fatal. This provides an estimate of the number of fatalities per year for the wind farm but assumes that no bird takes avoiding action to prevent a collision.
- Finally an assumed rate for collision avoidance is applied to the estimate.

10.3.47 This method is more suitable for some species than others (Madders and Whitfield 2006). For example, small and/or fast flying birds such as merlin, golden plover and most songbirds are difficult to detect beyond a distance of a few hundreds of metres and therefore it is rarely possible to generate reliable estimates of flight activity. In the case of these species collision risk is probably best determined through informed reasoning rather than quantitative modelling.

10.3.48 In order to provide a biologically realistic estimate of collision risk it is necessary to assume that birds take action to avoid collision (Band *et al.* 2007). However, reliable
empirical data on which to base estimates for avoidance are generally lacking (Chamberlain et al. 2006) and therefore the collision rates derived from assumed avoidance values should be considered as guarded estimates. Reviews of the issue of the avoidance of wind turbines by hen harrier and grey geese have provided evidence to support relatively high rates of avoidance, in the order of 99% (Whitfield & Madders 2005, Pendlebury 2006) and most recently 99.8% for geese in Scotland (SNH May 2013). However, there remains a need for more long-term systematic studies to estimate avoidance rates more accurately and to take more account of site specific factors that influence collision risk (e.g. turbine placement relative to site topography and wind patterns which in turn affect some species flight activity and behaviour).

10.3.49 In this assessment, estimates of collision risk/mortality have been calculated for key receptors where there was sufficient data to carry out the analysis. The collision risk for secondary species is provided in Technical Appendix 10.5: Details of Collision Risk Analysis, with the exception of common kestrel which is also reported in this Chapter. Species that are not included in the collision risk analysis are either not of conservation concern or at low collision risk due to their flight behaviour and/or are species which are infrequently present within the study area.

10.3.50 Various adjustments to the collision risk estimates have also been made to account for the turbine blade parameters relative to the height bands which were used to record observations of target and secondary species in flight. Further details and discussion of various biases applicable to collision risk modelling are provided in Technical Appendix 10.5: Details of Collision Risk Analysis.

10.3.51 The collision risk calculations are based on a combined total of c. 1575 hours of observation made during flight activity surveys undertaken between 2011 and 2013. Tables 10.10 and 10.11 summarise the flight-activity data from 2011, 2012 and 2013 for target species flights that passed within 500 m of the proposed wind turbines.

10.3.52 The potential collision risk was calculated for each species based on a number of assumptions. It is assumed that there is no influence on collision risk from weather conditions. In the case of diurnal raptors, as visual hunters, the risk of increased collision rates due to poor visibility is lessened by the likely reduction in flight activity during such periods as hunting efficiency is greatly reduced. Flight speeds and biometrics were conservatively estimated following current SNH guidance (SNH, October 2014). For example, the figures used for bird lengths and wingspans were from the upper end of the range (e.g. female measurements were used for sexually dimorphic species). This is a conservative approach as collision risk reduces as bird size decreases.

**Cumulative Assessment**

10.3.53 Details of the cumulative assessment methodology are provided in Section 10.7.

**Assessment Limitations**

10.3.54 There are considered to be no significant limitations to this assessment. However, all impact assessments are subject to some degree of uncertainty as to the potential scope, scale, duration and magnitude of effects and the range and sensitivity of receptors affected (see discussion above).

10.3.55 Such factors can be accounted for in impact assessment by assuming a reasonable ‘worst case scenario’ in relation to the potential effects of construction works, taking
10.3.56 Limitations in respect of bird collision risk modelling methods are well known (Band et al 2007). As discussed above, the method is limited by the current understanding of how bird flight activity and behaviour is affected by wind farms in the long-term and in proximity to individual wind turbines. However, this method includes parameters that can be adjusted to some extent to account for species-specific differences in morphology and flight behaviour and incorporates variables for individual turbine design, wind farm layout and operational regime. A further advantage of the Band Model, which has become widely adopted in wind farm EIA, is that it enables comparison of collision risk between proposals, which also helps to inform cumulative assessment.

10.4 Baseline Conditions

Site Context and Land Use

10.4.1 The primary land-uses within the site are commercial conifer production and extensive sheep and cattle grazing.

10.4.2 The main habitat types present within the site boundary comprise commercial conifer plantations (c. 37% of the total site area) (at various stages in the typical commercial rotation) wet modified bog (c. 21% of the total site area), marshy/marshy grassland (c. 19% of the total site area), recently felled coniferous plantation (c. 7%), semi-improved acid grassland (c. 3% of the total site area), with all other habitat types collectively constituting about 13% of the site area. There is one waterbody adjacent to the site at Penwhapple reservoir. To the north of the site the landform drops down towards the Water of Girvan and into a more intensively managed landscape with enclosed improved pasture and arable fields and mature semi-natural and plantation woodland. To the south lies the valley of the River Stinchar, which is also predominantly intensively managed lowland farmland.

Designated Sites

Statutory Designated Sites

10.4.3 The proposed development is not located within or adjacent to any statutory sites designated for ornithological interest and there are no such sites within 10 km. Statutory designated sites were therefore scoped out of this assessment.

Non-statutory Designated Sites

10.4.4 There are several non-statutory local sites designated for ornithological interest, within or adjacent to the proposed wind farm site (i.e. within 2 km), identified within the South Ayrshire Local Development Plan (2014). These sites are listed in Table 10.7 below and are shown on Figure 9.1. There are no boundaries provided for these sites in the Local Development Plan only point locations, which are assumed to be site centres. None of these sites are formally considered as receptors for this assessment as they appear to be located outside of the site boundary and there is insufficient information available about the rationale for their designation to be able to make any meaningful assessment of the potential effects of the proposed development on them.
10.4.5 Part of the Galloway Forest Park approximately 1 km to the south-east of the site is an RSPB Important Bird Area (IBA). The key species supporting this designation are: black grouse, due to its unfavourable conservation status in Europe; peregrine and short-eared owl, also species with an unfavourable conservation status in Europe and threatened at the European Union level.

### Desk Study Findings

10.4.6 Information obtained during the various desk studies identified that the study area provided 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 and barn owl were known to be present in the general area. Kestrel (*Falco tinnunculus*) was also known to breed in the general area.

10.4.7 The desk study confirmed that flocks of golden plover (peak no. of 85 in April 2002) are present in suitable 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 golden plover in the UK).

10.4.8 During baseline surveys for the existing Hadyard Hill wind farm a total of 17 curlew breeding territories were recorded within the survey area.

10.4.9 Records provided by 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 extinction of black grouse from the area.

10.4.10 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 proposed development survey area) or habitually feeding in suitable habitat within the study area.

*Hadyard Hill Wind Farm ES*

10.4.11 Ornithological surveys to inform the assessment of the existing Hadyard Hill wind farm were undertaken between April and December 2002. The following is a short summary of the main findings from various surveys undertaken (EnviroCentre, 2003):

- flight activity surveys (8 vantage points and a total of c. 132 hours of observation);
breeding bird surveys;
- wintering bird surveys (6 dates between 10th October to 14th December);
- waterfowl counts at Penwhapple Reservoir (on six dates between 7th September and 14th December); and
- field vole abundance survey and a hare and rabbit survey.

10.4.12 A total of 62 species were recorded during the breeding bird survey (April-July 2002) of which 40 showed evidence of breeding. The following is a summary of the results of the survey in relation to certain key species:

- hen harrier and peregrine - both present, no evidence of breeding;
- sparrowhawk (*Accipiter nisus*) and common buzzard (*Buteo buteo*) - both present, no evidence of breeding;
- common kestrel - one confirmed territory in a forestry plantation on the proposed site in 2002;
- golden plover - present but showing no evidence of breeding; and
- curlew - 17 confirmed breeding pairs scattered over suitable habitats within the survey area.

10.4.13 There was no focused black grouse survey undertaken and no observation of black grouse during all surveys in 2002. Historical records from the Dailly Community Council indicated there were regular sightings of lekking birds up to and including 2001 (see Technical Appendix 10.2: Desk Study Results for further details).

10.4.14 The flight activity surveys revealed the following in relation to key species:

- hen harrier - total of 11 flights with the main activity over Maxwellston Hill, Falkham Rig, by Brochloch and Delamford Hill;
- goshawk - one flightline over Brockloch;
- merlin - one flightline over Hadyard Hill;
- peregrine - total of five flights with the main activity over Maxwellston Hill, Green Hill and between Craiginmoddie and Milton Hill; and
- golden plover - total of six flights with the main activity over Maxwellston Hill and Hadyard Hill, with a peak flock size of 85 in April 2002.

10.4.15 During wintering bird surveys both merlin and peregrine were observed. A peak count of 26 golden plover was recorded on the 14th December 2002. There were also peak counts of 635 for fieldfare (*Turdus pilaris*) and 205 for redwing (*Turdus iliacus*) on 7th November 2002.

10.4.16 Peak numbers of target/secondary species recorded on Penwhapple reservoir include: 2 whooper swan (14th December 2002), 36 wigeon (*Anas penelope*) (14th October), 170 teal (14th December) and 82 mallard (*Anas platyrhynchos*) (14th December).
Hadyard Hill Post Construction Monitoring 2006-2014

10.4.17 The following is a brief summary of the key findings from post-construction bird monitoring of the existing Hadyard Hill wind farm completed between 2006 and 2011 (Ecology UK 2007, RPS 2008 & 2009, MacArthur Green Ltd 2012):

- breeding curlew numbers declined markedly between 2002 and 2008 (3 years after the wind farm became operational). From an estimated 17 pairs in 2002 to 5 in 2008. This decline may partly be explained by natural variation, and it reflects national population declines during this period, although some of this reduction may be due to wind turbine collision or displacement effects (RPS 2009, Whitfield et al. 2010);

- passage and wintering golden plover were recorded in the Faikham Rig area. A maximum of 320 was recorded on 19th April 2006;

- there was one breeding pair of barn owls in the survey area in 2006, whilst another pair bred just outside the wind farm site in 2006 (see the Confidential Annex for further details);

- in June 2007, a barn owl with juveniles was recorded within the raptor study area (see the Confidential Annex for further details); and

- in 2011 a pair of peregrines were recorded on site and a large number of golden plover in the north of the survey area.

10.4.18 Bird carcass searches of turbine bases have been completed since 2006 at the existing Hadyard Hill wind farm (the results are recorded in a SSER database). In recent years formal searches have been implemented on a monthly basis and bird carcasses found by maintenance staff on an ad hoc basis are also recorded. There were a total of six bird carcasses recorded in 2006 (three buzzards, two kestrels and an oystercatcher). None recorded in 2007, 2008, 2009 or 2010. During 2011 one buzzard and one swift carcass were reported. In 2013 carcasses of a sand martin, skylark and a gull species were recorded. During 2014 two buzzard carcasses and a herring gull carcasse were noted. There is no apparent pattern to these recorded other than the swift and sand martin carcasses both being found under the same wind turbine.

10.4.19 Curlew and golden plover, despite their flight behaviour, which presumably increases their relative susceptibility to collision with wind turbines, to date have not been recorded as collision victims during the carcass searches.

RSPB Records

10.4.20 Data for the wider study area was provided by the RSPB in 2011 and 2013. The most notable records being for black grouse (see the Confidential Annex for further details). These records confirmed there were several small historical black grouse leks, located towards the centre and north-eastern parts of the proposed development study area, present during the mid to late 1990's.

Raptor Study Group

10.4.21 Dumfries & Galloway and South Strathclyde Raptor Study Groups provided notable records of breeding raptors within the wider study area including historical details of three peregrine breeding sites. Details are provided in the Confidential Annex.
10.4.22 Data was provided by the Forestry Commission, particularly in relation to black grouse. Lek locations, counts and ad hoc sightings for the 10 km grid squares NS30 and NX39 were provided (see the Confidential Annex for further details).

10.4.23 The following summary of the baseline surveys completed between 2011 and 2013 focuses on target species (see Table 10.2 above). 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.

10.4.24 The following is a summary of the key findings from the breeding bird surveys completed in 2011 and 2012. Further detail is provided in the key species accounts in Technical Appendix 10.6: Breeding Bird Survey Results, and the non-confidential mapped results from the various surveys are provided as:

- Figures 10.15-10.17 (2011 breeding bird survey);
- Figure 10.18-10.20 (2012 breeding bird survey);
- Figure 10.21 (results of black grouse survey);
- Figure 10.22 (non-confidential breeding raptor results);
- Figure 10.23 Winter Walkover Survey Results (Winter 2011-2012);
- Figure 10.24 Winter Walkover Survey Results (Winter 2012-2013);

10.4.25 Breeding records of species considered to be at risk of persecution (such as those on Schedule 1 to the Wildlife and Countryside Act 1981) or disturbance are provided in a separate Confidential Annex.

10.4.26 Table 10.8 summarises the results of the breeding bird surveys in 2011 and 2012 for species of national conservation concern or special statutory protection. Details of all species recorded during 2011 and 2012 are provided in Technical Appendix 10.3: All Bird Species Recorded and their Status, Technical Appendix 10.8: Ad Hoc Records or the Confidential Annex.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>2011</th>
<th>2012</th>
<th>Peak no. within 500 m of turbines</th>
<th>UK BoCC Status i</th>
<th>UK / LBAP ii</th>
<th>SBL iii</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curlew</td>
<td>4</td>
<td>10</td>
<td>3</td>
<td>Amber</td>
<td>UK</td>
<td>x</td>
</tr>
<tr>
<td>Common Snipe</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>Amber</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barn Owl</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>Amber</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Cuckoo</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>Red</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skylark</td>
<td>251</td>
<td>382</td>
<td>142</td>
<td>Red</td>
<td>UK</td>
<td>x</td>
</tr>
<tr>
<td>Song Thrush</td>
<td>9</td>
<td>12</td>
<td>4</td>
<td>Red</td>
<td>UK / L</td>
<td>x</td>
</tr>
<tr>
<td>Tree Pipit</td>
<td>13</td>
<td>5</td>
<td>3</td>
<td>Red</td>
<td>UK</td>
<td></td>
</tr>
</tbody>
</table>
Table 10.8: Apparent Breeding Territories Recorded for Species of National Conservation Concern during 2011 and 2012 Surveys

<table>
<thead>
<tr>
<th>Common Name</th>
<th>2011</th>
<th>2012</th>
<th>Peak no. within 500 m of turbines</th>
<th>UK BoCC Status i</th>
<th>UK / LBAP ii</th>
<th>SBL iii</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesser Redpoll</td>
<td>0</td>
<td>14</td>
<td>9</td>
<td>Red</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Crossbill iv</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>Green</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

i. Species status on the UK list of Birds of Conservation Concern (Eaton et al. 2009).
ii. Species that are a priority for conservation action in the UK or Local Biodiversity Action Plans.
iii. Species on the Scottish Biodiversity List.

Target Raptor Species

10.4.27 Within the wider survey area two separate peregrine breeding sites were recorded as occupied in 2011, 2012 and 2013. Due to changes to the extent of the proposed development through the EIA process neither of these sites is now closer than 2 km from any proposed wind turbine.

10.4.28 There was no evidence during surveys in 2011 or 2012 of breeding activity by hen harrier, osprey, merlin or goshawk within the raptor area. However, all of these species were observed periodically and to varying frequencies during the flight activity surveys (see Table 10.9 below). All are possibly breeding in the wider surrounding area.

10.4.29 Two hen harrier winter roost sites were found within the raptor survey area during winter 2012/13. The sites were only occasionally used by small numbers of birds (peak of 2).

10.4.30 During 2013 a focal study of breeding peregrine ranging behaviour was completed at each of the two breeding sites. Both sites were used in 2013 by separate breeding pairs. 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 design of the proposed development layout with the aim of reducing the potential adverse effects from the proposals on this species.

10.4.31 There were two barn owl breeding attempts recorded within the core survey area in 2012 (one confirmed and one suspected). Both sites are >300 m from the nearest proposed wind turbine (see the Confidential Ornithological Annex for further details).

Other Raptors and Owls

10.4.32 Common buzzard, sparrowhawk and common kestrel were recorded on numerous occasions between 2011 and 2013. Observations confirming breeding within the raptor study area (see Figure 10.22 and Technical Appendix 10.6: Breeding Bird Survey Results) were made for all three 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. Tawny owl was confirmed as breeding within the raptor study area during the survey period.
Black Grouse

10.4.33 There was no evidence of lekking black grouse within the core study area 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. 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

10.4.34 There was a relatively low density of breeding waders recorded given the extent of apparently suitable habitat present within the survey area. The most abundant species were curlew with a peak of 10 territories estimated for the core survey area in 2012. Of these only 3 territories were located within 500 m of the proposed development. Other breeding wader species, typical of the habitats within in the area, are present in very low numbers (e.g. common snipe).

10.4.35 Concentrations of golden plover, particularly during the autumn passage period, were noted in the areas of Hadyard Hill, Maxwellston Hill, Barony Hill and Cairn Hill. None of these locations are within the proposed development. The peak number of golden plover observed was a flock of approximately 220 flying to the east of Cairn Hill and Knockinculloch in November 2011. Breeding wader surveys and flight survey findings confirmed that this species is confined to passage / winter periods only.

Breeding Woodland and Moorland Songbirds

10.4.36 The moorland breeding passerine assemblage is considered to be relatively species-poor and typical of grassy moorland in the uplands of south-west Scotland. The vast majority of the species recorded are widespread and common although some species are of conservation concern at a national level (e.g. skylark and meadow pipit).

10.4.37 The coniferous plantations within the survey area support a typical suite of breeding passerines, with the majority of species being relatively common and widespread, both in a local context and across the wider area. The importance of the site is raised slightly due to the relatively large area and the presence of some species of national conservation concern, for example, cuckoo, tree pipit, song thrush, grasshopper warbler, lesser redpoll and spotted flycatcher (all of which are on the UK Red List of Birds of Conservation Concern) and common crossbill (which is listed on Schedule 1 of the Wildlife & Countryside Act 1981).

Migratory and Wintering Geese and Swans

10.4.38 The site was rarely visited by wild geese or whooper swans and patterns of flight activity showed no regular local or passage movements over the site. The site provides very limited suitable habitat for wintering / passage wildfowl generally. Penwhapple Reservoir is the only potential roost site of any note within the area, however there was no evidence of regular use of this site by significant numbers of passage or wintering geese or swans from surveys completed in winter 2011/12 and 2012/13. There are some known feeding areas of whooper swan, a rare winter visitor, particularly in relation to fields in the floodplain of the water of Girvan but these sites are well outside of any potential zone of influence of the proposed development.
South-west Scotland is an important region for wintering wild geese and swans generally, 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 development, 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 proposed development was located adjacent to, or in between important roosting and foraging areas, but this is not the case.

Other Breeding/Wintering Birds and Notable Records

There was one breeding record from 2012 of red grouse. There are records of winter visiting fieldfare and redwing flocks within the core survey area. Common crossbill displaying breeding behaviour were recorded at three locations over the winter period 2012/13. There were also records of wintering hen harrier, merlin, peregrine, golden plover and barn owl using the site. Other records of note include Lapland bunting (Calcarius lapponicus) and snow bunting (Plectrophenax nivalis).

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

Summary of Flight Activity Survey

This section summarises the results of the flight activity surveys completed for the proposed development in 2011, 2012 and 2013. The detailed findings are provided in Technical Appendix 10.4: Details of Flight Activity Survey Effort and Results and the mapped results are shown on Figures 10.7-10.14. Target Species

A summary of the observed flight activity by target species is provided in Table 10.9 and Table 10.10 below. Flight activity by target species was relatively infrequently recorded within the core survey area. Table 10.9 gives the number of flight lines (and number of birds for flight lines representing more than one bird) recorded between 2011 and 2013 within the core study area. Table 10.10 provides a summary of the distribution of time at the five flight height bands for each target species (this includes all flights recorded not just those within the core study area). The mapped flight lines are shown on Figures 10.7, 10.9, 10.11 and 10.13.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>No. of flight lines recorded during all surveys</th>
<th>No. of flight lines in core study area (total no. birds in parentheses)</th>
<th>No. of flight lines at risk height in core study area (total no. birds in parentheses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Golden plover</td>
<td>15</td>
<td>6 (155)</td>
<td>4 (153)</td>
</tr>
<tr>
<td>Hen harrier</td>
<td>11</td>
<td>7 (7)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Peregrine</td>
<td>8</td>
<td>2 (3)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Goshawk</td>
<td>7</td>
<td>4 (6)</td>
<td>4 (6)</td>
</tr>
</tbody>
</table>
Table 10.9: Summary of Recorded Flight Activity by Target Species within the Core Study Area (2011 - 2013)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>No. of flight lines recorded during all surveys</th>
<th>No. of flight lines in core study area (total no. birds in parentheses)</th>
<th>No. of flight lines at risk height in core study area (total no. birds in parentheses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merlin</td>
<td>8</td>
<td>3 (3)</td>
<td>3 (3)</td>
</tr>
<tr>
<td>Barn owl</td>
<td>4</td>
<td>4 (5)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Pink-footed goose</td>
<td>2</td>
<td>1 (21)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Osprey</td>
<td>1</td>
<td>1 (1)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Whooper swan</td>
<td>1</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Brent goose</td>
<td>1</td>
<td>1 (95)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Table 10.10: Percentage Distribution of Time Observed 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.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>% Very Low</th>
<th>% Low</th>
<th>% Medium</th>
<th>% High</th>
<th>% Very High</th>
<th>Total time (secs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Golden plover</td>
<td>5 (2)</td>
<td>45 (5)</td>
<td>28 (10)</td>
<td>21 (7)</td>
<td>2 (1)</td>
<td>3659</td>
</tr>
<tr>
<td>Hen harrier</td>
<td>17 (5)</td>
<td>45 (6)</td>
<td>38 (2)</td>
<td>-</td>
<td>-</td>
<td>1654</td>
</tr>
<tr>
<td>Peregrine</td>
<td>-</td>
<td>22 (2)</td>
<td>17 (5)</td>
<td>37 (3)</td>
<td>24 (1)</td>
<td>1085</td>
</tr>
<tr>
<td>Goshawk</td>
<td>8 (1)</td>
<td>-</td>
<td>50 (6)</td>
<td>42 (3)</td>
<td>-</td>
<td>840</td>
</tr>
<tr>
<td>Barn owl</td>
<td>23 (2)</td>
<td>77 (4)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>487</td>
</tr>
<tr>
<td>Merlin</td>
<td>-</td>
<td>73 (3)</td>
<td>27 (5)</td>
<td>-</td>
<td>-</td>
<td>477</td>
</tr>
<tr>
<td>Pink-footed goose</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>54 (1)</td>
<td>46 (1)</td>
<td>260</td>
</tr>
<tr>
<td>Brent goose</td>
<td>-</td>
<td>-</td>
<td>100 (1)</td>
<td>-</td>
<td>-</td>
<td>145</td>
</tr>
<tr>
<td>Osprey</td>
<td>-</td>
<td>50 (1)</td>
<td>50 (1)</td>
<td>-</td>
<td>-</td>
<td>90</td>
</tr>
<tr>
<td>Whooper swan</td>
<td>-</td>
<td>-</td>
<td>100 (1)</td>
<td>-</td>
<td>-</td>
<td>12</td>
</tr>
</tbody>
</table>

Raptor Prey Transect Results

10.4.44 The detailed findings of the raptor prey transect surveys are provided in Technical Appendix 10.6: Breeding Bird Survey Results. Survey findings for transects carried out in 2011 indicate a relatively low abundance of vole prey evidence with the highest abundance at Doughty Hill, and no evidence recorded at Hadyard Hill. Survey findings for 2012 also indicated a relatively low abundance of vole prey with the only evidence found on Doughty Hill and Daldowie Hill. There was however a relatively high abundance of common moorland songbirds observed along all transects in both years.
Bird Interactions with Existing Wind Turbines

10.4.45 During the flight activity surveys there were a number of observations of individuals or flocks of birds flying through the existing Hadyard Hill wind farm. These species include grey heron, common buzzard, common kestrel, lesser black-backed gull, common gull (*Larus canus*), herring gull (*L. argentatus*), great black-backed gull (*L. marinus*), rook (*Corvus frugilegus*), carrion crow (*C. corone corone*), raven (*C. corax*) and fieldfare. Some of these observations were of birds interacting or in very close proximity to wind turbine blades. No collisions were observed.

10.4.46 The findings from regular searches by SSER for bird carcasses under the wind turbines are summarised in paragraph 10.4.18 above.

Evaluation of Ornithological Receptors

10.4.47 The following accounts for key receptors summarise the findings from the desk studies and baseline surveys and conclude with a receptor evaluation. Further background information on each species is provided in Technical Appendices 10.6 and 10.7.

*Hen harrier*

10.4.48 There was no evidence of breeding in the survey area during 2011 or 2012 but the site does appear to be used by this species outside of the breeding season particularly during the post-breeding period. The south-west of Scotland is a nationally important region for wintering hen harrier (Forrester et al. 2007) and the survey area as a whole provides extensive suitable foraging habitat (associated with unenclosed moorland and clear-fell areas within the conifer plantation which is likely to exceed 1% of this habitat within the wider West Central Belt NHZ, see Table 9.7 of Chapter 9: Ecology) as well as two locations which are used by hen harrier as communal roost sites.

10.4.49 Taking into consideration current level of use of the study area, the extent and quality of habitats and the potential for this to improve with the increasing amounts of clear-fell and pre-thicket re-stock plantation present in future years the survey area is assessed to be of Regional nature conservation value for wintering hen harrier.

*Peregrine*

10.4.50 Peregrine was one of the most frequently recorded target species during flight activity surveys. The survey area was used as a hunting ground mainly during the breeding season. Breeding attempts at two locations occurred within the wider raptor survey area in 2011, 2012 and 2013 (see the Confidential Annex for further details). The results of 2013 surveys confirmed that the two breeding sites were occupied by separate pairs that year. Two pairs represents >1% of the estimated population with the West Central Belt NHZ (estimated at 50 pairs, SNH 2012) but less than 1% of the Scottish population. The study area as a whole is therefore considered to be of Regional nature conservation value for peregrine

*Merlin*

10.4.51 Merlin flights were recorded in habitat comprising rough, unimproved grassland close to restock conifer plantations. The evidence from flight activity surveys and raptor surveys suggested no breeding occurred within the raptor survey area in 2011 or 2012. However, the area was being used for hunting, including during the breeding season.
10.4.52 The survey area is towards the northern fringe of the known breeding range of this species in southern south-west Scotland. There is abundant suitable foraging habitat and songbird prey populations within the plantation areas and in adjacent moorland habitats. Ground-nesting opportunities appear to be limited however there are corvid nests in the more mature coupes of the conifer plantations, which provide good nesting opportunities for merlin. Although the survey area currently supports no breeding pairs merlin are present occasionally, as the site provides abundant moorland songbird prey, and so may be supporting breeding birds in the wider area. The study area is therefore considered to be of Regional nature conservation value for merlin.

Goshawk

10.4.53 Goshawk was a relatively frequently recorded target species during flight activity surveys. Mature plantation areas appears to be used as a hunting ground during the breeding season, however there was no evidence from the raptor surveys or flight activity surveys of any breeding occurring within the survey area. When not undertaking breeding display flights the typical hunting behaviour of this species (i.e. within and below the forest canopy) reduces its potential detectability during standard flight activity surveys. It must therefore be considered likely that the levels of activity recorded during the survey period are not fully representative of all flight activity by this species within the area.

10.4.54 Observations of goshawk activity from the breeding raptor and flight activity surveys completed in spring-summer 2011 and 2012 is that there is at least one pair nesting in the wider area to the south (i.e. outside of the site). The Scottish breeding population has been estimated as 130 pairs (Forrester et al. 2007). The most recent published estimate for the south-west of Scotland is c. 20 pairs (Roos et al. 2015) and 1-4 pairs have previously been estimated for Ayrshire (Forrester et al. 2007). Therefore the survey area as a whole, based on current evidence and given the extent of suitable habitat within the site which is used for hunting by at least one breeding pair in the wider area, is considered to be of Regional nature conservation value for goshawk.

Black grouse

10.4.55 Although this area has supported black grouse populations at greater numbers in the past, only very low levels of activity were recorded within the survey area in 2011 and 2012 (i.e. a single bird displaying at a lek site which is >1 km from the nearest proposed wind turbine). Contributing factors for the lack of suitable habitat conditions are over-grazing by sheep and forest maturation. However, there are some areas of pre-thicket forestry, suitable for black grouse, present within and close to the survey area.

10.4.56 Taking into consideration the potential for the population to recover in the study area, with a predicted increase in the extent of potentially suitable habitat, the unfavourable conservation status of the species nationally and in the region (particularly in Ayrshire), a precautionary nature conservation evaluation of Regional for the survey area as a whole, is considered appropriate for this species.

Golden plover

10.4.57 Evidence from flight activity surveys indicates that this species is present in the region during passage periods and sporadically in winter. During the winter golden plover can spend much of their time inland (in contrast to most coastal wintering waders) feeding and roosting in areas of earthworm-rich enclosed grassland and
ploughed fields in lowland areas, although they may also frequent coastal sites (Byrkjedal & Thompson, 1998). Numbers fluctuate markedly in response to the severity of the weather. The region as a whole may form part of a broad migratory corridor for birds that breed in Scotland, Iceland and Scandinavia.

10.4.58 The population of wintering/passage golden plover and supporting habitats are considered important in the context of the local area, but not significant at a national or regional level. Consequently a High Local nature conservation value is considered appropriate for this species.

Curlew

10.4.59 Curlew was recorded relatively frequently during the flight activity surveys, with activity concentrated in Milton Hill and Delamford Hill area, associated with breeding activity in these areas. Breeding bird surveys in 2011 and 2012 recorded a peak number of 10 apparent territories of which only three are within 500 m of the proposed development. This is likely to be less than 1% of the South Ayrshire population.

10.4.60 Taking into account the conservational importance of curlew and the medium level of curlew activity on site, a High Local nature conservation value is considered appropriate for this species.

Barn owl

10.4.61 The habitats within the proposed development site are generally of moderate to low value for barn owl for hunting. Nesting opportunities in this area are primarily associated with agricultural buildings, particularly old stone barns and sheds and purpose built nest boxes. There was at least one breeding attempt by barn owl within the site in 2012 (see the Confidential Annex for further details).

10.4.62 Taking into consideration the estimated size of the population in the wider region (estimated at 500 pairs in Ayrshire and Dumfries & Galloway, Forrester et al 2007) the quality of the habitat within the majority of the site and the presence of known breeding sites in the area a nature conservation value of High Local is considered appropriate.

Short-eared owl

10.4.63 There was only one record of short-eared owl from surveys between May 2011 and March 2013. There is some suitable nesting habitat and extensive suitable foraging habitat for this species within the area. No breeding records for this species were revealed during the desk study. It is therefore assumed that currently the survey area is of no greater than High Local nature conservation value for this species. Although it is important to recognise that, with the large population fluctuations (in response to prey population cycles) and the semi-nomadic nature of this species, this situation may change in future years.

Wintering/Passage Geese and Swans

10.4.64 The site provides very limited suitable habitat for wintering / passage geese and swans. There is little, if any, potentially suitable foraging habitat and there are no known or potential roost sites within 1 km of the proposed development. In the wider surrounding area, the closest waterbodies for which there are records of roosting wildfowl are Penwhapple Reservoir (approximately 1 km north-west of the nearest
proposed turbine). There are some known feeding areas of whooper swan, particularly along the Water of Girvan.

10.4.65 Whooper swan is a relatively rare winter visitor to the survey area. However, they do winter in the surrounding area (e.g. Water of Girvan). Although the potential for this species to occasionally fly over the proposed development cannot be discounted, the available evidence and consideration of the distance to important sites indicates that this would be highly sporadic.

10.4.66 Pink-footed goose was infrequently recorded passing through the survey area with a total of two flightlines recorded throughout the whole survey period, none of which were at collision risk height.

10.4.67 Winter flight activity and walkover surveys in 2011/12 and 2012/13 did not identify significant or regular movement of wildfowl at collision risk height over the site. However, there is the potential for migratory geese or swans to pass through this general area (including over the site) during peak passage periods and at night. Most of the available desk study data suggests that such activity is likely to be concentrated along valleys (e.g. the Water of Girvan and River Stinchar valleys to the north-west and south of the proposed development). More regular movements might be expected if the proposed development was located adjacent to, or between, important roosting and foraging sites but this is not the case.

10.4.68 A nature conservation evaluation, for the survey area as a whole, of High Local is considered appropriate for this group of species.

Summary of the Nature Conservation Evaluation

10.4.69 The nature conservation value of the populations of bird species recorded within the survey area has been systematically evaluated based on information drawn from desk study and extensive field surveys completed between 2011 and 2013. The nature conservation values of the study area for the various receptors range from ‘medium’ (i.e. Regional importance) to ‘low’. There are a number of species that breed within the study area and merit special attention due to their European or national conservation status (as a species) and/or potential sensitivity to wind farm development, in particular merlin. There are also species that use habitats within the study area that are considered nationally threatened and these include hen harrier, peregrine, barn owl and black grouse.

10.4.70 Table 10.11 provides a summary of the nature conservation value of the survey area for all ornithological receptors along with the rating of their sensitivity to wind farm development (based on the criteria summarised in Table 10.3). Only those receptors which have a greater than Low (high local) nature conservation evaluation and greater than low generic sensitivity to wind farm development have been considered in any detail within the impact assessment.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Hadyard Extension Study Area - Nature Conservation Value</th>
<th>General Vulnerability to Wind Farm Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hen harrier</td>
<td>Regional</td>
<td>High</td>
</tr>
<tr>
<td>Goshawk</td>
<td>Regional</td>
<td>High</td>
</tr>
<tr>
<td>Common kestrel</td>
<td>Medium Local</td>
<td>High</td>
</tr>
</tbody>
</table>
### Table 10.11: Evaluated Ornithological Receptors

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Hadyard Extension Study Area - Nature Conservation Value</th>
<th>General Vulnerability to Wind Farm Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peregrine</td>
<td>Regional</td>
<td>High</td>
</tr>
<tr>
<td>Merlin</td>
<td>Regional</td>
<td>High</td>
</tr>
<tr>
<td>Black grouse</td>
<td>Regional</td>
<td>High</td>
</tr>
<tr>
<td>Golden plover</td>
<td>High Local</td>
<td>Medium</td>
</tr>
<tr>
<td>Curlew</td>
<td>High Local</td>
<td>Medium</td>
</tr>
<tr>
<td>Barn owl</td>
<td>High Local</td>
<td>Medium</td>
</tr>
<tr>
<td>Short-eared owl</td>
<td>High Local</td>
<td>Medium</td>
</tr>
<tr>
<td>Geese &amp; Swans</td>
<td>High Local</td>
<td>High</td>
</tr>
<tr>
<td>Moorland songbirds</td>
<td>Medium Local</td>
<td>Low</td>
</tr>
<tr>
<td>Woodland songbirds</td>
<td>Medium Local</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Potential Future Trends/Do Nothing Scenario**

10.4.71 Due to the complex range of potential influencing factors it is difficult to predict with any certainty what would occur to the status of key bird populations and supporting habitats in the study area should the proposed development not go ahead. However, it is anticipated that should the proposed development not be constructed, the use and management of the site would continue in a broadly similar manner to current practice with the primary land-use continuing to be upland sheep and cattle grazing (at similar stocking rates and grazing regime to the current management) and commercial conifer forestry. There is the potential for habitat quality for black grouse and hen harrier, in particular, to improve as a result of the felling of maturing conifer plantations (particularly the plantation areas to the west of Doughty Hill) which may result in an increase in activity by these species from current baseline levels.

10.5 Likely Significant Effects

**Introduction**

10.5.1 The following section considers the potential effects during the construction, operation and decommissioning of the proposed development on the key ornithological receptors. The mitigation measures proposed and the likely residual effects are discussed in section 10.5. The assessment is based on the proposed development as described in Chapter 2: Proposed Development, which includes an outline of the proposed Construction Environmental Management Plan (CEMP) in Technical Appendix 2.4.

10.5.2 The potential effect magnitude levels depend on a range of factors, in particular the breeding status/site use by the species at the time of the works. The status of various species within a site can vary markedly from year to year, successfully raising chicks in one year, failing early in another breeding season or not attempting to breed at all, due to variations in weather conditions, prey availability, disturbance etc. Some species not recorded as breeding within the period 2011 - 2012 but present in the area may be breeding within or adjacent to the site at the time of construction.
10.5.3 A summary impact assessment table is provided at the end of the Chapter which includes the conclusion of the pre-mitigation and post-mitigation (i.e. residual) assessment of effects for individual species where appropriate and a summary of the proposed mitigation measures.

**Construction Effects**

**Introduction**

10.5.4 Chapter 2: Proposed Development describes the construction process and schedule for the proposed development. Construction effects include the potential disturbance to breeding / foraging birds (including dependent young) or sensitive sites, such as nests or roost sites, and the direct / indirect, temporary / permanent loss of habitat as a result of the works.

**Construction Disturbance and Displacement**

10.5.5 The construction phase of the project is anticipated to be 22 months in total. Tree clearance would be in three phases, initially with key-holing to provide access to turbine and other infrastructure construction locations at the beginning of the works programme (see Technical Annex 2.3 Forestry). The felling would be phased in a manner that ensures compliance with the Forest and Water Guidelines (Forestry Commission 2011).

10.5.6 Assuming the least favourable timing of works in relation to the bird breeding season, disturbance to breeding birds arising from tree felling and vegetation / ground clearance, general construction noise, vehicles, vibration, lighting, presence of construction workers, etc., would have an effect on breeding success and potentially cause displacement of birds from the affected areas. It is assumed that birds could be subject to disturbance from construction works during all/part of the breeding season for up to three breeding seasons in total, assuming the least favourable commencement date (e.g. mid-summer). Although the context of the construction work, that is within compartments of active commercial plantations, is also taken into consideration in this assessment.

10.5.7 It is assumed that no nesting Schedule 1 species or their dependent young would be disturbed by the works in compliance with the Wildlife and Countryside Act 1981 (as amended). In addition the active nest sites of all wild birds are protected so it is also assumed that the construction works would be carried out in a manner that avoids damaging nest sites of all wild birds; measures to help achieve this are outlined in Section 10.6.

10.5.8 Noise from construction works may affect birds in a number of ways including the ability of a bird to select, establish and defend a territory, its foraging and breeding success and song learning. The degree of disturbance impact would be dependent on a range of variables, including the time of year, as the potential magnitude of the impact may vary depending on the stage of the breeding season, the species affected, the duration and magnitude of the source of the disturbance, the nature of the surrounding habitats/tree cover and topography and the availability of suitable alternative habitats for birds to move into.

10.5.9 Breeding raptors are particularly vulnerable to disturbance at the nest site where repeated disturbance can cause adults to cease egg incubation; even temporary
cooling or over-heating of eggs can result in failure to hatch. In extreme cases, for tree or cliff nesting species (e.g. peregrine), adults may knock chicks out of the nest if the disturbance is sudden and intense. Flushing of the adult birds from the nest site is also likely to increase the risk of predation of chicks or eggs abandoned at the nest. Birds such as peregrine and other raptor species are considered to have a relatively high sensitivity to disturbance in comparison to songbirds, for example.

10.5.10 Winter use of the site by some species is greater than during the breeding season. For example, construction activities near to hen harrier night roosts or focal areas for passage / wintering golden plover could result in disturbance. However, the layout of the proposed development, which has been modified to avoid sensitive wintering areas where possible, should ensure that the potential for such effects is reduced. For example due to the separation distances of >500 m from concentrations of golden plover activity (e.g. see Figure 10.13) and from hen harrier roost sites (see the Confidential Ornithological Annex for further details) the potential for disturbance to these species will be greatly reduced.

10.5.11 Table 10.8 provides estimates of the number of breeding territories of wader species of conservation concern and UK red listed / specially protected songbirds within 500 m of the proposed development (including wind turbines and all site roads). It is also important to consider that construction works would move progressively across the site and would not be occurring simultaneously across the entire area affecting all habitats continuously throughout the construction period.

Hen harrier

10.5.12 The potential effect on hen harrier from construction disturbance is anticipated to be low. There is no recent history of breeding attempts by this species within the site or within 2 km of the site, forest felling areas. There is some potential for disturbance and displacement during the post-breeding and winter periods. During construction, displacement has been suggested potentially to occur up to 500 m around construction sites with some disruption up to 1 km, depending on line of visibility (Madders 2004; cited in Bright et al. 2008).

10.5.13 It is possible that felling operations in the adjacent forest and construction works within these areas would discourage hen harrier from hunting over these areas. However, taking into consideration the extent of unaffected similar habitats in the wider area, any short-term displacement due to tree felling or construction operations should have little adverse effect on this species.

10.5.14 The pre-mitigation assessment of construction-related disturbance to and displacement of, hen harrier is considered to be no greater than low magnitude resulting in a minor effect in the short-term which is not significant.

Goshawk

10.5.15 Felling and construction activities would potentially disturb hunting goshawk. Goshawk will hunt over a wide variety of habitats, including mature open woodland and developing plantations. However, most prey is caught in forest edge habitats adjoining moorland and agricultural areas, where preferred prey is relatively plentiful and the habitat affords opportunities for surprise attacks. The site is used by hunting goshawk and is likely to be supporting adult birds that are nesting in the wider area. No nest sites have been located within the site during surveys between 2011 and 2012; however, it is considered possible that breeding may occur in future years.
10.5.16 The pre-mitigation assessment of construction-related disturbance and displacement of breeding goshawk is considered to be no greater than low magnitude resulting in a minor effect in the short-term which is not significant.

Peregrine

10.5.17 The proposed development is located within the wider hunting range of two pairs of peregrine (the nest sites are all > 2 km from the nearest proposed wind turbine, access track or any other proposed ancillary infrastructure, borrow pit or temporary construction compound). Therefore, there would be no direct disturbance to any current nest sites from the proposed development. Peregrine do occasionally hunt over the site, however, the available data suggests that the proposed development site is not particularly important during the breeding season. It is considered unlikely that any short-term displacement from the construction works could have a material effect on breeding success for this species.

10.5.18 Assuming the ‘worst case’ level of disruption for the duration of the construction period, the pre-mitigation assessment of construction-related disturbance to and displacement of breeding peregrine is considered to be no greater than low magnitude and minor in the short-term and not significant.

Merlin

10.5.19 For merlin, a potential maximum disturbance distance of 500 m is considered to be appropriate based on the findings of Ruddock and Whitfield (2007). This study considered the distances that birds may react to individual people approaching on foot rather than the types of potential disturbance associated with construction works. However, it is possible that people on foot are likely to provoke a response at a greater distance than vehicles and may be more important than construction-related noise (e.g. Jackson et al. 1977 cited in Ruddock and Whitfield 2007) or sources of disturbance at operational wind farms (Madders and Whitfield 2006).

10.5.20 Based on the findings of the desk study and field surveys undertaken for this assessment, it is considered unlikely that there would be any merlin nest sites present within 500 m of the works. As a Schedule 1 species, felling and construction related disturbance near to merlin breeding sites should be avoided through pre-works surveys and therefore significant disruption of any potential breeding attempts is unlikely.

10.5.21 Hunting adults could be potentially disturbed from localised areas around felling and construction sites and this could affect their ability to provision nests and therefore affect breeding success. The site currently provides good foraging opportunities for merlin; however any temporary displacement of foraging birds would probably result in a very small percentage loss in overall foraging resource.

10.5.22 Assuming the ‘worst case’ level of disruption for the duration of the construction period, the pre-mitigation assessment of construction-related disturbance and displacement of foraging or potentially breeding merlin is considered to be no greater than low magnitude and minor in the short-term and therefore not significant.

Black grouse

10.5.23 There is the potential for black grouse to be disturbed by construction works near to lek sites, nesting, roosting, brood-rearing and wintering areas. However, based on records from the past 10-15 years the proposed wind farm area is located outside of the main loci of recent black grouse observations, and is assumed to provide
relatively poor quality habitat at this time. In relation to the potential for disturbance to lek sites, based on the Ruddock & Whitfield disturbance review (2007), a potential maximum zone of disturbance to lekking black grouse from the felling and construction operations of 750 m has been assumed in this assessment. There are several historical lek sites identified during surveys of the proposed wind farm and from desk study sources, six of which (recorded between 1991 and 2000) are within 750 m from the proposed wind farm. Lek activity is typically focused around dawn and dusk and therefore works during the day between the times of two hours after sunrise and two hours before sunset is unlikely to result in any disturbance. Although there have been some black grouse observations in the period 2011-12, there have been no active leks recorded within this period within 1 km of the proposed wind farm.

10.5.24 For black grouse, pre-mitigation construction disturbance is assessed to be no greater than low magnitude and minor in the short-term and **not significant**.

**Golden plover**

10.5.25 No golden plover breeding territories were recorded within the survey area during the period 2011-12 and there are no records of this species breeding in the area in recent years based on the desk study data. Wintering and passage period records are associated with areas of moorland on the fringes of the site, with the majority of the activity >1 km to the north-east of the nearest likely source of disturbance from construction. There is the potential for disturbance to birds during this period but activity appears to be sporadic and the sensitivity to the potential adverse effects of felling and construction disturbance is not considered to be high in this context.

10.5.26 Golden plover pre-mitigation construction disturbance is assessed to be no greater than low magnitude and minor in the short-term and **not significant**.

**Curlew**

10.5.27 There was a peak of three curlew breeding territories being recorded within 500 m of any proposed turbine or associated infrastructure during the survey period 2011-12. There were no wintering and passage period records during the survey periods 2011-12 and 2012-13. There is the potential for disturbance to birds during this period and the breeding bird season but activity appears to be low and the sensitivity to the potential adverse effects of felling and construction disturbance is not considered to be high in this context.

10.5.28 It is considered very unlikely that all of the associated breeding pairs would suffer a failed breeding attempt as a result of disturbance from construction works but that is a possibility for a small proportion to do so. Assuming a realistic 'worst case' level of disruption for the duration of the construction period, the assessment of construction-related disturbance to and displacement of breeding curlew is considered to be no greater than low magnitude and minor in the short-term which is **not significant**.

**Barn owl**

10.5.29 Current known barn owl nest sites are in locations that should not be directly affected by the construction works. Construction activities may interfere with foraging behaviour, however as barn owls typically hunt outside of daylight working hours this would significantly reduce the potential for disturbance due to construction work. Therefore it is likely that any effects on foraging efficiency during the construction period would be limited. Nest sites in owl boxes (and high seats) within the surrounding area could be affected by wind farm related felling of the wider
planted. However, it has been assumed that the felling contractor will be made aware of the location of the nest sites and that they will be protected from disturbance (as a species listed on Schedule 1 to the Wildlife & Countryside Act 1981, as amended).

10.5.30 For barn owl pre-mitigation construction disturbance is assessed to be low in magnitude and a minor effect in the short-term which is **not significant**.

**Wintering/Passage Geese and Swans**

10.5.31 For most bird species, construction-related effects are considered to be only potentially significant during the main breeding season (i.e. March to August inclusive). However, for geese and swans (for example whooper swan, pink-footed and greylag goose) the winter and passage periods are the more sensitive times of year. Evidence from surveys undertaken for the proposed development indicates that there are few areas in the vicinity of the site that are likely to attract appreciable numbers of wild geese, swans, or other wildfowl.

10.5.32 The nearest roost sites for whooper swan, pink-footed goose and greylag goose, are at least 1 km from the proposed development so the potential for disturbance to roosting geese is considered to be very low.

10.5.33 For pre-mitigation construction disturbance, these species have been assigned a negligible effect magnitude and negligible potential effect in the short-term and **not significant**.

**Summary of Pre-mitigation Construction Assessment**

10.5.34 A summary of the assessment of potential tree felling and construction phase disturbance and displacement effects for each receptor, prior to mitigation and management, is given in Table 10.12, below.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Value</th>
<th>Magnitude</th>
<th>Effect Level</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hen harrier</td>
<td>Regional</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Peregrine</td>
<td>Regional</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Merlin</td>
<td>Regional</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Goshawk</td>
<td>Regional</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Black grouse</td>
<td>Regional</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Golden plover</td>
<td>High Local</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Curlew</td>
<td>High Local</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Barn owl</td>
<td>High Local</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Geese &amp; Swans</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Short-term</td>
</tr>
</tbody>
</table>

**Table 10.12: Construction Phase – Pre-mitigation Assessment of Construction Disturbance / Displacement (significant effects highlighted in bold)**
Operational Effects

Direct Habitat Loss and Change

10.5.35 Although habitat loss occurs initially during pre-construction tree clearance and during construction, the effect of habitat loss on receptors is a long-term effect which is therefore assessed as an operational phase effect. Further details and discussion of habitat losses resulting from the construction of this project are provided in Chapter 9: Ecology.

10.5.36 The vast majority of habitats affected by the proposed development are associated with conifer plantations and upland moorland. Approximately 961 ha of coniferous plantation would be felled (see Technical Appendix 2.3: Forestry for further details on woodland removal). The plantation areas would not be replanted with commercial conifers during the lifetime of the wind farm. The total amount of moorland habitat (i.e. primarily modified bog and marsh/marshy grassland habitats) directly affected by wind farm infrastructure has been estimated at 16.14 ha (see Table 9.8 in Chapter 9: Ecology), which is approximately 2% of the total extent of these habitats within the site.

10.5.37 Consideration has been given during the design of the proposed development to avoiding areas of particularly sensitive habitat such as watercourses and areas of wet, unmodified blanket bog on deeper peat. No significant loss (other than at a localised level) of any habitats is predicted from the construction and upgrade of the site roads which would service the proposed development.

10.5.38 The scale of the direct moorland habitat loss from the built scheme is not considered to be a significant effect upon any bird receptor due to the relatively small total area, distributed over the site, its low ecological value due to its modification and the small extent of the habitat types affected within the immediate surrounding area. This assessment takes into consideration the potential for wind turbine bases and site roads to result in indirect effects over a wider area than the construction footprint because of changes to local hydrology.

10.5.39 Direct habitat loss, arising from tree clearance, the construction of site roads and the installation of the wind turbines for the proposed development, is considered unlikely to be significant for the majority of receptors in the long-term. A high proportion of the proposed felling would be of commercial conifer plantation, which would have been felled at some future point as part of the normal cycle of timber harvesting for such forests. The proposed felling would occur on the north-western edge of a very extensive area of commercial plantation and other semi-natural woodland habitat (including the Galloway Forest Park) and this is not considered to be significant for the majority of receptors given this context.

Hen harrier

10.5.40 Moorland habitat loss at the anticipated relatively small-scale is considered to be of negligible effect to hen harrier. Following tree felling there would be a temporary increase in potentially suitable foraging habitat for hen harrier in comparison to the situation should the proposed development not be constructed. Overall, it is likely that the proposed felling could have a small beneficial effect on hen harrier habitat availability in the medium-term (this excludes consideration of the interaction with collision risk effect, which is discussed and assessed below).
10.5.41 In conclusion, the magnitude of habitat loss effects on hen harrier is considered to be of negligible magnitude with a negligible effect which is **not significant**.

**Merlin**

10.5.42 Similarly to hen harrier, moorland habitat loss at the anticipated relatively small-scale is considered to be a negligible effect for merlin. Tree felling would reduce the extent of available potential nesting opportunities for this species. The effect of habitat loss on merlin is considered to be of potential negligible-low magnitude resulting in a minor adverse effect in the long-term which is **not significant**.

**Goshawk**

10.5.43 The site is occasionally used by foraging goshawk, which probably nest in the surrounding area. Forest felling activities associated with the proposed development would potentially disturb foraging goshawk and may also affect the availability of suitable nesting habitat in future years. The magnitude of habitat loss effects on goshawk is considered to be low magnitude with a minor adverse effect in the long-term which is **not significant**.

**Other Receptors**

10.5.44 The potential pre-mitigation effect of direct habitat loss on other raptors and owls (including peregrine), black grouse, golden plover and curlew is not considered to be significant at the regional scale due to the small amount and proportion (in terms of the surrounding area) of habitat affected. The plantation forest felling, without re-planting of commercial conifers, is considered unlikely to materially affect most of these species in the long-term. The reduction in the extent of thicket and pole stage conifer coupes within the area is likely to reduce the availability of cones, therefore adversely affecting foraging habitat as well as potentially reducing the availability of suitable nesting areas for birds such as common crossbill.

10.5.45 A summary of the assessment of potential habitat loss effects for each receptor, prior to consideration of additional mitigation and management, is given in Table 10.13.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Nature Conservation Value</th>
<th>Magnitude</th>
<th>Effect Level</th>
<th>Impact Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hen harrier</td>
<td>Regional</td>
<td>Negligible</td>
<td>Negligible</td>
<td>n/a</td>
</tr>
<tr>
<td>Goshawk</td>
<td>Regional</td>
<td>Low</td>
<td>Minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Peregrine</td>
<td>Regional</td>
<td>Negligible</td>
<td>Negligible</td>
<td>n/a</td>
</tr>
<tr>
<td>Merlin</td>
<td>Regional</td>
<td>Negligible-low</td>
<td>Minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Black grouse</td>
<td>Regional</td>
<td>Negligible</td>
<td>Negligible</td>
<td>n/a</td>
</tr>
<tr>
<td>Golden plover</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td>n/a</td>
</tr>
<tr>
<td>Curlew</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td>n/a</td>
</tr>
<tr>
<td>Barn owl</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td>n/a</td>
</tr>
<tr>
<td>Geese &amp; Swans</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Risk of Collision from Wind Turbines

10.5.46 Wind farms present a risk of birds colliding with the moving wind turbine blades. The risk of collision is dependent on a wide range of factors including time of year, bird age, size and flight behaviour, degree of displacement (i.e. avoidance of the wind farm area), nature of the surrounding topography, habitat quality, weather, wind speed and direction, wind turbine design, layout and spacing. Some of these factors may act in combination to increase collision risk (e.g. soaring species may use topographic feature to help generate lift, turbines placed close to these feature may increase collision risk for those species) others may interact to decrease risk (e.g. birds may avoid the wind farm as a whole resulting in a reduced potential for collisions to occur). Certain taxonomic groups are considered to be at greater risk of collision. They are larger, less manoeuvrable species and/or species (families, groups of species) which spend a considerable proportion of their life on the wing, for example divers, grebes, herons, wildfowl, waders, raptors, owls and grouse.

10.5.47 Other groups of birds such as passerines are also at risk of collision with wind turbine blades however they are often present in high enough densities and have relatively high reproductive rates such that the effect of the additional mortality from turbine collision is less likely to be significant to the local population. Larger birds such as raptors tend to have a lower reproductive rate than smaller species, such as passerine spp. and wader spp., a longer period before first breeding and a much lower population density. Consequently, although there may not be significant differences in the propensity for collision with wind turbines, differences in life history, reproductive strategy and population status can result in marked differences in the potential 'sensitivity' of different species to additional mortality from wind farms.

10.5.48 The risk of collision is also influenced by wind farm site location. For example, wind farms sited near to migratory routes, particularly where there is a 'bottleneck' effect caused by the surrounding topography, migration staging areas, flyways between roosting and feeding areas or anywhere where high numbers of birds may congregate, for instance where there is a high concentration of food supply, are often the most hazardous to birds (Winkelman 1995).

10.5.49 For wind farms where bird collisions have been reported the rates per turbine are often highly variable (e.g. ranging from 0.01 to 23 bird collisions per year). However, although there are very few published empirical studies of bird collision risk at operational wind farms in upland areas in the UK, most reviews of available data from studies of wind farms in the UK and the rest of Europe have found that collisions are generally rare in wind farms that have been well-sited (e.g. Crockford 1992, Benner et al. 1993, Winkelman 1995, Erickson et al 2001 and Hötker et al. 2006).

Collision Risk by Species

10.5.50 Table 10.15 below gives the estimated number of collisions per year for each relevant species, the estimated total number of collisions over the 25 year lifetime of the proposed development and the estimated rate of collision (further details are provided in Technical Appendix 10.5). A collision avoidance rate of 98% has been used for the assessment for all species apart from hen harrier for which a 99% avoidance rate has been used and kestrel for which 95% has been used (following current guidance, Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model, September 2010).
### Table 10.15: Summary Results of the Collision Risk Model Results – Peak Annual Collisions Estimated for Target Species at the assumed Avoidance Rates

<table>
<thead>
<tr>
<th>Species</th>
<th>95% avoid.</th>
<th>98% avoid.</th>
<th>Total over 25 years (98%)</th>
<th>1 bird every x years (98%)</th>
<th>99% avoid.</th>
<th>Total over 25 years (99%)</th>
<th>1 bird every x years (99%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hen harrier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Merlin</td>
<td>0.01</td>
<td>0.24</td>
<td>104.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goshawk</td>
<td>0.05</td>
<td>1.15</td>
<td>21.77</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osprey</td>
<td>0.01</td>
<td>0.16</td>
<td>155.41</td>
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<tr>
<td>Golden plover</td>
<td>0.36</td>
<td>9.05</td>
<td>2.76</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Curlew</td>
<td>0.04</td>
<td>0.91</td>
<td>27.56</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kestrel&lt;sup&gt;i&lt;/sup&gt;</td>
<td>1.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

<sup>i</sup> Collision rates for Kestrel are based on means derived from two summer survey periods.

### Hen harrier

10.5.51 The collision risk model provided an estimate of annual collision mortality of 0.03 for hen harrier which equates to one collision every c. 30 years. Therefore, assuming baseline levels of flight activity remain the same, the proposed development would be very unlikely to result in more than one hen harrier death over the lifespan of the proposal. At this rate any additional mortality from the proposed development would have a negligible influence on existing over-winter survival rates and consequently no effect on the long-term status of the regional 'wintering population'.

10.5.52 The estimated of collision rate is based on flight activity data collected when a high proportion of the conifer plantation within the site is at thicket and pole stage (c. 85%, see Table 9.8 in Chapter 9: Ecology) and therefore of low value as hunting habitat for hen harrier. The proposed felling (estimated at c. 961 ha, see Technical Appendix 2.3: Forestry) has the potential to result in an increase in hen harrier flight activity, in particular, within the site in comparison to current baseline levels. This is due to the increase in small mammal prey populations that typically occurs in the years following commercial conifer plantation felling and the attendant flush of grass and rush growth. Assuming grazing intensity within the former plantation areas remains unchanged, most of the proposed felling area is likely to revert to a mosaic of acid, neutral and marshy grassland over the lifetime of the wind farm. Although unchecked natural regeneration of Sitka spruce saplings could affect large parts of the clear-felled areas. Based on the extent of low yield class coupes (<YC8) where there is an existing peat depth of greater than 50 cm (see Technical Appendix 2.3: Forestry) only c. 22 ha of the felled area (2.3% of the site) could potentially recover, in the long-term, to a form of wet heath or blanket bog vegetation.

10.5.53 However, the collision rate would have to increase markedly (by the order of 250%) to raise the estimate to two collisions during the lifetime of the wind farm. Even at this level of risk it is very unlikely to be important in the context of the over-winter survival rate of the regional population. Additionally, the hunting behaviour of hen harrier does not place them at particular risk of collision with the proposed wind turbines. Typical hen harrier hunting behaviour is to ‘quarter’ the ground, flying at less than 10 m above the vegetation in order to surprise and rapidly seize prey.
10.5.54 If breeding activity were to occur in the area, and birds were not deterred from nesting due to the presence of the wind turbines, then the risk of collision may also increase from current baseline estimates. Hen harriers are considered to be at greater risk of collision with wind turbines during breeding display flights or as recently fledged birds (Madders 2004). Display flights, solo or mutual high circling, undulating flights are made by males and females, although the more intricate and intense 'sky-dancing' behaviour is typically exhibited by males. The peak period for this behaviour is early in the breeding season, from early April to early May, ranging from late February to late May (Hardey et al. 2009). However, this is considered an unlikely scenario given the currently unfavourable conservation status of the breeding hen harrier population in the wider region and the absence of breeding activity in wider area in the recent past. There was no evidence of hen harrier nesting within the site from surveys completed between 2011 and 2012.

10.5.55 In conclusion, the magnitude of the collision risk effect on hen harrier based on current and predicted future levels of activity within the wind farm area is considered to be low resulting in a minor effect in the long-term which is not significant.

Peregrine

10.5.56 There have been very few reported peregrine fatalities as a result of collision with wind turbines in Europe. However, their flight speed and hunting behaviour, where they can be intently focused on the pursuit of other birds as prey with dramatic high speed 'stooping' attacks from above, would be expected to place them at some increased risk of collision with turbines during such flights. Peregrine typically hunt over open ground or water away from woodland and woodland edge with the majority of prey taken on the wing (Cramp & Simmons 1988, Ratcliffe 1993). Unlike other raptors, such as golden eagle, there appears to be little evidence for a behavioural displacement effect (i.e. birds avoiding wind farms as a whole and thereby reducing the risk of collision).

10.5.57 There were no recorded peregrine flights at risk height within the proposed wind turbine area during the 2011 to 2013 survey period. However, peregrine are active in the area (two breeding pairs in the wider area) and suitable habitat and prey populations for hunting is present within the site. Due to the lack of flight activity recorded in the flight risk zone during the baseline surveys it is not possible to inform the assessment of collision mortality through collision risk modelling. However a precautionary assessment has been made based on the assumption that the proposed removal of the conifer plantation has the potential to result in a marginal increase in activity within the site, from the current baseline levels, during wind farm operation.

10.5.58 The assessment has been based, in part, on crude estimates of change in the extent of 'open habitats' within nominal core and wider home ranges about the nest sites. The extent of ‘open habitats’ within the proposed wind farm site would increase by c. 913 ha (see Technical Appendix 2.2: Forestry) as a result of the proposed felling
and would remain unplanted for the life-time of the wind farm (allowing for a proposed 48 ha of compensatory tree planting). The proposed plantation felling would be well outside of a 2 km radius core range for one of the currently used breeding sites and would equate to c. 2.2% of a nominal 6 km radius home range. For the other breeding site the proposed felling would account for c. 2.5% of the core range and c. 6.3% of the 6 km radius wider range. Whilst there is uncertainty about the potential value of the former plantation areas as productive hunting habitat for peregrine these estimates indicate a relatively small proportional increase, in the context large hunting range of breeding peregrines, of potentially suitable habitat. Taking into consideration these future changes to habitat quality there is considered to be the potential for the effect magnitude from annual collision mortality to increase from a negligible to a low level.

10.5.59 In conclusion, the magnitude of collision risk to peregrine based on current and predicted levels of activity within the site is considered to be of negligible-low magnitude resulting in a negligible-minor effect in the long-term which is not significant.

Merlin

10.5.60 The estimated collision rate for merlin (using 98% avoidance) equates to one bird every c. 105 years. Given this very low estimated rate it is considered highly unlikely that actual collision mortality could materially affect survival rates even of the local population. When actively hunting, and during commuting flights, merlin typically fly low over the ground, well below turbine rotor height. Although, flight height can increase when birds are in pursuit of songbirds that try to evade capture by gaining height. However, similarly to hen harrier, data collected during the flight activity surveys at the site indicated that overall merlin flight activity was predominantly below the collision risk height band (see Table 10.10).

10.5.61 Merlin are considered to be at greater potential risk of collision during aerial display flights by adults and practice flights by juveniles. Both behaviours would be expected to be concentrated within an area approximately 500 m from a potential nest site. However, the proposed tree felling would ensure that potentially suitable tree-nesting opportunities for merlin are removed from the immediate vicinity of the proposed development minimising the potential for birds to be exposed to increased collision risk as a result of nesting attempts close to the proposed development. Tree-nesting merlin are dependant on re-using old stick nests made by other birds, primarily crows (Rebecca et al. 1992). Low trees (e.g. less than ten years old) and stands of low willow scrub, which may be retained within c. 500 m of the proposed wind turbines, are unlikely to provide suitable nesting opportunities for this species. Typical ground-nesting habitat is generally lacking in the site due to an absence of suitable tall heather stands or suitable nesting crags.

10.5.62 The magnitude of collision risk to merlin based on current levels of activity within the site is considered to be of negligible-low magnitude resulting in a negligible-minor effect in the long-term which is not significant.

Goshawk

10.5.63 The collision risk analysis provided a peak estimate of annual collision mortality for goshawk of 0.05 (based on a 98% avoidance rate) which equates to one bird strike every c. 22 years. Additional mortality at this rate is considered highly unlikely to have a material adverse effect on overall survival rates of the goshawk population within the local area. The proposed felling plans would have the effect of largely
removing any potential nesting opportunities and reducing the quality of hunting habitat for goshawk within the site. Therefore it is considered very unlikely that the baseline levels of flight activity would increase within the proposed development as a result of the forest felling plans.

10.5.64 The magnitude of collision risk to goshawk is considered to be negligible-low magnitude resulting in a negligible-minor effect in the long-term which is **not significant**.

**Black grouse**

10.5.65 No flight activity by black grouse was observed within the flight risk area during the various survey periods. There are no recently active lek sites within 1 km of the proposed wind turbines and closer historical lek sites have not shown evidence of leking activity since 2000. No evidence of breeding or foraging within 500 m of wind turbines was found during the 2011-12 surveys. However, there is the possibility of breeding and foraging activity by black grouse increasing within the site in the future as a result of an increase in the extent of open-space and broadleaf woodland in the long-term. Although it is important to note that there has been no apparent increase in black grouse activity as a result of felling associated with the existing Hadyard Hill wind farm (based on pre- and post-construction monitoring between 2002 and 2009, RPS 2009).

10.5.66 Based on the current baseline information, and taking into consideration the potential for activity to increase in the area post-felling, it has been concluded that the magnitude of the collision risk effect on black grouse is negligible-low resulting in a negligible-minor effect which is **not significant** effect in the long-term.

**Golden plover**

10.5.67 The peak estimate of annual collision mortality for golden plover (using the 98% avoidance rate) is 0.36 which equates to one bird every 2.8 years (or 9 collisions during the 25-year lifetime of the proposed development). The risk of collision mortality to this species is considered to be low and at a rate that is unlikely to be of importance even at the level of the local passage/wintering population. The proposed conifer plantation felling could increase the availability of suitable wintering habitat for this species within the proposed wind farm site, and therefore increase flight activity in comparison to existing baseline levels. This species may be displaced, to some extent, by the presence of the turbines which would reduce the risk of collision. Additionally, the baseline survey results indicate that the preferred locations used by golden plover are largely outside of the potential zone of influence of the proposed wind farm. The magnitude of the collision risk effect on golden plover is considered to be of low magnitude resulting in a minor effect which is **not significant** in the long-term.

**Curlew**

10.5.68 The peak estimate of annual collision mortality for curlew (applying the 98% avoidance rate) is 0.04, which equates to one bird every c. 28 years. The risk of collision mortality to this species is considered to be low and at a rate of annual that is unlikely to be important even at the local population level. It is possible that the conifer plantation felling (without re-planting of conifers) would increase the availability of suitable breeding habitat for this species within the proposed wind farm. This is due to a reduction in plantation edge-effects, i.e. for areas of suitable nesting habitat adjacent the conifer plantation (Stroud et al. 1990), and the creation of some potentially suitable nesting habitat within the clear-felled areas. The extent of the
potential medium to long-term displacement effect is unclear but evidence from a monitoring studies in Scotland indicates that displacement may not be as significant as previously feared (Whitfield et al 2010). Although the actual results from pre- and post-construction monitoring of the existing Hadyard Hill wind farm is inconclusive in this regard (see para 10.4.17). The magnitude of the collision risk effect on curlew is considered to be negligible-low resulting in a negligible-minor effect which is not significant in the long-term.

Common kestrel

10.5.69 Kestrel is considered as a receptor for the assessment of collision risk due to the unfavourable conservation status of the national population (e.g. kestrel is on the UK Amber list and the Scottish population has suffered an estimated 58% decline between 1995 and 2009, Risely et al. 2011) and the relatively high susceptibility of this species to turbine collision.

10.5.70 The mean estimate of annual collision mortality for kestrel (assuming the 95% avoidance rate) is 1.17 which equates to 29 birds during the lifetime of the wind farm. This is likely to be an over-estimate as it does not account for the depletion of the existing resident population from initial collisions and the resulting reduction in flight activity in the area. However, the removal of c. 961 ha of conifer plantation as part of the proposed development may result in an increase in activity from current levels within the collision risk zone due to the anticipated increase in small mammal numbers following felling and the recovery of grasses, sedges and rushes.

10.5.71 This species was frequently recorded hunting near to the proposed development during the breeding season and at other times of the year. Kestrels are known to be susceptible to collision with wind turbines, due primarily to their favoured hunting behaviour and some evidence of a behavioural attraction to wind farms (Whitfield & Madders 2006b). The relatively high frequency of flight activity recorded during 2011 to 2013 at collision risk height also supports this (see Technical Appendix 10.5). The relatively high susceptibility of this species was also evident from monitoring studies of the exiting Hadyard Hill wind farm. A total of 2 kestrel carcasses were recorded in 8 years of monitoring (0.25 per year). The actual number of collisions is likely to be much greater than this as the number of birds found has to be adjusted to account for various biases (i.e. scavenger removal, search efficiency and crippling biases) in order to provide an estimate of the actual collision rate.

10.5.72 The results of the collision model, and experience from monitoring of operational wind farms, suggests that there is a certain / near-certain likelihood of an effect on survival rates at the local population level for this species. Therefore the assessment has concluded an effect magnitude of medium resulting in a minor effect which it not significant at the scale of the regional breeding population.

Summary of pre-mitigation Assessment

10.5.73 Table 10.16 provides the assessed pre-mitigation effect magnitude and effect level for each of the potentially affected receptors.
Table 10.16: Operation Phase – Pre-mitigation Assessment of Collision Risk from Wind Turbines (significant effects highlighted in bold)

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Nature Conservation Value</th>
<th>Magnitude</th>
<th>Effect Level</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hen harrier</td>
<td>Regional</td>
<td>Low</td>
<td>Minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Kestrel</td>
<td>Medium Local</td>
<td>Medium</td>
<td>Minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Peregrine</td>
<td>Regional</td>
<td>Negligible-low</td>
<td>Negligible-minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Merlin</td>
<td>Regional</td>
<td>Negligible-low</td>
<td>Negligible-minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Goshawk</td>
<td>Regional</td>
<td>Negligible-low</td>
<td>Negligible-minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Black grouse</td>
<td>Regional</td>
<td>Negligible-low</td>
<td>Negligible-minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Golden plover</td>
<td>High Local</td>
<td>Low</td>
<td>Minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Curlew</td>
<td>High Local</td>
<td>Low</td>
<td>Minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Barn owl</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td>n/a</td>
</tr>
<tr>
<td>Geese &amp; Swans</td>
<td>High Local</td>
<td>Negligible-low</td>
<td>Negligible-minor</td>
<td>Long-term</td>
</tr>
</tbody>
</table>

Collision Risk – Other Built Structures

10.5.74 The three proposed permanent anemometer masts pose a potential collision risk to birds. The proposed masts would be of a free standing, lattice design and as such they would present a minimal risk to birds.

10.5.75 Collision mortality/injury from other structures is considered to be no greater than negligible-low effect magnitude and minor and not significant effect in the long-term for any receptor.

Displacement/Disturbance/Barrier Effects

10.5.76 Turbine-related displacement, assuming no habituation over time, has the potential to affect breeding success and reduce individual fitness as it results in the effective loss of habitat for nesting, foraging and roosting. The scale of the effects would be likely to vary considerably between species and could be dependent on factors such as the number of turbines affecting the same habitat/population of birds and the zone of displacement relative to territory size etc.

10.5.77 Displacement of birds from suitable habitat by operating wind turbines has been observed in a number of studies of offshore (e.g. Desholm & Kahlert 2005) and onshore wind farms (e.g. Larsen & Madsen 2000; Devereux, Denny & Whittingham 2008; Pearce-Higgins et al. 2008 and 2009). From various published field studies and literature reviews (e.g. Winkelman 1995, Green 1995, Leddy et al. 1999, Larsen and Madsen 2000, de Lucas et al. 2004, Hötker et al. 2006) it is apparent that displacement effects vary between locations and species, with some species showing remarkable tolerance of wind turbines and others being entirely displaced from a wind farm area. The results of pre- and post-construction monitoring studies
in the Scottish uplands indicate that the scale of potential displacement effects on some upland wader species during the wind farm operational phase is lower than had been previously assumed, with several studies showing no evidence of a significant effect on species such as curlew and golden plover (e.g. Fielding & Haworth 2010 and 2012, Whitfield et al. 2010, Douglas et al. 2011).

10.5.78 Some common songbird species have either shown relatively small scale displacement of 100-200 m from turbines or no apparent displacement at all (Hötker et al. 2006, Devereux, Denny & Whittingham 2008) whereas almost complete displacement of golden eagle from a new wind farm located within suitable hunting ground has been reported (Walker et al. 2005). However, with studies of operational wind farms it is often difficult to account for concurrent changes to habitat condition within and outside of the wind farm area, either as a result of construction or from deliberate habitat enhancement, influencing habitat use within the wind farm area.

10.5.79 There is also the potential for the presence of the wind farm to affect flight behaviour and force birds to make deviations which are more costly in terms of energy expenditure or in extreme cases prevent access to important habitats. For infrequent movements this is less of a potential concern. However for birds such as geese and swans, that can use favoured daily commuting routes between winter roost sites and freeing areas, this has the potential to be an important effect. Similar effects can result if wind farms are placed across migration corridors. For this assessment the potential for the wind farm to result in significant barrier effects for the species that have been recorded using the development site is considered to be very low. As discussed in section 10.4 there is no evidence that the proposed wind farm site is overflown with any regularity by appreciable numbers of migrating or wintering geese or swans. Therefore there is no further consideration of the potential barrier effect of the proposed wind farm for any of the receptors.

Hen harrier

10.5.80 In relation to potential habitat displacement effects on hen harrier, some studies have reported a significant reduction in flight activity, of the order of 50%, up to 500 m from operating wind turbines (Pearce-Higgins et al. 2009). This is a larger zone of effect than had previously been indicated from published monitoring studies and literature reviews. Previous studies, generally focused on individual sites or reviews of monitoring studies for individual sites outside of the UK, have indicated a much lower potential effect on hen harrier. For example, Whitfield and Madders (2006), in a review of the effects of wind farms on hen harriers, examined displacement effects from several operational schemes in Europe and the United States. Only one wind farm study reported evidence of any displacement effect. Whitfield and Madders concluded that if displacement of foraging occurs then it is likely be limited to within 100 m of wind turbines.

10.5.81 Pearce-Higgins et al. (2009) also reported statistically significant turbine displacement for meadow pipit and skylark, which are hen harrier prey species, at distances from wind turbines of up 100 m and 200 m respectively.

10.5.82 A conservative potential displacement zone of 500 m radius from each wind turbine base would include foraging areas but no known / historical nest sites or roost sites. As there is no regular breeding activity within 500 m of the proposed wind farm, displacement effects would principally affect only foraging birds during the winter months which may increase in the wind farm area following plantation felling.
10.5.83 The effect magnitude for displacement for wintering hen harriers is considered to be negligible-low resulting in a minor effect which is not significant.

Peregrine

10.5.84 Studies of the ranging behaviour of breeding peregrines in the Scottish Highlands have shown that approximately 70% of their prey is taken within 2 km of the nest (Weir, 1978). This is often used as an indication of a nominal core hunting territory for this species although breeding birds can range much further than this on hunting flights. There are two known nest sites in the study area, however both are over 2 km from the nearest proposed wind turbine. There are occasional commuting and hunting flights over the general area and some increase in activity following plantation clearance might be expected. However, given the separation of the proposed wind farm from the core breeding territories and the extent of suitable habitat in the wider area it is reasonable to assume that the proposed development is unlikely to result in appreciable displacement effects affecting breeding pairs either through direct displacement or by displacement / collision mortality of prey species.

10.5.85 The magnitude of operational disturbance effects on peregrine is therefore judged to be negligible-low with a minor effect in the long-term which is not significant.

Merlin

10.5.86 Merlin are thought to be relatively tolerant of operating wind farms and have been recorded nesting and foraging close to turbines, although the long-term effect on breeding success is uncertain. In view of the limited information available, a precautionary approach is considered appropriate and it is assumed that there would be some level of displacement to foraging birds. Therefore, for the purposes of this assessment, it is assumed that foraging birds would be displaced from areas within 100 m of wind turbines.

10.5.87 There are no known merlin nest sites within the raptor survey area and the forest felling proposals would ensure that potentially suitable tree nest sites are not located near to any turbines. Data from the 2011-13 surveys indicates that merlin make very limited use of afforested habitat (e.g. forest rides, riparian edges) away from the moorland edges of the plantation for nesting or foraging, this activity might be expected to increase following tree felling of the planation areas. In consideration this, the magnitude of operational disturbance effects on merlin is judged to be negligible-low resulting in a minor effect which is not significant.

Goshawk

10.5.88 Goshawk may breed in the wider area and there is occasional hunting activity by goshawk within the site. There is very little information available in the literature or from published monitoring studies on the potential displacement effects of wind turbines on this species. The proposed forest felling for the proposed development is considered likely to have a greater potential influence on the distribution of this species than the wind turbines. This would result in the removal of potentially suitable foraging and nesting habitat from the vicinity of the proposed development.

10.5.89 The magnitude of operational disturbance effects on goshawk is considered to be low with a minor effect which is not significant effect in the long-term.
Black grouse

10.5.90 There are five historical leks in the vicinity of the proposed development, although there has been no evidence (since 1997) of lekking at these sites. While no breeding was in evidence within 1 km of the proposed development during in the 2011-2012 survey period, there is the possibility of breeding and foraging activity by black grouse increasing within the site in the future as a result of an increase in the extent in the medium-term of open-space and broadleaf woodland.

10.5.91 Operational displacement to black grouse has been assessed as a negligible-low magnitude effect resulting in a minor effect which is not significant.

Curlew and Golden Plover

10.5.92 Curlew has been identified as being of relatively high sensitivity to displacement from onshore wind turbines in some published studies. For example, a reduction in the density of curlew within 500 m of wind turbines of 42% has been reported from one UK based study (Pearce-Higgins et al. 2009). However, an extensive multi-site monitoring study (which included the existing Hadyard Hill wind farm as one of the sites) has reported little evidence for a significant displacement effect on breeding curlew from operational wind farms (Whitfield et al. 2010).

10.5.93 A peak number of three breeding curlew territories was recorded within 500 m of the proposed wind turbines during surveys completed between 2011 and 2012. The proposed development is therefore assumed to result in a long-term displacement effect to this species with a potential estimated reduction in the breeding population of up to three pairs.

10.5.94 There were no breeding golden plover territories recorded within 500 m of the proposed development during surveys completed between 2011 and 2012. However, habitats in the core survey area do support wintering and passage flocks which are important at a local level. However the primary golden plover wintering area, identified through the 2011-13 surveys is >1 km to the north-east of the proposed development.

10.5.95 Approximately half of the proposed wind turbines are located within conifer plantation which does not support breeding or wintering waders (with the exception of woodcock). Following felling it is considered unlikely to be provide attractive habitat in the medium-term, without significant management measures being implemented, and due to the displacement effect from the proposed wind turbines. Therefore it is considered unlikely that adverse effects on breeding curlew or wintering / passage golden plover will increase appreciably during the lifetime of the wind farm.

10.5.96 In conclusion, the magnitude of operational effects on the local breeding curlew population and wintering golden plover is considered to be low resulting in a minor effect which is and not significant.

Barn owl

10.5.97 The potential effect on breeding barn owl from operational disturbance and displacement is anticipated to be low for the proposed development based on the findings of the baseline surveys and desk study. There is at least one breeding barn owl pair within the immediate surrounding area of the proposed development.

10.5.98 There is the potential for disturbance and displacement of hunting barn owl, although there is little evidence from the scientific literature to suggest that this species are
particularly susceptible to displacement from operational wind farms. There have been successful breeding pairs nesting within c. 500 m of the existing wind farm at Hadyard Hill (see the Confidential Annex for further details).

10.5.99 The effect from operational displacement on barn owl has been assessed as low resulting in a minor effect which is **not significant** in the long-term.

**Wintering/Passage Geese and Swans**

10.5.100 Given the low importance of this site for wintering and passage geese and a swans and very low levels of flight activity recorded, the magnitude of operational effects on wintering and passage geese and swans and other wildfowl is considered to be not greater than negligible-low resulting in a negligible-minor effect which is **not significant** in the long-term.

**Summary of pre-mitigation Assessment**

10.5.101 The following Table 10.17 provides the assessed effect level for each of the potentially affected receptors.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Nature Conservation Value</th>
<th>Magnitude</th>
<th>Effect Level</th>
<th>Impact Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hen harrier</td>
<td>Regional</td>
<td>Negligible-Low</td>
<td>Negligible-Minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Goshawk</td>
<td>Regional</td>
<td>Low</td>
<td>Minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Peregrine</td>
<td>Regional</td>
<td>Negligible-Low</td>
<td>Negligible-Minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Merlin</td>
<td>Regional</td>
<td>Negligible-Low</td>
<td>Negligible-Minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Black grouse</td>
<td>Regional</td>
<td>Negligible-Low</td>
<td>Negligible-Minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Golden plover</td>
<td>High Local</td>
<td>Low</td>
<td>Minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Curlew</td>
<td>High Local</td>
<td>Low</td>
<td>Minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Barn owl</td>
<td>High Local</td>
<td>Low</td>
<td>Minor</td>
<td>Long-term</td>
</tr>
<tr>
<td>Geese &amp; Swans</td>
<td>High Local</td>
<td>Negligible-Low</td>
<td>Negligible-Minor</td>
<td>Long-term</td>
</tr>
</tbody>
</table>

**Displacement during Maintenance Activities**

10.5.102 The wind turbines would require periodic routine maintenance and occasionally there may be the need to replace large components such as rotor blades. Consequently the amount of potential disturbance would vary depending on the scale, duration and timing of the maintenance activities. However, it is reasonable to assume that disturbance from such activities during the operation of the proposed development would be significantly lower than that which could occur during the construction phase.
10.5.103 Assuming that maintenance works could be carried out at the least favourable time for birds during the breeding season, this has been assessed as a low magnitude and not greater than a minor and not significant effect for all raptor species of conservation concern and black grouse. For curlew the potential effect is considered to be of a low magnitude resulting in a minor and not significant effect. For golden plover, barn owl and short-eared owl and, wintering and passage wildfowl the effect magnitude is considered to be negligible resulting in a negligible and not significant effect in the short-term.

**Disturbance Related to Public Access**

10.5.104 New site roads, particularly in the areas of open moorland, but also in the coniferous plantation has the potential to cause disturbance to nesting and foraging birds through increased human access to the site. Although no vehicles other than agricultural vehicles and those associated with the operation and maintenance of the wind farm would be allowed access to the site, the presence of roads leading into the site may encourage walkers, some with dogs, cyclists, horse riders to make use of the new site roads.

10.5.105 Assuming that any additional activity occurs consistently over the longer-term and that there is no initial 'novelty' period with human activity decreasing after a period of time, and no efforts are made to control/direct access then the unmitigated effect could be potentially of low magnitude and resulting in a minor and not significant effect over the long-term for raptors of conservation concern and black grouse, whilst all other species could be potentially of no greater than negligible resulting in a negligible and not significant effect.

**Decommissioning Effects**

**Disturbance during Decommissioning**

10.5.106 Works associated with the decommissioning of the proposed development have the potential to disturb breeding and wintering birds. The exact timing of this work (approximately 25 years after the commencement of the scheme), relative to the more sensitive periods of the year for breeding birds, is not known at this time; it has therefore been assumed that work may occur at the least favourable time relative to the relevant key avian receptors within the site.

10.5.107 Broadly similar potential sources of disturbance and effects on birds to the construction phase could arise during the decommissioning works. These effects are discussed in the previous section and are therefore not repeated here, however it is likely that the duration and intensity of works at each of the wind turbines to be dismantled would be less than that required to construct a replacement wind turbine.

10.5.108 In comparison to the construction of the proposed development, there would be less tree clearance required to enable the decommissioning works to proceed. This would result in a lower potential magnitude of disturbance effect from felling operations on goshawk and other woodland birds.

10.5.109 A summary of potential decommissioning phase disturbance effects for each receptor, prior to mitigation, is given in Table 10.18, below.
### Table 10.18: Decommissioning Phase – Pre-mitigation Assessment of Disturbance Impacts (significant effects highlighted in bold)

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Nature Conservation Value</th>
<th>Magnitude</th>
<th>Effect Level</th>
<th>Impact Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hen harrier</td>
<td>Regional</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Peregrine</td>
<td>Regional</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Merlin</td>
<td>Regional</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Goshawk</td>
<td>Regional</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Black grouse</td>
<td>Regional</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Golden plover</td>
<td>High Local</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Curlew</td>
<td>High Local</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Barn owl</td>
<td>High Local</td>
<td>Low</td>
<td>Minor</td>
<td>Short-term</td>
</tr>
<tr>
<td>Geese &amp; Swans</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td>n/a</td>
</tr>
</tbody>
</table>

10.5.110 The decommissioning of the wind turbines would have a positive benefit in terms of removing the potential collision risk. Habitat reinstatement would be decided in consultation with the statutory authorities at the time of decommissioning. It is assumed that habitats lost to the wind farm infrastructure would be reinstated. Disturbance effects due to decommissioning and reinstatement of turbine hard standings would last no longer than 18 months. Apart from the shorter duration, the effects on birds would be similar to those during construction.

10.5.111 There will probably be disturbance to birds arising from the works required to decommission the wind farm at the end of its operational life. Assuming the least favourable timing of the works, the removal of the wind turbines, sub-station and associated infrastructure has the potential to have a low magnitude of effect causing minor and not significant effects on curlew and golden plover. However, the effects should be restricted to the short-term, one breeding season only and would not be of the same potential scale as the construction effects.

10.5.112 The magnitude of decommissioning effects on raptors of conservation concern and black grouse is considered to be low with a minor effect which is not significant effect in the short-term. For all other species, the magnitude of decommissioning effects is considered to be low or negligible with a negligible-minor and not significant effect in the short-term.

### Mitigation

10.6.1 All of the potential effects on sensitive bird receptors arising from the construction and operation of the proposed wind farm are considered to be not greater than minor and are therefore not significant in terms of the EIA Regulations. As such, no mitigation measures are proposed.
10.7  Residual Effects

Introduction

10.7.1  The following provides further detail on the proposed best practice measures, grouped under the broad effect types that the measures are intended to address, which would help to further reduce the potential magnitude of impacts on all receptors. Table 10.28 at the end of this chapter provides residual effect levels for all receptors and all of the types of potential effect considered in this assessment.

Felling and Construction Disturbance

10.7.2  All known, suspected and recently occupied Schedule 1 raptor nest sites / territories have been considered during the design process for the proposed development. Consequently all known Schedule 1 nest sites would be separated from the construction works (including all built elements, the borrow-pits and temporary construction compounds) and should not be subject to direct disturbance during the breeding season, in compliance with the provisions Wildlife & Countryside Act 1981, as amended. However, there is the potential for the proposed felling (i.e. felling beyond that required to accommodate the construction of the wind farm infrastructure) to disturb nesting Schedule 1 birds (e.g. barn owl) present in the surrounding area. Pre-constructions breeding raptor and owl surveys are proposed in order to help inform the approach to the construction works and felling operations associated with the wind farm extension so that breeding Schedule 1 species active nest sites are protected and are not disturbed during the breeding season.

10.7.3  In the spring/summer (during the bird breeding season) prior to any construction works being undertaken (including enabling works such as tree felling and the ground investigation) surveys would be undertaken to identify any Schedule 1 species breeding activity and to demarcate areas potentially sensitive to disturbance. Construction works would be programmed to avoid areas within an appropriate buffer from active nest sites as agreed with the ECoW for identified breeding activity during sensitive periods. Site specific buffer zones would be established, appropriate to the specific circumstances, under the advice of a suitably experienced ornithologist and in liaison with SNH.

10.7.4  Where possible tree felling would be undertaken outside of the main breeding bird season (i.e. April to July inclusive). Where this is not possible, trees would only be felled during this period following an assessment by an ornithologist as to the likelihood that birds are nesting within the felling area. In practice, with densely planted Sitka spruce, this is very difficult if not impossible to determine categorically and therefore would be judged on a precautionary basis.

10.7.5  In addition to the pre-construction surveys for Schedule 1 bird species, all works areas would be checked by the site ecologist / ornithologist for the presence of any nesting birds in advance of works commencing during the main bird breeding season. Should any active nest sites be found in areas where construction works are proposed, the location of the nest would be protected from damage and disturbance. An appropriate buffer zone would be demarcated clearly on the ground, and all construction workers made aware of the need to avoid access to the area.

10.7.6  All works would be monitored by a suitably experienced ecologist / ornithologist to help ensure that protection measures are properly implemented and maintained and that works proceed in accordance with best practice and the provisions of the Wildlife and Countryside Act (1981, as amended).
Habitat Change

10.7.7 The potential increased collision risk to hen harrier as a result of clear-felling would be monitored as part of the standard SSE carcass monitoring and post construction breeding bird surveys.

Disturbance Related to Public Access

10.7.8 In order to minimise potential disturbance to breeding birds as a result of increased access it is proposed that a sign would displayed at the site entrance explaining the responsibilities of the public towards breeding birds.

Decommissioning

10.7.9 The potential effects associated with decommissioning primarily relate to disturbance of species of conservation concern. Effects are likely to be much reduced in comparison with the construction phase. The development, during the 25-year operating period, of new and enhanced habitats away from the wind farm area would also reduce the magnitude of the potential effects. Disturbance during decommissioning works would be minimised through programming potential disturbing works away from sensitive sites and outside of sensitive periods in the same manner as for construction disturbance mitigation.

10.8 Cumulative Effects

Methodology

10.8.1 The approach to the cumulative assessment is based on relevant current national policy and best practice guidance. The primary relevant guidance are the SNH publications 'Assessing the Cumulative Impact of Onshore Wind Energy Developments' (SNH 2012) and 'Assessing Significance of Impacts from Onshore Windfarms on Birds outwith Designated Areas' (SNH 2006).

10.8.2 Broadly, there are three main sources for cumulative effects:

- Type 1 - those arising from the project being assessed.
- Type 2 - those arising from the project being assessed in combination with those arising from other proposed development projects.
- Type 3 - those arising from the proposed project in combination with those that are predicted to arise from completed development projects.

10.8.3 Type 1 effects are associated with the proposed development and are therefore the focus of the majority of the rest of this chapter. Type 2 and 3 are potential 'in combination' effects associated with existing and proposed development and are considered in this section of the assessment. This assessment focuses on wind farm development only. Past and on-going Type 3 effects will be, to some extent, reflected in baseline data for this EIA. For example, the baseline surveys commenced 5 years after the existing Hadyard Hill wind farm became operational. Therefore, short-term to early medium-term effects will have been acting on the avifauna, within the influence of this wind farm, prior to and during the data collection phase for this assessment.

10.8.4 Cumulative effects, from two or more development proposals, can be additive (i.e. the effect of each of the proposals can be summed), antagonistic (i.e. the combined effects are less than if they were summed) or synergistic (i.e. the combined effects
are greater than if they were summed). In relation to combined collision mortality estimates the approach has been to assume, on a precautionary basis, that the effect on key receptor populations would be additive. However, combining collision mortality estimates from a number of different projects is not a simple summing process as in practice individual birds taken from a population, as a result of collision mortality, can be removed only once and this then reduces the number of birds subject to collision risk from other sources.

10.8.5 In relation to Type 2 effects, priority is given in this assessment to consideration of proposals which have planning consent. There is clearly greater uncertainty about projects which are at the EIA Scoping stage. Additionally projects at this stage rarely have any detailed baseline survey information or assessments available for review. Therefore the assessment of potential cumulative effects is inevitably more speculative for such proposals.

10.8.6 The relevant spatial scale is also an important consideration in determining the scope of the cumulative assessment. The assessment of potential cumulative effects has been restricted to those projects that have the potential to interact with the same key receptor populations at a similar scale of influence of the proposed wind farm.

10.8.7 As the residual assessment has concluded that there would be no significant effect on any receptor populations beyond localised effects it is considered appropriate that this assessment focuses on the potential for cumulative effects within plans or projects at a local (i.e. within c. 10 km) rather than regional scale. It is considered very unlikely that the proposed development could result in cumulative effects to any receptor which would result in a potentially significant effect at the regional (or NHZ) population scale. Therefore the assessment has focused on those plans or projects with the potential to affect the same populations at a local-scale that would be affected by the proposed development.

10.8.8 Finally, the assessment focuses on those receptors for which the Hadyard Hill extension study area is considered to be of potential regional importance (i.e. hen harrier, goshawk, merlin, peregrine and black grouse).

Summary of Available Information

10.8.9 Table 10.19 below lists the proposals within approximately 10 km of the proposed development which are currently in the planning process or post-consent / pre-construction stage which are considered to have the potential to result in cumulative effects on key bird receptors. Smaller proposals of three or fewer turbines have been excluded from further consideration.

<table>
<thead>
<tr>
<th>Name</th>
<th>No. turbines</th>
<th>Distance from Proposed Development (km)</th>
<th>Direction from Proposed Development</th>
<th>Status</th>
<th>Assessment information available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knockskae</td>
<td>12</td>
<td>2.0</td>
<td>North-east</td>
<td>Scoping</td>
<td>No information</td>
</tr>
<tr>
<td>Linfaim Farm</td>
<td>25</td>
<td>3.6</td>
<td>North-east</td>
<td>Application</td>
<td>Published ES and ES Addendum</td>
</tr>
</tbody>
</table>
Table 10.19: Proposed Wind Farm Projects Considered in the Cumulative Assessment

<table>
<thead>
<tr>
<th>Name</th>
<th>No. turbines</th>
<th>Distance from Proposed Development (km)</th>
<th>Direction from Proposed Development</th>
<th>Status</th>
<th>Assessment information available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tralorg</td>
<td>8</td>
<td>4.5</td>
<td>West</td>
<td>Approved</td>
<td>Collision rates only</td>
</tr>
<tr>
<td>Assel Valley</td>
<td>10</td>
<td>5.0</td>
<td>West</td>
<td>Approved</td>
<td>Published ES</td>
</tr>
<tr>
<td>Kirk Hill</td>
<td>8</td>
<td>5.7</td>
<td>North-east</td>
<td>Application</td>
<td>Published ES</td>
</tr>
</tbody>
</table>

10.8.10 A quantitative assessment of potential cumulative effects is reliant on the availability of published assessments and the information provided being sufficiently detailed. Therefore, the Knockskae proposal has been excluded from further consideration due to the lack of currently available information. Additionally, priority has been given to consideration of proposals that have planning approval and for which there are detailed assessments available.

10.8.11 None of the published assessments report significant residual effects for any receptor at a scale greater than the local population level. Following a review of the collated information, and consideration of receptors where there was a potential for material cumulative effects to occur, the assessment focused on the breeding populations of the following species: hen harrier, curlew, barn owl, kestrel and peregrine (NB kestrel is only considered in relation to collision risk).

10.8.12 Table 10.20 provides as summary of the baseline and estimated collision rates for each of the focal receptors and the proposals that were considered where there was information available.

Table 10.20: Summary of Baseline Information for the Wind Farm Projects Considered in the Cumulative Assessment

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Hadyard Hill Ext</th>
<th>Linfairn Farm</th>
<th>Tralorg</th>
<th>Assel Valley</th>
<th>Kirk Hill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kestrel</td>
<td>1-2 pairs</td>
<td>Not reported</td>
<td>1-2 pairs</td>
<td>1 pair</td>
<td>Not breeding</td>
</tr>
<tr>
<td></td>
<td>(wider area)</td>
<td></td>
<td></td>
<td></td>
<td>(breeding in wider area)</td>
</tr>
<tr>
<td>Peregrine</td>
<td>2 pairs</td>
<td>Recorded over the site.</td>
<td>Recorded over the site.</td>
<td>Recorded over the site.</td>
<td>Recorded over the site.</td>
</tr>
<tr>
<td></td>
<td>(wider area)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barn owl</td>
<td>1-2 pairs</td>
<td>Not reported</td>
<td>Not reported</td>
<td>Not reported</td>
<td>1 pair</td>
</tr>
<tr>
<td>Golden plover</td>
<td>Wintering only</td>
<td>Not reported</td>
<td>Wintering only</td>
<td>Not reported</td>
<td>Wintering only</td>
</tr>
<tr>
<td>Curlew</td>
<td>3 pairs</td>
<td>Not reported</td>
<td>Not reported</td>
<td>1 pair</td>
<td>3 pairs</td>
</tr>
</tbody>
</table>
Table 10.20: Summary of Baseline Information for the Wind Farm Projects Considered in the Cumulative Assessment

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Hadyard Hill Ext</th>
<th>Linfairn Farm</th>
<th>Tralorg</th>
<th>Assel Valley</th>
<th>Kirk Hill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collision Risk – annual estimates (where provided)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kestrel</td>
<td>1.17</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>0.40</td>
</tr>
<tr>
<td>Peregrine</td>
<td>n/a</td>
<td>n/a</td>
<td>0.01</td>
<td>n/a</td>
<td>0.03</td>
</tr>
<tr>
<td>Barn owl</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Golden plover</td>
<td>0.36</td>
<td>n/a</td>
<td>0.16</td>
<td>n/a</td>
<td>0.84</td>
</tr>
<tr>
<td>Curlew</td>
<td>0.04</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Collision Risk

10.8.13 Annual collision estimates for kestrel were only provided in the Kirk Hill ES. However, no significant regional-scale effects were reported for any of the proposals for this species. Kirk Hill is located a sufficient distance from the Hadyard Hill extension that different breeding pairs will be affected by each scheme. Assuming additive annual mortality the combined effect of both projects operating simultaneously is 1.57 birds per annum. This increase in collision rate is not considered large enough to warrant an increase in the residual significance level (i.e. a significant effect for the local population but not at the regional level, and not significant in terms of the EIA Regulations).

10.8.14 For peregrine the reported rates, in combination with predictions for the Hadyard Hill extension for this species do not warrant any change to the residual collision risk assessment.

10.8.15 For barn owl there are no reported collision rates for any scheme and non-significant effects where an assessment was made. There is no change to the residual collision risk assessment.

10.8.16 Annual collision estimates for golden plover were only provided in the Tralorg and Kirk Hill ESs. No significant regional-scale effects were reported. All three sites could affect the same regional passage / wintering ‘population’. Assuming additive annual mortality the combined effect of all projects operating simultaneously is 1.36 birds per annum. This increase in collision rate at the regional is not considered large enough to warrant an increase in the residual significance level (i.e. minor, long-term, and not significant).

10.8.17 Annual collision estimates for curlew were only provided in the Kirk Hill ES. No significant regional-scale effects were reported. Kirk Hill is located a sufficient distance from the Hadyard Hill extension that different breeding pairs will be affected by each scheme. Assuming additive annual mortality the combined effect of both projects operating simultaneously is 0.14 birds per annum. This increase in collision rate at the regional is not considered large enough to warrant an increase in the residual significance level (i.e. minor, long-term, and not significant).

Construction – disturbance/displacement

10.8.18 For peregrine no direct effect on known nest sites is likely as a result of the Hadyard Hill extension project and none were reported for the other projects considered.
10.8.19 Only Kirk Hill reported the presence of breeding barn owl (1 pair). Assuming best practice is implemented to protect any breeding sites from disturbance (and to ensure compliance with the legal protection of this species under the Wildlife & Countryside Act 1981) no material change to the residual assessment is considered necessary.

10.8.20 Tralorg and Kirk Hill report the presence of wintering / passage period golden plover. No significant regional-scale effects were reported. All three sites could affect the same regional passage / wintering ‘population’ should construction works occur simultaneously. However, displacement would be temporary and there would be extensive alternative habitat for this species to use given the wide ranging behaviour of the species outside of the breeding season. No change to the residual assessment is considered necessary.

10.8.21 Assel Valley and Kirk Hill both reported the presence of breeding curlew (1 pair and 3 pairs respectively). In combination with Hadyard Hill extension a total of 7 breeding territories could be affected simultaneously (assuming the worst case) for 1-2 breeding seasons. However, assuming best practice to minimise disturbance to nesting birds during construction (and to ensure compliance with general legal protection under the Wildlife & Countryside Act 1981), there will be a cumulative short-term effect on the local population but the existing residual assessment of Minor remains appropriate.

Habitat Loss / Change

10.8.22 None of the assessments reported residual significant effects on any receptor as a result of direct habitat loss or habitat change for any of the focal species. The extent of habitat loss on modern wind farm development is relatively minor (e.g. estimated at c. 2% for moorland habitats within the site for the Hadyard Hill extension). Whilst there is the potential for an additive effect this is not considered to be close to the threshold which would justify increasing the assessed residual effect magnitude level for any of the receptors considered in this assessment.

Operation – disturbance/displacement/barrier effects

10.8.23 The only receptor where there is considered to be the theoretical potential for cumulative operational displacement effects is breeding peregrine (at least 2 pairs). This is difficult to qualify with the information currently available and uncertainty about the long-term future use of the Hadyard Hill extension site following tree clearance. However, it is considered very unlikely that the magnitude of the cumulative effect, given the low level of the assessed residual effect (Low-negligible), could increase to such an extent that a significant effect would be appropriate (i.e. the cumulative residual effect remains no greater than minor and not significant).

10.8.24 For golden plover and curlew there is the potential for cumulative effects with Hadyard Hill extension and several of the proposals considered here. However, taking into consideration the estimates of the maximum numbers of birds or pairs potentially affected, and with pre- and post-construction monitoring (in relation to breeding golden plover and curlew) finding little evidence of measurable operational displacement effects (in the medium term at least), the potential for significant cumulative effects, on at greater than the local population scale, is considered very unlikely. Therefore the residual assessments of operational displacement for both species remain unchanged from what was reported in the main assessment.
Conclusion

10.8.25 No potentially significant cumulative collision, disturbance, habitat loss or displacement effects on any of the key receptors has been identified in this assessment taking into consideration the available information.

10.8.26 In relation to collision risk there are no key species (i.e. relevant to the proposed development assessment) identified in any assessment where there is the potential for significant cumulative collision mortality from any of the proposals combined (i.e. at the regional / NHZ scale). There is the potential for cumulative effects from collision mortality to be potentially significant at a local to district level for common kestrel. However, this would not be considered a significant effect in the context of the EIA regulations and following current guidance on cumulative effect assessment (i.e. SNH 2012).

10.9 Assessment Summary and Conclusions

10.9.1 The baseline description of the bird fauna present within the site and adjacent areas has been derived from an extensive desk study, consultation with national and local data holders, and field surveys completed between 2011 and 2013. Surveys were undertaken across the site and wider survey area to assess the distribution of wintering, migratory and breeding bird species of conservation concern, and potential sensitivity to wind farm development. The species present can be grouped broadly into raptors and owls, black grouse, waders, wintering/passage geese, breeding and wintering songbirds. Within these groups there are a number of species present that merit special attention due to their European or national conservation status as a species and/or potential sensitivity to wind farm development. Recognition of their conservation status is through listing on either Annex I of the EU Birds Directive, and/or Schedule 1 of the Wildlife and Countryside Act. Annex I and/or Schedule 1 species that use habitats within the proposed wind farm site include hen harrier, peregrine and goshawk. The wider area also supports a small black grouse population which is of high importance due to the unfavourable conservation status of the regional and national populations.

10.9.2 This assessment has considered the various potential effects arising from the construction, operation and decommissioning of the proposed development, and evaluated the significance of these effects on the identified avian receptors in the context of their conservation value, sensitivity to wind farm development and the magnitude of the potential effects.

10.9.3 Based on the identified ornithological constraints, the location and layout of the proposed development has been adapted to avoid/reduce some of the identified potential effects.

10.9.4 The summary results of the impact assessment are provided in Table 10.21 at the end of this chapter.

10.9.5 During construction, effects on birds may arise from loss of moorland and woodland habitats and from disturbance associated with construction activities. No significant habitat loss is predicted for any species, taking into consideration the scale of the proposed development and the extent of direct habitat loss in comparison to the abundance of the habitats affected in the wider area. Disturbance effects would be mitigated to some extent through careful scheduling of construction works and pre-construction surveys, to avoid disturbance to birds during the breeding season. With
the proposed mitigation measures implemented, residual effects from disturbance during the construction phase would not be significant.

10.9.6 During wind farm operation, effects may arise from collision with turbines and other structures resulting in injury or death, displacement/disturbance from areas where turbines are operating and disturbance by maintenance activities and pedestrian access via newly created site roads. Collision risk has been assessed using data gathered during flight activity by surveys that recorded the number of flights and height relative to the collision risk zone, and a standard model used in wind farm EIA. The residual effect of wind turbine collision for all species is not considered to be significant.

10.9.7 Disturbance from the operation of the proposed development could result in effects through displacement and/or disturbance of breeding birds, potentially reducing feeding opportunities and/or breeding success; however no significant residual effects from operational disturbance/displacement are predicted in this assessment.

10.9.8 Other operational residual effects including maintenance of tracks, public access and collision with other built structures are assessed as being not significant for all species.

10.9.9 The residual effects on all species of decommissioning the wind farm are considered to be broadly similar to those during construction and are therefore not more than minor for all species and not significant. Prior to decommissioning a re-assessment of the bird fauna using the site would be required to determine the specific mitigation measures required to reduce any potentially significant effects.

10.9.10 The potential for cumulative effects on key receptors to occur as a result of interactions with proposed and existing wind farms in the wider area has been considered based on the available information on potential effects of these proposals. No significant residual effects from the construction or operation of the schemes that have been considered were identified in the assessment.

Summary of Effects

10.9.11 A summary of the ornithological impact assessment, including consideration of all of the proposed mitigation measures, is provided in Table 10.21 below.
<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Receptor(s)</th>
<th>Nature Conservation Value</th>
<th>Potential Effect Magnitude</th>
<th>Potential Impact Level (significance)</th>
<th>Summary of Proposed Best Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(i) Undertake pre-felling / pre-construction surveys to locate any breeding / nest sites, implement protection measures, demarcate areas potentially sensitive to disturbance during the breeding season to prevent construction disturbance (NB potential presence of breeding common crossbill which may nest outside of the main bird breeding season for woodland songbirds).</td>
</tr>
<tr>
<td>Disturbance and Displacement</td>
<td>Hen harrier</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td>(ii) Programme construction works to avoid areas of known sensitivity (e.g. within appropriate buffers of active Schedule 1 species nest sites / roost sites) during sensitive periods.</td>
</tr>
<tr>
<td></td>
<td>Goshawk</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td>(iii) Construction works would also be monitored by a suitable experienced site ecologist to ensure that mitigation measures are properly implemented and the effects on breeding birds minimised.</td>
</tr>
<tr>
<td></td>
<td>Merlin</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td>(iv) Any works that it is necessary to complete during the breeding season would be carried out under the supervision of the site ecologist to ensure that works proceed in accordance with best practice and the</td>
</tr>
<tr>
<td></td>
<td>Peregrine</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Black grouse</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Golden plover</td>
<td>High Local</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Curlew</td>
<td>High Local</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Barn owl</td>
<td>High Local</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Short-eared owl</td>
<td>High Local</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Geese &amp; Swans</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moorland Songbirds</td>
<td>Medium Local</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(v) Ensure that all mitigation measures are properly implemented and the effects on breeding birds minimised.</td>
</tr>
</tbody>
</table>
### Table 10.21: Summary of the Impact Assessment for Ornithology (significant effects highlighted in bold)

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Receptor(s)</th>
<th>Nature Conservation Value</th>
<th>Potential Effect Magnitude</th>
<th>Potential Impact Level (significance)</th>
<th>Summary of Proposed Best Practice</th>
<th>Residual Effect (significance)</th>
<th>Confidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodland Songbirds</td>
<td>Medium Local</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td></td>
<td>legal protection of all wild birds under Wildlife and Countryside Act 1981 (as amended).</td>
<td>Minor</td>
<td>Probable</td>
</tr>
<tr>
<td>Hen harrier</td>
<td>Regional</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td>(i) Habitat loss and change resulting from the proposed development is not considered to be significant for any sensitive bird receptor.</td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Goshawk</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (long-term)</td>
<td></td>
<td></td>
<td>Minor</td>
<td>Probable</td>
</tr>
<tr>
<td>Merlin</td>
<td>Regional</td>
<td>Negligible-Low</td>
<td>Minor (long-term)</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Peregrine</td>
<td>Regional</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Black grous</td>
<td>Regional</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Golden plover</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Curlew</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Barn owl</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Short-eared owl</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Geese &amp; Swans</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Certain</td>
</tr>
<tr>
<td>Moorland Songbirds</td>
<td>Medium Local</td>
<td>Low</td>
<td>Minor (long-term)</td>
<td></td>
<td></td>
<td>Minor</td>
<td>Certain</td>
</tr>
<tr>
<td>Woodland Songbirds</td>
<td>Medium Local</td>
<td>Low</td>
<td>Minor (long-term)</td>
<td></td>
<td></td>
<td>Minor</td>
<td>Certain</td>
</tr>
</tbody>
</table>
Table 10.21: Summary of the Impact Assessment for Ornithology (significant effects highlighted in bold)

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Receptor(s)</th>
<th>Nature Conservation Value</th>
<th>Potential Effect Magnitude</th>
<th>Potential Impact Level (significance)</th>
<th>Summary of Proposed Best Practice</th>
<th>Residual Effect (significance)</th>
<th>Confidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational: Collision risk from wind turbines and other built structures</td>
<td>Hen harrier</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (long-term)</td>
<td>(i) Based on the assessment of current baseline data no specific mitigation is currently proposed to address operational collision risk for any species.</td>
<td>Minor</td>
<td>Probable</td>
</tr>
<tr>
<td></td>
<td>Goshawk</td>
<td>Regional</td>
<td>Low-Negligible</td>
<td>Negligible-Minor (long-term)</td>
<td>(ii) In recognition of the potential for activity by certain species to increase from baseline levels following conifer plantation removal (e.g. hen harrier) a post construction monitoring programme of carcass searches and breeding bird surveys will be implemented.</td>
<td>Negligible-Minor</td>
<td>Probable</td>
</tr>
<tr>
<td></td>
<td>Kestrel</td>
<td>High Local</td>
<td>Medium</td>
<td>Minor (long-term)</td>
<td></td>
<td>Minor</td>
<td>Certain</td>
</tr>
<tr>
<td></td>
<td>Merlin</td>
<td>Regional</td>
<td>Low-Negligible</td>
<td>Negligible-Minor (long-term)</td>
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<tr>
<td></td>
<td>Golden plover</td>
<td>High Local</td>
<td>Low</td>
<td>Minor (long-term)</td>
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<td>Minor</td>
<td>Probable</td>
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<td></td>
<td>Curlew</td>
<td>High Local</td>
<td>Low</td>
<td>Minor (long-term)</td>
<td></td>
<td>Minor</td>
<td>Probable</td>
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<tr>
<td></td>
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<td>High Local</td>
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<td>Negligible</td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
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<tr>
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<td>Short-eared owl</td>
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<td>Negligible</td>
<td>Probable</td>
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</table>
Table 10.21: Summary of the Impact Assessment for Ornithology (significant effects highlighted in bold)

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Receptor(s)</th>
<th>Nature Conservation Value</th>
<th>Potential Effect Magnitude</th>
<th>Potential Impact Level (significance)</th>
<th>Summary of Proposed Best Practice</th>
<th>Residual Effect (significance)</th>
<th>Confidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geese &amp; Swans</td>
<td>High Local</td>
<td>Low-Negligible</td>
<td>Negligible-Minor (long-term)</td>
<td></td>
<td></td>
<td>Negligible-Minor</td>
<td>Probable</td>
</tr>
<tr>
<td>Moorland Songbirds</td>
<td>Medium Local</td>
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<td>Negligible (long-term)</td>
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<td>Negligible</td>
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<tr>
<td>Woodland Songbirds</td>
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<td>Negligible (long-term)</td>
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<td><strong>Operational:</strong></td>
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<tr>
<td>Displacement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(i) Based on the assessment of current baseline data no specific mitigation is considered to be necessary to address operational displacement for any species.</td>
<td>Negligible-Minor</td>
<td>Probable</td>
</tr>
<tr>
<td>Hen harrier</td>
<td>Regional</td>
<td>Low-Negligible</td>
<td>Negligible-Minor (long-term)</td>
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<td>Probable</td>
</tr>
<tr>
<td>Goshawk</td>
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<td>Low</td>
<td>Minor (long-term)</td>
<td></td>
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<td>Minor</td>
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<tr>
<td>Golden plover</td>
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<td>Low</td>
<td>Minor (long-term)</td>
<td></td>
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<td>Minor</td>
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</tr>
<tr>
<td>Curlew</td>
<td>High Local</td>
<td>Low</td>
<td>Minor (long-term)</td>
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<td>Minor</td>
<td>Probable</td>
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<tr>
<td>Potential Impacts</td>
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<td>Nature Conservation Value</td>
<td>Potential Effect Magnitude</td>
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</tr>
<tr>
<td>Barn owl</td>
<td>High Local</td>
<td>Low</td>
<td>Minor (long-term)</td>
<td></td>
<td>Minor</td>
<td>Probability of occurring</td>
<td>Probable</td>
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<tr>
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<td>Negligible-Minor (long-term)</td>
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<td>Probable</td>
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</tr>
<tr>
<td>Geese &amp; Swans</td>
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<td>Negligible-Minor (long-term)</td>
<td></td>
<td>Negligible-Minor</td>
<td>Probable</td>
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<tr>
<td>Moorland Songbirds</td>
<td>Medium Local</td>
<td>Low-Negligible</td>
<td>Negligible-Minor (long-term)</td>
<td></td>
<td>Negligible-Minor</td>
<td>Probable</td>
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</tr>
<tr>
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<td>Low-Negligible</td>
<td>Negligible-Minor (long-term)</td>
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<td>Negligible-Minor</td>
<td>Probable</td>
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</tr>
<tr>
<td>Hen harrier</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td></td>
<td>Negligible-Minor</td>
<td>Probable</td>
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<tr>
<td>Goshawk</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (short-term)</td>
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<td>Negligible-Minor</td>
<td>Probable</td>
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<td>Low</td>
<td>Minor (short-term)</td>
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<td>Negligible-Minor</td>
<td>Probable</td>
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<tr>
<td>Peregrine</td>
<td>Regional</td>
<td>Low-Negligible</td>
<td>Negligible-Minor (long-term)</td>
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<tr>
<td>Black grouse</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (short-term)</td>
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<td>Negligible-Minor</td>
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</table>

**Operational:** Disturbance due to maintenance activities.
Table 10.21: Summary of the Impact Assessment for Ornithology (significant effects highlighted in bold)

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Receptor(s)</th>
<th>Nature Conservation Value</th>
<th>Potential Effect Magnitude</th>
<th>Potential Impact Level (significance)</th>
<th>Summary of Proposed Best Practice</th>
<th>Residual Effect (significance)</th>
<th>Confidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Golden plover</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Curlew</td>
<td>High Local</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td></td>
<td></td>
<td>Negligible-Minor</td>
<td>Probable</td>
</tr>
<tr>
<td>Barn owl</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Short-eared owl</td>
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<td>Negligible</td>
<td>Probable</td>
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<tr>
<td>Geese &amp; Swans</td>
<td>High Local</td>
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<td>Negligible</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Moorland Songbirds</td>
<td>Medium Local</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td></td>
<td></td>
<td>Negligible-Minor</td>
<td>Probable</td>
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<tr>
<td>Woodland Songbirds</td>
<td>Medium Local</td>
<td>Low</td>
<td>Minor (short-term)</td>
<td></td>
<td></td>
<td>Negligible-Minor</td>
<td>Probable</td>
</tr>
<tr>
<td>Hen harrier</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (long-term)</td>
<td></td>
<td>(i) Provide signs at entrances used by the public to promote responsible access to the site following the outdoor access code and help reduce the risk of disturbance to important nesting areas and sensitive winter roost sites.</td>
<td>Negligible-Minor</td>
<td>Probable</td>
</tr>
<tr>
<td>Goshawk</td>
<td>Regional</td>
<td>Negligible-Low</td>
<td>Negligible-Minor (long-term)</td>
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<td>Negligible-Minor</td>
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<tr>
<td>Merlin</td>
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<td>Low</td>
<td>Minor (long-term)</td>
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<td>Probable</td>
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<tr>
<td>Peregrine</td>
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<td>Negligible-Minor (long-term)</td>
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</table>

Operational:
Disturbance due to increased public access
### Table 10.21: Summary of the Impact Assessment for Ornithology (significant effects highlighted in bold)

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Receptor(s)</th>
<th>Nature Conservation Value</th>
<th>Potential Effect Magnitude</th>
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</tr>
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<tbody>
<tr>
<td>Black grouse</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (long-term)</td>
<td></td>
<td></td>
<td>Negligible-Minor</td>
<td>Probable</td>
</tr>
<tr>
<td>Golden plover</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
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<tr>
<td>Curlew</td>
<td>High Local</td>
<td>Low</td>
<td>Minor (long-term)</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Barn owl</td>
<td>High Local</td>
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<td>Negligible</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Short-eared owl</td>
<td>High Local</td>
<td>Low</td>
<td>Minor (long-term)</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Geese &amp; Swans</td>
<td>High Local</td>
<td>Negligible</td>
<td>Negligible</td>
<td></td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Moorland Songbirds</td>
<td>Medium Local</td>
<td>Negligible-Low</td>
<td>Negligible-Minor (long-term)</td>
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<tr>
<td>Woodland Songbirds</td>
<td>Medium Local</td>
<td>Negligible-Low</td>
<td>Negligible-Minor (long-term)</td>
<td></td>
<td></td>
<td>Negligible-Minor</td>
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<tr>
<td>Decommissioning Phase: Disturbance</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Hen harrier</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (short term)</td>
<td>(i) Disturbance during decommissioning works would be minimised through the programming of potentially disturbing works away from sensitive sites and outside of sensitive periods (in the same manner as for construction disturbance mitigation).</td>
<td></td>
<td>Negligible</td>
<td>Probable</td>
</tr>
<tr>
<td>Goshawk</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (short term)</td>
<td></td>
<td></td>
<td>Negligible</td>
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<tr>
<td>Merlin</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (short term)</td>
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<th>Summary of Proposed Best Practice</th>
<th>Residual Effect (significance)</th>
<th>Confidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peregrine</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (short term)</td>
<td>Pre-decommissioning surveys would be undertaken to inform the implementation of appropriate mitigation.</td>
<td>Negligible</td>
<td>Probable</td>
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<tr>
<td>Black grouse</td>
<td>Regional</td>
<td>Low</td>
<td>Minor (short term)</td>
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<tr>
<td>Golden plover</td>
<td>High Local</td>
<td>Low</td>
<td>Minor (short term)</td>
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<td>Low</td>
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</tr>
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<td>Probable</td>
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<td>Low</td>
<td>Minor (short term)</td>
<td>Negligible</td>
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<tr>
<td>Geese &amp; Swans</td>
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<td>Negligible</td>
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<td>Moorland Songbirds</td>
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<tr>
<td>Woodland Songbirds</td>
<td>Medium Local</td>
<td>Low</td>
<td>Minor (short term)</td>
<td>Negligible</td>
<td>Probable</td>
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10.10 References


EnviroCentre (2003). Hadyard Hill Wind Farm, Environmental Impact Assessment.


### 10.11 Glossary and Abbreviations

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOD</td>
<td>Above Ordnance Datum, the height above acknowledged sea level.</td>
</tr>
<tr>
<td>Assessment</td>
<td>An umbrella term for description, analysis and evaluation.</td>
</tr>
<tr>
<td>Avian</td>
<td>Of or related to birds</td>
</tr>
<tr>
<td>Avifauna</td>
<td>All bird species native to a specific habitat, region or geological period.</td>
</tr>
<tr>
<td>Barrier Effects</td>
<td>Obstacle or factor preventing / hampering the free movement of a species from one area to another.</td>
</tr>
<tr>
<td>Bird Community</td>
<td>The assemblage of bird species that co-occur in a given habitat or area (typically referring to breeding birds).</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>From ‘biological diversity’, a measure of the variety (taxonomic, genetic) of organisms in an ecosystem.</td>
</tr>
<tr>
<td>Biodiversity Action Plan</td>
<td>A conservation programme deriving from the 1992 Convention on Biological Diversity. It includes descriptions of biological resources, prioritising certain species and habitats and setting out plans and targets for their conservation. The UK BAP provides a national framework for a series of Local BAPs, usually compiled and managed by local authorities.</td>
</tr>
<tr>
<td>Carrying capacity</td>
<td>The number of organisms of a specific species that can be supported indefinitely by that environment given the resources available in that environment.</td>
</tr>
<tr>
<td>Collision risk</td>
<td>How likely it is that a bird species will collide with a man-made structure, may be a qualitative judgment or quantified through collision risk modelling.</td>
</tr>
<tr>
<td>Cumulative effects</td>
<td>The summation of effects acting on a receptor that result from changes caused by a development in conjunction with other past, present or reasonably foreseeable actions.</td>
</tr>
<tr>
<td>Disturbance</td>
<td>A temporary change in environmental conditions, typically related to human activity, that negatively affects an organism.</td>
</tr>
<tr>
<td>Effect</td>
<td>A predicted change in the environmental baseline as a result of the proposed development. Effects can be positive or negative.</td>
</tr>
<tr>
<td>Environmental baseline</td>
<td>The existing (pre-development) context of a study area.</td>
</tr>
<tr>
<td>Environmental Impact Assessment</td>
<td>In this context, the process by which information about the environmental effects of a project is evaluated and mitigation measures are identified.</td>
</tr>
<tr>
<td>Environmental Statement</td>
<td>A suite of documents providing the necessary environmental information in respect of an environmental impact assessment undertaken for a proposed development. It must include all information that is reasonably required to assess the potential significant environmental effects.</td>
</tr>
<tr>
<td>EIA Regulations</td>
<td>The Environmental Impact Assessment Regulations relevant to this application are The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011</td>
</tr>
<tr>
<td>Flight Corridors</td>
<td>Linear areas where bird flight activity is most concentrated.</td>
</tr>
<tr>
<td><strong>Term</strong></td>
<td><strong>Definition</strong></td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Flight Activity Survey</td>
<td>Fixed duration survey from strategically located vantage points (VPs) during which bird flight activity data (e.g. flight behaviour, direction and height above ground level) is systematically recorded for focal species.</td>
</tr>
<tr>
<td>Habitat</td>
<td>An ecological or environmental area that is inhabited by a particular organism; the natural and/or physical environment in which an organism lives.</td>
</tr>
<tr>
<td>Indirect effects</td>
<td>Effects on a receptor which are not a direct result of an action but are often produced at one remove from it or as a result of a complex pathway. Sometimes referred to as secondary effects.</td>
</tr>
<tr>
<td>Magnitude</td>
<td>In relation to effect, a combination of the scale, extent and duration of an effect.</td>
</tr>
<tr>
<td>Mitigation</td>
<td>Measures, including any process, activity or design to prevent, reduce and where possible offset any significant adverse environmental effects of a development or aspect of a development.</td>
</tr>
<tr>
<td>Non-Technical Summary</td>
<td>A brief report summarising the principle sections of the Environmental Statement in non-technical language. The Non-Technical Summary is bound into the main report, but is also be available as a free-standing document.</td>
</tr>
<tr>
<td>Ornithology</td>
<td>The branch of zoology that deals with the scientific study of birds.</td>
</tr>
<tr>
<td>Ramsar site</td>
<td>Wetland sites that are of international importance, as designated under Article 2(1) of the Convention on Wetlands of International Importance especially as Waterfowl Habitat. Ramsar (Iran)</td>
</tr>
<tr>
<td>Receptor</td>
<td>A population of a species or their supporting habitat / environmental conditions which are affected by a development.</td>
</tr>
<tr>
<td>Residual effects</td>
<td>Effects predicted as a consequence of the development assuming successful implementation of the identified mitigation measures.</td>
</tr>
<tr>
<td>Screening</td>
<td>The first stage in an environmental impact assessment used to determine if further assessment is necessary.</td>
</tr>
<tr>
<td>Scoping</td>
<td>The process of identifying the issues to be addressed by an Environmental Impact Assessment</td>
</tr>
<tr>
<td>Special Protection Area</td>
<td>Special Protection Areas are protected sites designated in accordance with Article 4 of the EC Birds Directive. They are designated for rare and vulnerable birds (as listed on Annex I of the Directive), and for regularly occurring migratory species.</td>
</tr>
<tr>
<td>Yield class</td>
<td>The mean cubic metres growth, for each hectare of tree species, for each years growth.</td>
</tr>
</tbody>
</table>
Chapter 11: Transport

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11 Transport

11.1 Introduction

11.1.1 This chapter considers the likely significant effects related to transport associated with the construction, operation and decommissioning of the proposed Hadyard Hill Extension wind farm. The specific objectives of the chapter are to:

- describe the transport baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation.

11.1.2 The assessment was carried out by WYG Environment Planning Transport Limited, of WYG Group.

11.1.3 The chapter is supported by:

- Technical Appendix 11.1: Transport Assessment.

11.1.4 Figures 11.1 – 11.2 are referenced in the text where relevant.

11.2 Scope of Assessment

11.2.1 A high level overview of the effects of the traffic movements has been considered in accordance with Institute of Environmental Assessment (now Institute of Environmental Management and Assessment (IEMA) Guidelines for the Environmental Assessment of Road Traffic (1993). The document is referred to below as the IEMA Guidelines.

Scoping and consultation

11.2.2 Consultations were undertaken with organisations that have a direct involvement or responsibility for roads in the study area.

11.2.3 Consultation responses relating to transport issues were received from the following consultees:

- Energy Consents and Deployment Unit, 16th April 2014 (incorporating responses from Transport Scotland (TS) and South Ayrshire Council (SAC)).

11.2.4 The consultation responses are summarised in Technical Appendix 1.1: Consultation Register, which also describes how the ES addresses each of the issues raised, and in Technical Appendix 11.1: Transport Assessment.
**Issues Scoped Out**

11.2.5 The scope of this assessment takes account of the committed mitigation measures both incorporated into the design and those standard construction and decommissioning mitigation measures incorporated into the proposed development, as described in Chapter 2: Proposed Development, and Technical Appendix 2.4: Construction Environmental Management Plan. Table 11.1 summarises the issues scoped out of the assessment:

<table>
<thead>
<tr>
<th>Potential Effect</th>
<th>Basis for Scoping Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative effects</td>
<td>No cumulative impacts are anticipated as a result of the proposed development as no other significant developments that would impact on the study area are anticipated to be under construction (the main period of traffic generation) within the same timescale.</td>
</tr>
</tbody>
</table>

**11.3 Assessment Methodology**

11.3.1 The methodology adopted in this assessment has involved the following key stages:

- determine baselines;
- review proposed development for impacts;
- evaluate significance;
- identify mitigation; and
- assess residual effects.

**Baseline Characterisation**

**Study Area**

11.3.2 The study area for assessment was identified through consideration of the likely routes to be used by construction traffic and lengths of road on which the impacts might be greatest. The study area was agreed through scoping discussions with the Ayrshire Roads Alliance and TS. Further details are provided in Technical Appendix 11.1: Transport Assessment.

**Desk Study / Field Survey**

11.3.3 The baseline review focuses on the nature of the surrounding road infrastructure and the current level of traffic use and was informed by desktop studies and consultation, comprising the following:

- site visits;
- review of relevant transport planning policy;
- consideration of potential origin locations of construction staff and potential supply locations for construction materials to inform extent of local area roads network to be considered in the assessment;
- collection of traffic flow and speed data;
- review of the relevant roads hierarchy;
• review of sensitive junction locations;
• review of any areas of road safety concerns;
• review of accident data;
• review of any other traffic sensitive receptors in the area (routes, communities, buildings etc); and
• review of Ordnance Survey (OS) plans to derive a study area roads network.

Traffic Data

11.3.4 Traffic flow, speed and accident data was obtained from TS and Automatic Traffic Count (ATC) surveys to further enhance the understanding of the road network in the study area and to identify potential constraints on the network.

Roads Review

11.3.5 A route survey and swept path analysis exercise were undertaken to identify the extent of road improvements and realignment required for the Abnormal Indivisible Loads (AILs). Areas identified for road works were subject to a series of desk top and field studies to assess the likely significant impacts associated with them. The results of the assessment are summarised later in this chapter and in described in detail in section 9 of Technical Appendix 11.1: Transport Assessment.

Sensitivity Criteria

11.3.6 The IEMA Guidelines document includes guidance on how the sensitivity of receptors should be assessed. Using that as a base, professional judgement was used to develop a classification of sensitivity for various receptors. This is summarised in Table 11.2.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Receptor Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negligible</td>
</tr>
<tr>
<td>Location – Local Settlements</td>
<td>Individual dwellings or scattered settlements with no facilities</td>
</tr>
<tr>
<td>Road network and associated users</td>
<td>Roads with no adjacent settlements including new strategic trunk roads that would be little affected by additional traffic and suitable for AILs</td>
</tr>
<tr>
<td>Road structure</td>
<td>New strategic trunk road</td>
</tr>
</tbody>
</table>


Table 11.2: Classification of Receptor Sensitivity

<table>
<thead>
<tr>
<th>Receptor and classification</th>
<th>Receptor Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negligible</td>
</tr>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td>junctions capable of</td>
<td>constructed to</td>
</tr>
<tr>
<td>accommodating AILs</td>
<td>accommodate</td>
</tr>
<tr>
<td></td>
<td>significant HGV</td>
</tr>
<tr>
<td></td>
<td>composition</td>
</tr>
<tr>
<td></td>
<td>capable of regular</td>
</tr>
<tr>
<td></td>
<td>use by HGV traffic</td>
</tr>
<tr>
<td></td>
<td>constructed to</td>
</tr>
<tr>
<td></td>
<td>accommodate</td>
</tr>
<tr>
<td></td>
<td>frequent use by</td>
</tr>
<tr>
<td></td>
<td>HGVs</td>
</tr>
</tbody>
</table>

Assessment of Effects

Magnitude of Effect

11.3.7 The following rules, also taken from the IEMA Guidelines, were used to determine which links within the study area should be considered for detailed assessment:

- rule 1 – include highway links where traffic flows are predicted to increase by more than 30% (or where the number of heavy goods vehicles is predicted to increase by more than 30%); and
- rule 2 – include any other specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

11.3.8 The IEMA Guidelines identify the key impacts that are most important when assessing the magnitude of traffic effects from an individual development. Table 2.2 of Volume 11, Section 2, Part 5 of the Design Manual for Roads and Bridges (DMRB) (Highways Agency, 2008) sets out four levels against which the magnitude of these impacts should be assessed – major, moderate, minor and negligible. The impacts and levels of magnitude are discussed below:

- **Severance** – the IEMA Guidelines states that, “severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery.” Further, “Changes in traffic of 30%, 60% and 90% are regarded as producing ‘slight’, ‘moderate’ and ‘substantial’ [or minor, moderate and major] changes in severance respectively”. However, the Guidelines acknowledge that “the measurement and prediction of severance is extremely difficult”. (Para 4.28).

- **Driver delay** – the IEMA Guidelines note that these delays are only likely to be “significant [or major] when the traffic on the network surrounding the proposed development is already at, or close to, the capacity of the system.” (Para 4.32).

- **Pedestrian delay** – the delay to pedestrians, as with driver delay, is likely only to be major when the traffic on the network surrounding the proposed development is already at, or close to, the capacity of the system. An increase in total traffic of approximately 30% can double the delay experienced by pedestrians attempting to cross the road and would be considered ‘major’.

- **Pedestrian amenity** – the IEMA Guidelines suggests that a tentative threshold for judging the significance of changes in pedestrian amenity would be where the traffic flow (or its lorry component) is halved or doubled (Para 4.39). It is therefore considered that a change in the traffic flow of -50% or +100% would produce a ‘major’ change in pedestrian amenity.

- **Fear and intimidation** – there are no commonly agreed thresholds for estimating levels of fear and intimidation, from known traffic and physical conditions. However, as the impact is considered to be sensitive to traffic flow, changes in
traffic flow of 30%, 60% and 90% are regarded as producing ‘minor’, ‘moderate’ and ‘major’ changes in severance respectively.

- **Accidents and safety** – professional judgement would be used to assess the implications of local circumstances, or factors which may elevate or lessen risks of accidents.

**Significance Criteria**

11.3.9 To determine the overall significance of the effects, the results from the receptor sensitivity and effects magnitude assessment are correlated and classified using Table 11.3.

<table>
<thead>
<tr>
<th>Receptor Sensitivity</th>
<th>Magnitude of Effects</th>
<th>Major</th>
<th>Moderate</th>
<th>Minor</th>
<th>Negligible</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td></td>
<td>Large</td>
<td>Large/Moderate</td>
<td>Moderate/Slight</td>
<td>Slight</td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td>Large/Moderate</td>
<td>Moderate</td>
<td>Slight</td>
<td>Slight/Neutral</td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td>Moderate/Slight</td>
<td>Slight</td>
<td>Slight</td>
<td>Slight/Neutral</td>
</tr>
</tbody>
</table>

11.3.10 In terms of the EIA Regulations, effects would be considered to be of significance where they are assessed to be large or moderate.

11.3.11 The assessment of effects is summarised in Table 11.10 at the end of this Chapter.

**11.4 Baseline Conditions**

**Current Baseline**

**Study Area**

11.4.1 The impact assessment study focussed on the A77 between its junction with the A719 and a point south of Girvan; and the B734 between its junctions with the A77 and the proposed site access. The relevant section of the road network is indicated in Figure 11.1: Study Area and Traffic Count Locations.

11.4.2 The A77 is a trunk road that is constructed to accommodate a significant HGV composition. It is therefore considered to be a receptor of low sensitivity for the majority of its length.

11.4.3 The B734 is a single carriageway local B class road which is considered to be capable of regular use by HGVs. It is therefore considered to be a receptor of medium sensitivity.

11.4.4 The settlements of Maybole and Girvan contain railway stations, schools, shops and community facilities and as the A77 passes through them, are subject to waiting and loading restrictions. The settlements and the A77 through the settlements are therefore classified as receptors of high sensitivity.

11.4.5 Minishant and Kirkoswald, through which the A77 also pass, are considered to be receptors of low and medium sensitivity respectively.

11.4.6 Locations along the B734 are all considered to be individual dwellings or scattered settlements with no facilities and therefore classified as of negligible sensitivity.
11.4.7 All users of the roads are considered receptors subject to the same level of sensitivity as the route or location through which it passes, whichever is higher.

Existing Traffic Movements

11.4.8 To determine the existing road usage, data was obtained from a combination of data held within the TS database of counts and commissioned ATC surveys in November 2014 as follows:

- sites within TS database:
  - 1. A77 Carluie Toll – 100m north of B7034 south of Ayr;
  - 2. A77 Crossraguel Abbey – southwest of Maybole);
  - 3. A77 north of Girvan Mains;
  - 4. A77 Girvan South; and
  - 5. A77 south of Girvan.

- ATC sites:
  - 6. B734 to east of Girvan; and
  - 7. B734 at proposed site access junction.

11.4.9 The locations of the traffic count sites are illustrated in Figure 11.1: Study Area and Traffic Count Locations and existing traffic flow data is summarised in Table 5.1 of Technical Appendix 11.1. Construction traffic would also cross the unclassified road which runs through the site between Milton Bridge in the Stinchar valley and the B741 in the Water of Girvan valley. No significant effects are considered likely to be associated with this road crossing, and as such it is not considered further in the assessment.

Speed Survey

11.4.10 Three of the TS sites and the two ATC sites used to provide traffic volume data also provided speed statistics. The two way average and 85th percentile speeds observed at the count locations are summarised in Table 11.4.

<table>
<thead>
<tr>
<th>Survey Location</th>
<th>Average Speed (mph)</th>
<th>85th Percentile Speed</th>
<th>Speed Limit (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A77 Carluie Toll</td>
<td>49.21</td>
<td>53.44</td>
<td>60</td>
</tr>
<tr>
<td>3 A77 north of Girvan Mains</td>
<td>51.62</td>
<td>54.68</td>
<td>60</td>
</tr>
<tr>
<td>5 A77 south of Girvan</td>
<td>50.85</td>
<td>54.06</td>
<td>60</td>
</tr>
<tr>
<td>6 B734 to east of Girvan</td>
<td>37.00</td>
<td>48.8</td>
<td>60</td>
</tr>
<tr>
<td>7 B734 at proposed site access</td>
<td>29.60</td>
<td>33.20</td>
<td>60</td>
</tr>
</tbody>
</table>
11.4.11 The speed survey data indicates that average and 85th percentile speeds are substantially lower than the speed limit on all road surveyed, and especially so on the B734.

11.4.12 Average speed cameras are located on many sections of the A77 which will contribute to maintaining the average and 85th percentile speeds below the speed limit. The constrained geometry of the B734 also contributes to keeping vehicle speeds well below the posted speed limit.

Accident History

11.4.13 WYG obtained road traffic accident data from TS and the web resource crashmap.co.uk for the five years from the start of 2009 over the following links:
- A77 between its junctions with the A719 and B734 – a length of approximately 69 km two way; and
- B734 between its junctions with the A77 and the site access junction – a length of approximately 16 km two way.

11.4.14 Appendix A and section 5.6 of Technical Appendix 11.1 provide a summary and analysis of the personal injury accident data recorded on the 85 km of carriageway (i.e. two way) assessed for the five year period.

11.4.15 In summary, it is noted that the majority of accidents on the Trunk Road were slight and just over a third involved single vehicles. The highest percentage of accidents involved cars only. Only four accidents were recorded along the length of the B734 during the five year period with no common factors readily identifiable.

11.4.16 Accidents involving HGVs accounted for 13% of all the incidents on the Trunk Road (A77) and none on the local road (B734); this is important to note as the majority of movements associated with the proposed development would be undertaken by HGV traffic. There is no common cause that can be found amongst the accidents and the majority involve driver errors or poor judgement of some description.

Footpath Network

11.4.17 The access track through the existing Hadyard Hill wind farm, that would be used to provide access to the proposed development, is classified as Core Path SA46 within the South Ayrshire Core Paths Plan (South Ayrshire Council, 2009). This continues southwards from the site access junction on the B764, connecting with SA51, a right of way between Girvan and Barr.

11.4.18 A second Core Path, SA1 runs north to south between Crosshill and the River Stinchar, passing along the eastern edge of the application boundary, following the unclassified road that also forms part of National Cycle Route 7.

11.4.19 The routes of the Core Paths are indicated in Figure 5.2: Core Paths of Technical Appendix 11.1: Transport Assessment.

11.4.20 As noted above, the B734 is considered to be a receptor of medium sensitivity and all users of the roads are considered receptors subject to the same level of sensitivity as the route (paragraph 11.4.7). Therefore, where the core path follows the B734 it and its users are considered to be receptors of medium sensitivity.
AIL routing

11.4.21 The most suitable Port of Entry for turbine components bound for the site has been identified as the Port of Ayr. From the Port, loads would travel via the A719 through Ayr, the A77 towards Girvan and then the B734 towards Barr from which vehicles turn left into the site access. The route is indicated in Figure 11.2: Abnormal Indivisible Load Route.

11.4.22 A detailed assessment, including swept path analysis, was undertaken of the route. This identified a number of constraint points including:

- A79 Allison Street / A719 King Street Roundabout;
- A77 Smithston Bridge;
- A77 / B734 Bridgemill Roundabout;
- B734 Junction Old Dailly;
- B734 Penkill Right / Left Bend;
- B734 South of Penkill Right Bend;
- B734 Penwhapple Glen Left Bend;
- B734 North of Knockgerran Bridge Right / Left Bend;
- B734 Knockgerran Bridge;
- B734 Penwhapple Bridge; and
- B734 on approach to Site Access.

Future Baseline

Traffic Movements

11.4.23 For the purpose of this assessment it is assumed that construction of the project could commence during 2018 if consent is granted. For the purpose of this assessment, a 22 month construction period was assumed.

11.4.24 To assess the likely effects during the construction phase, 2018 Baseline traffic movements were assessed by applying National Road Traffic Forecast (NRTF) high growth factors to the surveyed traffic movements. Applying high growth factors provides a robust assessment as they represent higher than average growth and account for general committed development traffic.

11.4.25 The NRTF high growth factor is 1.0670. This factor was applied to the 2014 survey data to estimate the 2018 Baseline traffic movements shown in Table 11.5.

<table>
<thead>
<tr>
<th>Survey Location</th>
<th>Cars &amp; Lights</th>
<th>HGV</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A77 Carluie Toll</td>
<td>11,693</td>
<td>737</td>
<td>12,431</td>
</tr>
<tr>
<td>A77 Crossraguel Abbey</td>
<td>5,978</td>
<td>513</td>
<td>6,492</td>
</tr>
</tbody>
</table>

Table 11.5: Baseline Traffic Conditions (Weekday Average Two Way Movements)
### Table 11.5: Baseline Traffic Conditions (Weekday Average Two Way Movements)

<table>
<thead>
<tr>
<th>Survey Location</th>
<th>Cars &amp; Lights</th>
<th>HGV</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A77 north of Girvan Mains</td>
<td>6,838</td>
<td>574</td>
<td>7,257</td>
</tr>
<tr>
<td>A77 Girvan South</td>
<td>4,646</td>
<td>512</td>
<td>5,158</td>
</tr>
<tr>
<td>A77 south of Girvan</td>
<td>2,998</td>
<td>340</td>
<td>3,420</td>
</tr>
<tr>
<td>B734 to east of Girvan</td>
<td>1,440</td>
<td>48</td>
<td>1,488</td>
</tr>
<tr>
<td>B734 at proposed site access</td>
<td>390</td>
<td>19</td>
<td>409</td>
</tr>
</tbody>
</table>

### 11.5 Likely Significant Effects

#### Construction Effects

#### Types of Vehicle Traffic

11.5.1 During the assumed 22 month construction period, the following traffic would require access to the site:

- staff transport, either cars or staff minibuses;
- construction equipment and materials, deliveries of machinery and supplies such as concrete raw materials;
- AILs consisting of the wind turbine sections and also a heavy lift crane; and
- escort vehicles for AIL deliveries.

11.5.2 With the exception of the turbine elements, the vast majority of traffic would be normal construction plant and would include grading tractors, excavators, high capacity cranes, forklifts and dumper trucks. Most would arrive on-site on low loaders.

11.5.3 The turbines are delivered in component sections for transport and would be assembled on the site. The nacelle, blade and tower sections are classified as AIL due to their weight, length, width and height when loaded.

11.5.4 The components can be delivered on a variety of transport platforms, with typical examples illustrated in section 9 of Technical Appendix 11.1: Transport Assessment.

11.5.5 In addition to the turbine deliveries, two high capacity erection cranes would be needed to offload a number of components and erect the turbine. The cranes are likely to be mobile cranes with a capacity up to 1,000 tonnes that are escorted by boom and ballast trucks to allow full mobilisation on site. Smaller erector cranes will also be present to allow the assembly of the main cranes and to ease overall erection of the turbines.
Construction Vehicle Movements

11.5.6 The assessment is based upon information provided by the applicant and developed from experience of other wind farms of a similar scale which is detailed in Section 6 Technical Appendix 11.1: Transport Assessment. The import of materials is based on a worst case scenario where all stone required to build access tracks and other materials are imported to the site. It is likely that these worst case estimates would be reduced through the use of borrow pits within the site.

11.5.7 To enable comparison of the estimated 2018 Baseline traffic movements with total volumes including predicted construction traffic, average daily two-way movements for each month assuming a 22-day working month were determined. Traffic movements were also split by vehicle type in line with the Baseline data and the peak period for construction traffic determined. The final daily construction profile is set out in Table 11.6.

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Month</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars &amp; Lights</td>
<td></td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>74</td>
<td>74</td>
<td>74</td>
<td>74</td>
<td>74</td>
<td>74</td>
<td>74</td>
<td>211</td>
</tr>
<tr>
<td>HGV</td>
<td></td>
<td>174</td>
<td>172</td>
<td>172</td>
<td>172</td>
<td>172</td>
<td>173</td>
<td>195</td>
<td>195</td>
<td>195</td>
<td>195</td>
<td>195</td>
<td>205</td>
<td>278</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>211</td>
<td>208</td>
<td>208</td>
<td>208</td>
<td>208</td>
<td>246</td>
<td>269</td>
<td>269</td>
<td>269</td>
<td>269</td>
<td>269</td>
<td>278</td>
<td></td>
</tr>
</tbody>
</table>

11.5.8 The maximum traffic movements associated with construction of the proposed development are predicted to occur in month 15 of the programme. During this month, an average of 210 HGV movements are predicted per day and it is estimated that there would be a further 78 car and light van movements per day to transport construction workers to and from the site.

Development Traffic Distribution

11.5.9 The distribution of development traffic on the network would vary depending on the types of loads being transported. The full set of assumptions underlying the construction traffic distributions is set out in Section 6 of Technical Appendix 11.1: Transport Assessment, but include that:

- all abnormal turbine and crane loads would access the site via the A77 north, then the B734; and
- all track aggregate material and concrete raw materials would likely be sourced from Tormitchell Quarry from where the majority of the delivery route follows off-road access tracks, only using the B734 for a short 400 m section between the...
two existing points of access to Hadyard Hill wind farm, and crossing the unclassified road which runs through the site between Milton Bridge in the Stinchar valley and the B741 in the Water of Girvan valley.

**Predicted Effects**

11.5.10 To estimate the total trips on the study network during the peak of the construction phase, construction traffic was distributed through the network and combined with the 2018 Baseline traffic data. The resulting figures were compared with the weekday 2018 Baseline traffic; the percentage change in movements during the peak month of construction is set out in Table 11.7.

<table>
<thead>
<tr>
<th>Survey Location</th>
<th>Cars &amp; Lights</th>
<th>HGV</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A77 Carluie Toll</td>
<td>0.55%</td>
<td>2.17%</td>
<td>0.64%</td>
</tr>
<tr>
<td>A77 Crossraguel Abbey</td>
<td>1.07%</td>
<td>3.12%</td>
<td>1.23%</td>
</tr>
<tr>
<td>A77 north of Girvan Mains</td>
<td>0.94%</td>
<td>2.79%</td>
<td>1.10%</td>
</tr>
<tr>
<td>A77 Girvan South</td>
<td>0.30%</td>
<td>0.39%</td>
<td>0.31%</td>
</tr>
<tr>
<td>A77 south of Girvan</td>
<td>0.47%</td>
<td>0.59%</td>
<td>0.47%</td>
</tr>
<tr>
<td>B734 to east of Girvan</td>
<td>5.42%</td>
<td>37.79%</td>
<td>6.45%</td>
</tr>
<tr>
<td>B734 west of site access</td>
<td>20.01%</td>
<td>95.72%</td>
<td>23.49%</td>
</tr>
<tr>
<td>B734 east of site access</td>
<td>0.00%</td>
<td>1021.06%</td>
<td>46.98%</td>
</tr>
</tbody>
</table>

11.5.11 The results indicate that Total and HGV traffic movements are not predicted to increase by more than 5% on any of the trunk road sections of the network assessed. The greatest impact of total construction traffic will be on the B734 and it will be highest to the east of the site access junction.

11.5.12 On the B734, Total traffic movements are anticipated to increase by 6.45% and HGV movements by 37.79% between its junction with the A77 and the site access junction over the Baseline situation. To the east of the site access junction, the percentage uplift is considerably higher as the length of road would be affected by deliveries originating from Tormitchell Quarry.

11.5.13 West of the site access, the uplift in traffic on the B734 is anticipated to be 23.49% in Total movements and 95.72% in HGV movements. Although the uplift is high in percentage terms, this is partly due to the very low Baseline levels of HGV traffic on the link (19 movements a day).

11.5.14 East of the site access, the uplift in traffic on the B734 is anticipated to be 46.98% in Total movements and 1021.06% in HGV movements. Again although the uplift is high in percentage terms, this is partly due to the very low Baseline levels of HGV traffic.
on the link. This uplift in traffic movements would affect a length of road of around 400 m only, along which there are no other points of access nor any properties, farm or business premises.

**Effect Significance**

11.5.15 With reference to the IEMA Guidelines, neither Total nor HGV traffic movements are predicted to increase by more than 30% (or in fact 5%) on the trunk road sections of the study area. The effects are not therefore considered to be of significance and the trunk road was excluded from further assessment.

11.5.16 On the B734, Total traffic movements are not anticipated to increase by more than 30% except between the site access junction and the access to the southern section of the existing Hadyard Hill wind farm (a length of approximately 400 m). However, due to the predicted uplift in daily two way HGV traffic movements along the majority of its length and Total traffic and HGV movements east of to the site access, the B734 was taken forward to further assessment.

11.5.17 For various receptors, Table 11.8 summarises the predicted magnitude and significance of the impact of the increase in traffic movements on the various receptors identified in the IEMA Guidelines with no mitigation in place.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Potential Effect</th>
<th>Magnitude of Effect</th>
<th>Significance of Effect</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Users of / residents adjacent to B734 – medium sensitivity</td>
<td>Severance</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Increase in traffic could result in difficulties for people crossing the road during the construction period. Total traffic volumes are only predicted to change by more than 30% over the short length of road between the south and north points of access to the Hadyard Hill Wind Farm. While crossing demand is not observed to be high and there are no other properties on this length of road, the section of road and the access tracks do form part of Core Path SA46. The severance impact is considered to be moderate.</td>
</tr>
<tr>
<td>Driver Delay</td>
<td>Minor</td>
<td>Slight</td>
<td></td>
<td>Some delay to drivers may occur during the movement of AILs. The road network is not considered to experience operational difficulties as traffic movements are low. The change in traffic volumes would not take the system close to capacity limits. Any impact is therefore considered to be minor.</td>
</tr>
<tr>
<td>Receptor</td>
<td>Potential Effect</td>
<td>Magnitude of Effect</td>
<td>Significance of Effect</td>
<td>Comment</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------</td>
<td>---------------------</td>
<td>------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Pedestrian Delay</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Pedestrians could experience delay if their movements conflict with that of construction, and particularly AIL traffic. Pedestrian movements are not observed to be high but a section of the B734 does form part of Core Path SA46. Total traffic volumes are anticipated to change by around 47% on the section of the B734 forming part of the Core Path which could lead to moderate delays for pedestrians.</td>
</tr>
<tr>
<td>Pedestrian Amenity</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Pedestrian amenity could be affected where their movements conflict with that of construction and particularly AIL traffic. While the lorry component of traffic movements is anticipated to increase by over 1000% on the section of the B734 forming part of Core Path SA46, there is no existing footway provision and pedestrian flows are noted to be very low. It is therefore considered that the impact magnitude should be considered moderate over the 400 m length affected, with the significance also being considered moderate.</td>
</tr>
<tr>
<td>Fear and Intimidation</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>As Total traffic volumes are anticipated to change by between the 30% and 60% thresholds on part of the B734, the impact is considered to be moderate.</td>
</tr>
<tr>
<td>Accidents and Safety</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>There is potential for impact on safety due to driver frustration, particularly with regards to the transport of the AILs and due to potential conflict between HGVs and pedestrians.</td>
</tr>
</tbody>
</table>
Operational Effects

Predicted Effects

11.5.18 During the operational phase, the proposed development is anticipated to employ six full time staff in addition to those currently employed at the existing wind farm. As a result up to 12 additional light vehicle movements could be generated per day, an uplift of 3% on the B734 Baseline traffic flows. As at the existing wind farm, there would also be the potential for an additional two way movement every six months for servicing. Whilst it is not anticipated that there would be any AIL movements during the operational phases, should a component require replacing, a one off delivery would result.

Effect Significance

11.5.19 In terms of the IEMA Guidelines, such a small number of traffic movements and the associated percentage uplift over Baseline traffic movements is not considered significant.

Decommissioning Effects

Predicted Effects

11.5.20 Prior to decommissioning of the site, anticipated to be 25 years from the opening year, a traffic assessment would be undertaken and appropriate traffic management procedures followed.

11.5.21 The decommissioning phase would result in fewer trips on the road network than the construction phase as it is considered likely that elements of infrastructure such as access tracks and electrical connections would be left in place and components may be broken up on-site to allow transport by reduced numbers of standard HGVs.

Effect Significance

11.5.22 As decommissioning would result in fewer vehicle trips on the road network than the construction phase, the significance of any effects would not be greater. It can therefore be assumed that the assessment of the construction phases covers the worst case scenario.

11.6 Mitigation

Mitigation During Construction

General Construction

11.6.1 There a number of footpaths and tracks within or in close proximity to the site, one of which, Core Path SA46, follows part of the construction route on the B734. Access to these routes would be maintained or alternative provision made via segregation from construction traffic or diversion away from construction routes during the construction and decommissioning phases. Conflict between construction traffic and pedestrians would be prevented through appropriate traffic management and segregation or diversion. This would be managed through implementation of a Traffic Management Plan and Construction Traffic Management Plan, to be delivered through an appropriately worded condition if planning permission is granted.

11.6.2 During the construction period the applicant would maintain a website containing the latest information relating to traffic movements associated with vehicles accessing the site. This would be agreed with the roads authorities.
11.6.3 The following measures would be implemented in relation to site operation and maintenance during the construction phase:

- appropriate traffic management measures at the site access junction to avoid conflict with AILs and general traffic and pedestrians, subject to the agreement of the roads authority. These could include HGV warning signage and temporary speed limits;
- maintenance of access to or provision of alternative arrangements in respect of on-site footpaths and walking routes and to the length of Core Path SA46 that follows the construction traffic delivery route;
- all material deliveries (dry materials) would be sheeted to reduce dust and stop spillage on public roads;
- specific training and disciplinary measures would be established to ensure the highest standards are maintained to prevent construction vehicles from carrying mud and debris onto the carriageway;
- wheel wash facilities would be established at the site entrance;
- drivers would be required to pass through any sensitive areas, to be agreed with SAC / Transport Scotland, at low speed; and
- restriction of delivery hours, as agreed with the planning authorities.

11.6.4 All drivers who are regularly delivering to the site would be required to attend an induction to include:

- a safety briefing;
- the need for appropriate care and speed control;
- a briefing on driver speed reduction agreements (to slow site traffic at sensitive locations);
- identification of specific sensitive areas;
- identification of the specified route;
- the requirement not to deviate from the specified route; and
- the need to be aware of pedestrians at specific locations.

11.6.5 A community liaison committee would be established to ensure the smooth management of the project/public interface. It is proposed that the applicant, the construction contractors, the local community, and if appropriate, the police form the committee. This committee would form a means of communicating and updating on forthcoming activities and dealing with any potential issues arising.

11.6.6 Road improvements would be carried out in agreement with SAC and the appropriate statutory authorities to ensure that during delivery of turbine components minimal damage is caused to road surfaces, verges, street furniture and surrounding vegetation. Damage to road infrastructure caused directly by construction traffic would be made good, and street furniture removed on a temporary basis would be fully reinstated.
Abnormal Indivisible Loads

11.6.7 Before the AILs traverse the route, the following tasks would be undertaken to ensure load and road user safety:

- an Electronic Service Delivery for Abnormal Loads (ESDAL) contacts search for the proposed loads using the Highways Agency website to ascertain if there are any further constraints that are pertinent to the proposed development. This would identify roads authority, police and statutory consultee constraints, should they exist;
- a review of clear heights with utility providers and the transport agencies along the route. The developer would ensure with providers that there is sufficient clearance with an appropriate safety factor, especially with respect to power lines;
- trimming back of any vegetation which may foul the loads to allow passage;
- a review of forthcoming planned roadworks or closures that could affect the passage of the loads;
- a review of new and diverted underground services on the access route to ensure that there are none at risk from the abnormal loads;
- a review of maximum axle loadings on structures along the access route with the various roads agencies prior to the loads being transported;
- ensure that the police are satisfied with the route being used and that the local roads authorities have been further contacted regarding the proposed loads and suggested route; and
- a test run would be carried out to verify the proposed mitigation would permit the safe passage of abnormal loads.

11.6.8 A detailed Traffic Management Plan (TMP) would be developed in consultation with the police and roads authorities and agreed before deliveries to the site commence, to ensure road safety for all road users during transit of development loads and to minimise any impact. Measures within the TMP would include:

- methods for managing the convoy and procedures for liaising with the emergency services to ensure that police, fire and ambulance vehicles are not impeded by the loads. This would normally be undertaken by informing the emergency services of delivery times and dates and agreeing communication protocols and lay over areas to allow overtaking;
- specific construction traffic routes to minimise impact on unsuitable routes;
- a communications protocol to avoid delays with emergency vehicle traffic;
- a diary of proposed delivery movements to liaise with the communities to avoid key dates (such as fetes, etc); and
- working with local businesses to ensure the construction traffic does not interfere with deliveries or normal business traffic.

11.6.9 The abnormal load transports would be escorted by a number of vehicles including a police escort to assist a civilian escort car on specific sections of the route. An advance escort would warn oncoming vehicles ahead of the convoy, with the other
escorts staying with the convoy at all times. The escorts and convoys would remain in radio contact at all times, where possible.

11.6.10 The transit of AILs along areas of restricted geometry would be undertaken as a rolling closure to reduce the level of disruption to local traffic and residents. The timing of deliveries is subject to road licensing conditions and police requirements, it is likely that the convoys would travel during time periods to avoid significant interactions with other road users.

11.6.11 Advance warning signs would be installed on the approaches to the affected roads network. Temporary signage advising drivers that AILs will be operating would be erected on the sections of the proposed route from the junction of the A77 with the B734 through to the site access. The purpose of signage would be to help improve driver information and allow drivers of oncoming traffic to consider proceeding to the nearest convenient passing point, or breaking their journey until the convoy has moved on.

11.6.12 To further improve driver information, it is suggested that Variable Message Signs (VMS), operated by Transport Scotland, are used to warn drivers of AILs operating on the trunk road sections of the route. These would display information warning of possible delays and would allow drivers to consider alternative routes if possible.

11.6.13 For return journeys, the extendible low loaders used for the delivery of the longer wind turbine components, would be retracted to ensure they leave the site with a trailer length of no more than 16 m.

11.6.14 Additionally, information on the movement of AIL convoys would be provided to local media outlets to help assist the public. These would include local newspapers and radio stations.

11.6.15 Information would relate to expected AIL movements on the A77 and B734 through to the site access. It is hoped that this level of information would make residents aware of convoy movements and help reduce any potential conflicts.

11.6.16 Appropriate permits would be obtained in order to facilitate the transportation of AILs at specified times to be agreed with the roads and other statutory authorities. Likewise, appropriate permits would be obtained in order to facilitate the temporary removal of street furniture (e.g. signage) where this would be required during the transportation of AILs.

**Mitigation during Operation**

11.6.17 No mitigation measures during operation are proposed as it is predicted that there would only be a very small number of vehicle movements per week for maintenance purposes. Consideration may have to be given to the very occasional AIL movement to deliver replacement components, although any required mitigation to allow for this would have to be determined at the time.

**Mitigation during Decommissioning**

11.6.18 Given that similar operations are required to decommission the proposed development, the mitigation measures would be comparable with those indicated for the delivery and construction period.
11.7 Residual Effects

11.7.1 This section considers the assessment of traffic effects following the incorporation of the mitigation measures identified above. Effects during the operational phase were scoped out of the assessment, which therefore only considers those arising during the construction phase.

*Residual Effects during Construction Phase*

11.7.2 An evaluation of the potential effects of the increase in traffic on the local roads to be used as part of the route for construction traffic was undertaken. This considered the traffic effects on different environmental receptors identified in the IEMA Guidelines with no mitigation in place (Table 11.8).

11.7.3 Table 11.9 summarises the assessment of residual effects identified in the evaluation with mitigation in place. It confirms that following the implementation of the identified mitigation, the only residual effect considered to be significant in terms of the EIA Regulations (see paragraph 11.3.10) is that on pedestrian amenity on the B734. The impact on pedestrian amenity is assessed to be potentially moderate; however pedestrian flows are low in the area so the number of people that could be affected is likely to be minimal. The measures that would be developed through detailed design of the proposed development to ensure maintenance of access to all walking routes and footpaths is maintained would ensure any impact is minimised.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Potential Effect</th>
<th>Mitigation</th>
<th>Magnitude of Change (post mitigation)</th>
<th>Significance of Residual Effects</th>
<th>Residual Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Users of / residents adjacent to B734 – medium sensitivity</td>
<td>Severance associated with increased traffic movements</td>
<td>Implementation of CTMP, maintenance of access to Core Path SA46, application of speed limits, AIL movements controlled through TMP, traffic management at site access, restricted delivery hours</td>
<td>Minor</td>
<td>Slight</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Driver Delay associated with movement of AILs</td>
<td>Load escorts, advance warning signage, website. Implemented through TMP</td>
<td>Minor</td>
<td>Slight</td>
<td>Not Significant</td>
<td></td>
</tr>
<tr>
<td>Pedestrian Delay associated with AIL and</td>
<td>Implementation of CTMP, maintenance of access to Core Path SA46</td>
<td>Minor</td>
<td>Slight</td>
<td>Not Significant</td>
<td></td>
</tr>
</tbody>
</table>
Table 11.9: Assessment of Residual Effects Post Mitigation

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Potential Effect</th>
<th>Mitigation</th>
<th>Magnitude of Change (post mitigation)</th>
<th>Significance of Residual Effects</th>
<th>Residual Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>construction traffic movements</td>
<td></td>
<td>restricted delivery hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedestrian Amenity associated with AIL and construction traffic movements</td>
<td>Implementation of CTMP, maintenance of access to Core Path SA46 through segregation / diversion, restricted delivery hours</td>
<td>Minor</td>
<td>Slight</td>
<td>Not Significant</td>
<td></td>
</tr>
<tr>
<td>Fear and Intimidation associated with AIL and construction traffic movements</td>
<td>Implementation of CTMP and TMP</td>
<td>Minor</td>
<td>Slight</td>
<td>Not Significant</td>
<td></td>
</tr>
<tr>
<td>Accidents and Safety</td>
<td>Appropriate management of movement of AILs, traffic management measures along access route. Implemented through TMP and CTMP</td>
<td>Minor</td>
<td>Slight</td>
<td>Not Significant</td>
<td></td>
</tr>
</tbody>
</table>

11.8 Cumulative Effects

11.8.1 No cumulative impacts are anticipated as a result of this proposed development as no other significant developments that would impact on the study area are anticipated to be under construction (the main period of traffic generation) within the same timescale.

11.9 Summary

11.9.1 The proposed development would lead to increased traffic volumes on the A77 and B734 during the construction phase. Traffic volumes would fall off considerably outside the peak period of construction.

11.9.2 The maximum traffic impact associated with construction is predicted to occur in month 15 of the programme. The greatest impact would be felt on a short length of
the B734 between the site access junction and the access to the existing Hadyard Hill south site some 400 m to the east. During this month; an average of 192 HGV movements (or 16 per hour) is predicted per day. To the west of the site access junction, it is estimated that there would be an average of 18 HGV movements per day (or 1.5 per hour) with a further 78 car and light van movements per day to transport construction workers to and from the site.

11.9.3 No significant capacity issues are expected on any of the roads within the study area due to the additional construction traffic movements associated with the proposed development as background traffic movements are very low and the links are of reasonable standard.

11.9.4 A review of the local road network was undertaken to assess the feasibility of transporting turbines to the development site. No significant capacity issues are expected on any of the roads within the study area due to the additional construction traffic movements associated with the development as background traffic flows are very low and the links are of reasonable standard.

11.9.5 Traffic levels during the operational phase of proposed development would be one or two vehicles per week for maintenance purposes. Traffic levels during the decommissioning of the proposed development are expected to be lower than during the construction phase as some elements may be left in situ and others broken up on site.

11.9.6 The movement of AILs would require minor physical works at a limited number of locations along the A77 and B734 and would require a police escort.

11.9.7 With the implementation of appropriate mitigation, no significant residual effects are anticipated in respect of traffic and access issues.

<table>
<thead>
<tr>
<th>Likely Significant Effect</th>
<th>Mitigation</th>
<th>Residual Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severance</td>
<td>Implementation of CTMP, maintenance of access to Core Path SA46, application of speed limits, AIL movements controlled through TMP, traffic management at site access, restricted delivery hours</td>
<td>Not significant</td>
</tr>
<tr>
<td>Driver Delay</td>
<td>Load escorts, advance warning signage, website. Implemented through TMP</td>
<td>Not significant</td>
</tr>
<tr>
<td>Pedestrian Delay</td>
<td>Implementation of CTMP, maintenance of access to Core Path SA46, restricted delivery hours</td>
<td>Not significant</td>
</tr>
<tr>
<td>Pedestrian Amenity</td>
<td>Implementation of CTMP, maintenance of access to Core Path SA46, restricted delivery hours</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Fear and Intimidation</td>
<td>Implementation of CTMP and TMP</td>
<td>Not significant</td>
</tr>
</tbody>
</table>
### Table 11.10: Summary of Residual Effects

<table>
<thead>
<tr>
<th>Likely Significant Effect</th>
<th>Mitigation</th>
<th>Residual Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidents and Safety</td>
<td>Appropriate management of movement of AILs, traffic management measures along access route. Implemented through TMP and CTMP</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

### 11.10 References

Institute of Environmental Assessment (1993). Guidelines for the Environmental Assessment of Road Traffic

Highways Agency (2008). Design Manual for Roads and Bridges, Volume 2, Section 2, Part 5 Assessment and Management of Environmental Effects

URL: www.crashmap.co.uk

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

### 11.11 Glossary and Abbreviations

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>85th Percentile Speed</td>
<td>The speed which 85% of the vehicles are not exceeding</td>
</tr>
<tr>
<td>AIL</td>
<td>Abnormal Indivisible Load</td>
</tr>
<tr>
<td>ATC</td>
<td>Automatic Traffic Counter</td>
</tr>
<tr>
<td>Core Path</td>
<td>The most important routes in the area which provide a basic framework of routes to meet community needs while minimising any potential conflict with land management operations. They provide opportunities for walking, cycling, horse riding and other activities for people of all abilities. Core Paths may vary from beaten earth paths, to surfaced paths and tracks</td>
</tr>
<tr>
<td>HGV</td>
<td>Heavy Goods Vehicle</td>
</tr>
<tr>
<td>Local Road</td>
<td>Roads managed by the local authority</td>
</tr>
<tr>
<td>NRTF</td>
<td>National Road Traffic Forecast – 1997 forecasts by the Department for Transport of the growth in the volume of motor traffic (excluding motorcycles) on roads in Great Britain until the year 2031.</td>
</tr>
<tr>
<td>OS</td>
<td>Ordnance Survey</td>
</tr>
<tr>
<td>Swept Path Assessment</td>
<td>The calculation and analysis of the movement and path of different parts of a vehicle when that vehicle is undertaking a turning manoeuvre</td>
</tr>
<tr>
<td>Trunk Road</td>
<td>Strategic road managed by Transport Scotland and its agents</td>
</tr>
<tr>
<td>TS</td>
<td>Transport Scotland</td>
</tr>
</tbody>
</table>
# Chapter 12: Socioeconomics and Tourism

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<th>Section</th>
<th>Page</th>
</tr>
</thead>
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</tr>
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<td>2</td>
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</tr>
<tr>
<td>12.9  SUMMARY</td>
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<td>12.10 REFERENCES</td>
<td>19</td>
</tr>
</tbody>
</table>

## Appendices

None

## Figures

Figure 12.1:  Map of Local Area for Socioeconomic Assessment
12 Socioeconomics and Tourism

12.1 Introduction

12.1.1 This chapter identifies and assesses the potential socioeconomic and tourism effects associated with the construction, operation and decommissioning of the proposed development. The specific objectives of the chapter are to:

- describe the socioeconomic and tourism baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential beneficial and adverse effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address any likely or potential significant adverse effects;
- assess the residual effects remaining following the implementation of mitigation.

12.1.2 The assessment has been carried out by BiGGAR Economics.

12.2 Scope of Assessment

12.2.1 This chapter considers the potential for likely significant effects on socioeconomics and tourism activity as a result of the proposed development, as described in Chapter 2: Proposed Development.

12.2.2 Consultation responses relating to socioeconomic and tourism issues were received from the following consultees: South Ayrshire Council, April 2014; VisitScotland, April 2014; and Scottish Rights of Way and Access Society (ScotWays), April 2014.

12.2.3 The consultation responses are summarised in Technical Appendix 1.1: Consultation Register, which also describes how the ES addresses each of the issues raised.

12.2.4 Based on the consultation responses this assessment considers the following (in addition to the objectives set out above):

- potential effects on public rights of way and core paths;
- potential effects on tourism and recreational assets within the study area;
- potential effects on views from tourist accommodation in the area;
- the relative scale of tourism impact (local and national);
- potential positive effects on tourism from the proposed development;
- potential effects on the local tourism industry from any perceived proliferation of developments in the area.
12.3 Assessment Methodology

Baseline Characterisation

Study Area

12.3.1 Economic effects would be related to the extent to which the proposed development could change levels of activity in the local, regional and national economy. For the purposes of this assessment this has been defined as follows:

- Local – covering 2 data zones, S01005524 and S01005535 and 2 intermediate data zone areas, S02001058 and S02001059 (Figure 12.1);
- Regional – the local authority area of South Ayrshire; and
- National – Scotland.

12.3.2 The tourism assessment also considers potential tourism effects in the immediate vicinity of the proposed development including on tourist routes, accommodation and attractions. This focuses on a 5 km radius from the centre of the site.

Desk Study

12.3.3 In order to profile the baseline for the purpose of assessing socioeconomic effects the following has been undertaken:

- a review of national economic strategies;
- a review of regional and local economic strategies; and
- a review of the most recently published, publicly available socioeconomic statistics from the Office for National Statistics and National Records of Scotland.

12.3.4 In order to profile the baseline for the purpose of assessing the tourism effects the following has been undertaken:

- a review of evidence from existing studies on the effects of wind farm development on tourism;
- a review of national, regional and local tourism strategies;
- a review of tourist accommodation and visitor attractions within the study area using the VisitScotland website, local area specific websites and a general Google search; and
- a review of tourist routes using various online resources including Sustrans (cycle routes) and South Ayrshire Council (core paths).

Sensitivity Criteria

12.3.5 The first step in assessing potential effects was to establish the sensitivity of the various receptors considered. The criteria used to do this are given in Table 12.1.
### Table 12.1: Sensitivity Criteria

<table>
<thead>
<tr>
<th>Descriptor or Criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td>The receptor has little or no capacity to absorb change without fundamentally altering its present character, is of very high socioeconomic or tourism value, or of international importance.</td>
</tr>
<tr>
<td>High</td>
<td>The receptor has low capacity to absorb change without fundamentally altering its present character, is of high socioeconomic or tourism value, or of national importance.</td>
</tr>
<tr>
<td>Medium</td>
<td>The receptor has moderate capacity to absorb change without significantly altering its present character, has some socioeconomic or tourism value, or is of regional importance.</td>
</tr>
<tr>
<td>Low</td>
<td>The receptor is tolerant of change without detriment to its character, is low socioeconomic or tourism value, or local importance.</td>
</tr>
<tr>
<td>Negligible</td>
<td>The receptor is resistant to change and is of little socioeconomic or tourism value.</td>
</tr>
</tbody>
</table>

### Assessment of Effects

#### Magnitude of Effect

12.3.6 The next step in assessing potential effects was to assess the magnitude of each potential effect.

12.3.7 The magnitude of potential economic effects was assessed using an economic model that has been used to assess the economic effects of around 40 wind farms around the UK. This model was also the basis of an assessment of the economic effects of the UK onshore wind sector for the Department of Energy and Climate Change and Renewable UK (BiGGAR Economics, 2012).

12.3.8 The magnitude of effects on tourism receptors was assessed with reference to the evidence from previous research on the impact of wind farms on tourism and experience from existing and proposed developments elsewhere. In particular, this chapter draws on the conclusions of work undertaken by the Moffat Centre on behalf of the Scottish Government in 2008 on the effects of wind farms on tourism and also more recent VisitScotland research from April 2012 on consumer attitudes to wind farms and their effects on tourism (VisitScotland, 2012).

#### Magnitude Criteria

12.3.9 Table 12.2 summarises the magnitude criteria that were used in this assessment.
Table 12.2: Magnitude Criteria

<table>
<thead>
<tr>
<th>Descriptor or Criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Total loss or major alteration to key elements/features of the baseline conditions such that post development character/composition of baseline condition will be fundamentally changed. For example, a major long term alteration of community profile and business structure or a substantial change to tourism numbers resulting in the area being considered a less/more attractive place to visit.</td>
</tr>
<tr>
<td>Medium</td>
<td>Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition of the baseline condition will be materially changed. For example a moderate alteration of community profile and business structure or a substantial change to tourism numbers resulting in the area being considered a less/more attractive place to visit.</td>
</tr>
<tr>
<td>Low</td>
<td>Minor shift away from baseline conditions. Changes arising from the alteration will be detectable but not material; the underlying character/composition of the baseline condition will be similar to the pre-development situation. For example a noticeable long term alteration of community profile and business structure or a small and short term change in tourism numbers resulting in the area being considered a less/more attractive place to visit.</td>
</tr>
<tr>
<td>Negligible</td>
<td>Very little change from baseline conditions. Change is barely distinguishable, approximating to a “no change” situation.</td>
</tr>
</tbody>
</table>

Significance Criteria

12.3.10 By combining the sensitivity of the resource with the predicted magnitude of change, the significance of the effect can be determined. This is undertaken using Table 12.3. The significance can be beneficial or adverse. Moderate and Major effects (shaded boxes) are considered to be significant effects in terms of the EIA regulations.

Table 12.3: Significance Criteria

<table>
<thead>
<tr>
<th>Magnitude of Effect</th>
<th>Sensitivity of Receptors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very High</td>
</tr>
<tr>
<td>High</td>
<td>Major</td>
</tr>
<tr>
<td>Medium</td>
<td>Major</td>
</tr>
<tr>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>Negligible</td>
<td>Minor</td>
</tr>
</tbody>
</table>

12.4 Baseline Conditions

Socioeconomic Baseline Conditions

Strategic Context

National Economic Strategy

on earlier strategies published in 2007 and 2011 and maintains a focus on six priority sectors, including energy. Energy is one of the six sectors that the Scottish Government has identified as offering opportunities for growth. The strategic role of renewable energy for the Scottish economy can also be seen on the front cover since one of the five images includes a wind turbine and the full page image of a wind farm that precedes the executive summary.

**Regional Economic Strategy**

12.4.2 The draft South Ayrshire Economic Development Strategy 2013-2023 identifies seven future goals for South Ayrshire, one of which is a more diversified economy. The need to diversify the economy is relevant to this study. The strategy acknowledges that South Ayrshire has a lot less people (22%) employed in the Scottish Government’s six priority industries compared to the rest of Scotland (31%). Diversification into these industries (one of which is energy) will help to create a more resilient economy.

**Population**

12.4.3 The population of the data zones that form the Local Area is 8,238, 7% of the population of South Ayrshire. The demographic profile of the Local Area is considerably older than South Ayrshire and Scotland as a whole, with a quarter of the local population over the age of 65. In addition, the Local Area has a lower proportion of working age people than both South Ayrshire and Scotland as a whole.

<table>
<thead>
<tr>
<th>Table 12.4: Population of Study Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Local Area</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Population</td>
</tr>
<tr>
<td>Under 16</td>
</tr>
<tr>
<td>16-64</td>
</tr>
<tr>
<td>65+</td>
</tr>
</tbody>
</table>


**Economic Indicators**

12.4.4 The proportion of individuals who are economically active in South Ayrshire is marginally higher than that for Scotland as a whole and median gross weekly income is £50 higher in South Ayrshire than the rest of Scotland. South Ayrshire has a higher unemployment rate (8.0%) than the Scottish average of 6.6%.

**Key Employment Sectors**

12.4.5 Information about the structure of the economy is provided by the Business Register and Employment Survey (BRES) published by the Office for National Statistics. This indicates that in 2013 2,300 people were employed in the Local Area, representing 5% of total employment in South Ayrshire.

12.4.6 The largest source of employment in the Local Area is in the manufacturing sector. This sector accounts for more than a fifth of those in employment, more than double the South Ayrshire average of 10.2% and more than triple the Scottish average of 7.1%. A significant number of these manufacturing jobs are within the distilling, rectifying and blending of spirits sector as there is a whisky distillery in the Local Area.
12.4.7 Retail is also a more significant sector of employment in the Local Area than the rest of South Ayrshire, supporting 16.7% of employment in the area. The accommodation and food services sector, which is an important part of the tourism sector, accounts for 7.2% of employment in the Local Area. This is broadly in line with the average across Scotland, but significantly lower than South Ayrshire as a whole, where it accounts for 11.2% of employment.

Conclusions on Socioeconomic Baseline

12.4.8 The factors considered in the socioeconomic baseline indicate that the Local Area accounts for 7% of the population of South Ayrshire and has a demographic profile that is significantly older than both South Ayrshire and Scotland as a whole.

12.4.9 The largest source of employment in the Local Area is the manufacturing sector, which accounts for more than a fifth of those in employment. The accommodation and food services sector, which is an important part of the tourism sector, accounts for 7.2% of employment in the Local Area indicating that tourism makes less of a contribution to local employment than elsewhere in South Ayrshire (where it contributes 11.2% of employment).

12.4.10 The sensitivity of an economy to change will depend on the size and scale of the economy in relation to the potential effect of the change in question. It will also depend on the diversity of the economy in question and the relative importance of the sector in which the change is expected to occur. The scale of the proposed development in relation to the regional economy implies that the regional economy would be moderately sensitive to change but national economy is much larger and more diverse and so the sensitivity of the national economy was assessed as low.

Tourism Baseline Conditions

Research on Wind Farms and Tourism

Moffat Centre Research

12.4.11 The research commissioned by the Scottish Government (Moffat Centre, 2008) was based on an extensive literature review and a survey. The literature review considered 40 studies from the UK and Ireland and reports from Denmark, Norway, the US, Australia, Sweden and Germany and found that there was no evidence to suggest that wind farms have a serious negative economic effect on tourists.

12.4.12 The survey gathered the views of 380 tourists in four areas (Caithness and Sutherland; Stirling, Perth and Kinross; Scottish Borders; Dumfries and Galloway) and was undertaken at locations that maximised the likelihood that respondents would have seen a wind farm during their visit. The key findings were that:

- 75% of people felt that wind farms had a positive or neutral effect on the landscape;
- 2% of those interviewed who had seen a wind farm in the area (4 respondents out of 191) said that it would affect their decision to visit the area again, 2 indicated that the likelihood would increase and 2 that it would decrease;
- after seeing a photomontage of a local wind farm before and after development, 3% of respondents said that it would affect their decision to visit the area again; and
• after seeing a photomontage of a local wind farm before and after an extension was added, 7% of respondents said that it would affect their decision to visit the area again.

12.4.13 The study identified two potential effects: visibility from tourist routes (impacting on decisions to return) and visibility from accommodation (impacting prices some tourists might be prepared to pay). Overall the study concludes that the effects of meeting renewables targets on tourism are so small that, provided planning and marketing are carried out effectively, there is no reason why the two are incompatible.

Visit Scotland Research

12.4.14 This research (VisitScotland Insight Department, 2012) found that for 83% of residents in Scotland the decision to holiday in Scotland would not be affected by the presence of a wind farm. This study also found that 80% of respondents in Scotland, when asked about holidays and short breaks in the Scottish countryside, disagreed or felt neutral that wind farms spoilt the look of the Scottish countryside. Almost half (46%) of respondents in Scotland stated they would be interested in visiting a wind farm visitor centre.

Scottish Parliament Inquiry

12.4.15 During 2012, the Economy, Energy and Tourism Committee of the Scottish Parliament heard evidence from a wide range of experts as part of an inquiry into the achievability of the Scottish Government’s 2020 renewable energy targets, the merits of the targets, and what the risks and barriers are to realising them. Tourism was one of the issues investigated by the Inquiry and the evidence considered included both the Glasgow Caledonian University and VisitScotland reports cited above, as well as a range of other studies. The findings of the Committee were published in November 2012 (Scottish Parliament Economy, Energy and Tourism Committee, November 2012) and are reiterated below:

12.4.16 “While some strongly held localised and anecdotal opinion exists, the Committee has seen no empirical evidence which demonstrates that the tourism industry in Scotland will be adversely affected by the wider deployment of renewable energy projects, particularly onshore and offshore wind.”

12.4.17 “Whilst care always needs to be taken in terms of the planning process and decisions on the siting of individual projects in areas popular with tourists and in our rural and wild land areas, no one has provided the Committee with evidence, as opposed to opinion, that tourism is being negatively affected by the development of renewable projects. However, given the importance of this issue, the Committee recommends that VisitScotland and the Scottish Government continue to gather evidence on this from visitors to Scotland.”

BiGGAR Economics Research

12.4.18 This has been confirmed by analysis of wind farm development and tourism employment trends between 2008 and 2011 in each local authority area in Scotland (BiGGAR Economics, 2013). The analysis found that there was no correlation between changes in wind farm capacity and tourism employment trends. The detailed findings showed that, at the end of 2011, the South Ayrshire Council area accounted for around 11% of the installed capacity of onshore wind in Scotland and that total installed capacity in the area had increased by more than 135% between 2008 and 2011. Over the same period however tourism employment in the South Ayrshire
Council area also grew, by 4.7% (bucking the national trend which saw a 2.5% decrease in tourism employment).

**Strategic Context – National and Regional Tourism Strategy**

12.4.19 Tourism Scotland 2020 (Scottish Tourism Alliance, June 2012) is Scotland’s main tourism strategy. Its primary goal is to increase the annual overnight visitor spend by £1 billion in 2011 prices. The largest target market for this growth is visitors from within the UK. The strategy intends to achieve this growth through four priorities, one of which is building sustainable tourism. As part of achieving this priority the strategy states that industry should seek out practices that benefit communities and the environment.

12.4.20 Tourism policy in the area is guided by the Ayrshire & Arran Tourism Strategy 2012/17 (Ayrshire Economic Partnership, 2011). The main objectives of the strategy are to increase visitor numbers in the area by 10% and to increase annual visitor spend by 20%. The strategy identifies eight attributes of Ayrshire and Arran that attract tourists and have the potential to develop and grow: culture and heritage (including Burns activities and natural environment, golf, sailing, Arran, food and drink, islands, weddings and civil partnerships, business tourism and events and festivals. The Local Area (e.g. Barr, Dailly) is not mentioned in the tourism strategy.

**Value and Volume Of Tourism**

12.4.21 Sustainable tourism is one of seven growth sectors identified in the Scottish Government’s Economic Strategy. Data from the BRES shows that in 2013, sustainable tourism, as defined by the Scottish Government, accounted for 13.3% of employment in South Ayrshire. This is significantly higher than the proportion of tourism related employment across Scotland as a whole (8.5%) and higher than the Local Area (7%). This suggests that tourism is somewhat less important to the Local Area than to other parts of South Ayrshire.

12.4.22 According to the Scottish Government there were 390 registered tourism enterprises in South Ayrshire in 2012, 12% of all registered enterprises in South Ayrshire. The total turnover of these enterprises in 2012 (latest figures available) was estimated at £181 million and their contribution to Scottish Gross Value Added (GVA) in 2012 (latest figures available) was estimated at £83 million. This represents approximately 7% of the total GVA of South Ayrshire (Scottish Government, 2015).

12.4.23 VisitScotland estimate that 0.7 million people from the rest of the UK and 72,000 people from overseas visited the Ayrshire and Arran region in 2013. These visitors spent a combined total of £169 million (VisitScotland, 2014).

**Reasons for Visiting**

12.4.24 VisitScotland (2012) commissioned a national visitor survey that was undertaken during 2011 and 2012. Regional results for Ayrshire and Arran show that the most important reason for visiting the area, as mentioned by 27% of visitors, was the scenery and landscape. Other important reasons included previously visiting the area (as mentioned by 20% of visitors) and visiting a particular attraction (18%).

12.4.25 The visitor survey also includes information about the types of activities visitors engage in while in an area. It shows that the most popular activities on visits to Ayrshire and Arran were visiting a beach (as mentioned by 52% of visitors) and visiting a historic venue (51%). Trying local food was mentioned by 44% of visitors and 42% mentioned taking a short walk.
Tourist Attractions

12.4.26 According to VisitScotland (2014) the top five visitor attractions in the Ayrshire and Arran region in 2013 were Dean Castle Country Park, Robert Burns Birthplace Museum, Culzean Castle and Country Park, Heads of Ayr Farm Park in Ayr and Dick Institute Museum in Kilmarnock. None of these attractions are located within 5 km of the proposed development.

12.4.27 Barr is a conservation village located approximately 4 km south of the proposed development. The village website (www.barvillage.co.uk) lists walks, cycling and fishing as the main attractions in the area. Although a conservation village, Barr is not mentioned in the Ayrshire & Arran Tourism Strategy indicating that the village is not seen as a tourism driver for Ayrshire (although there are local aspirations to develop and promote tourism in the village) and therefore can be considered as having low sensitivity to change.

12.4.28 Brunston Castle golf course is situated approximately 4 km north of the proposed development. As the golf course is primarily of local importance it can also be assessed as having low sensitivity.

12.4.29 The main focus of tourism activity in the local area is the Girvan Valley to the north of the proposed development and the town of Girvan, which is situated on the Ayrshire coast around 10 km from the site. Girvan’s attractions include the Stumpy Tower originally built as a prison and the coastal scenery, which includes the island of Ailsa Craig, which is just offshore. The primary access route to Girvan is from the A77 which follows the coast. The importance of Girvan and the Girvan Valley as a focus for local tourism activity was taken into account at the design stage, with a number of turbines that had originally been proposed for the area around Barony Hill and Cairn Hill to the north and east of the site dropped in order to reduce potential visual effect in the Water of Girvan valley. This substantially reduces the sensitivity of these tourism assets to change and makes it reasonable to scope them out of this assessment.

12.4.30 The Galloway Forest Park was the first park in the UK to be awarded Dark Sky Park status from the International Dark Sky Association in November 2009. It is one of only three dark sky parks in Europe. The Scottish Dark Sky Observatory is situated on the Craigengillan estate, outwith the Galloway Forest Dark Sky Park and is open to the public for stargazing. The Observatory is located approximately 20 km from the proposed development. The Park is undoubtedly a driver of tourism but as the proposed development is not within the Park it can assessed as having low sensitivity.

12.4.31 The Trump Turnberry golf course and resort is located 10 km north west of the proposed development. The golf course is a championship course that has hosted the Open in the past, most recently in 2009 (www.turnberry.co.uk/british-open-championship, accessed 13th March 2015) and as such can be considered a national tourism resource. The sensitivity of the resort to change will be determined by the extent to which the proposed development might be expected to change the behaviour of tourists visiting the resort. In April 2014 the Turnberry was purchased by Donald Trump, who at the time was quoted as saying “we will be spending a great deal of time, effort and money to make Trump Turnberry the finest resort of its kind anywhere in the world.” (Scotsman, 16th December 2014). The existing Hadyard Hill wind farm was operational at the time of the purchase and some turbines (1-10 turbines) are visible from the some parts of the course. However, as a links gold course, the primary views are of the coastline and out to sea. Given that the visibility of some turbines has not discouraged significant investment, the sensitivity of the resort was assessed as low.
Tourist Accommodation

12.4.32 Details about the tourist accommodation available within 5 km of the proposed development was gathered by undertaking a search of the VisitScotland website. This was supplemented by information from local area specific websites (e.g. www.barrvillage.co.uk) as well as online booking websites such as booking.com. This was further supplemented by a general Google search.

12.4.33 Tourist accommodation identified includes 5 self-catering properties and 7 bed and breakfast establishments. These were primarily concentrated around the settlements of Dailly and Barr, to the north and south of the proposed development respectively.

12.4.34 Delamford Farm House, a bed and breakfast establishment, is located within the site boundary. Its website includes a panoramic video of the view from Hadyard Hill, where the turbines of the existing Hadyard Hill wind farm are clearly visible.

12.4.35 All of these accommodation providers are relatively small. This means that any significant adverse effects on these businesses would have a negligible effect on the local tourism sector as a whole. The size of these businesses does however mean that even very small changes to the local tourism market could have a substantial effect on the viability of individual businesses.

12.4.36 The sensitivity of individual accommodation providers to change would depend on the extent to which the behaviour of potential guests might be influenced by the presence of the proposed development. The fact that there is already an operational wind farm on the site and nearby accommodation providers continue to operate suggests that customers are relatively insensitive to this type of development. For this reason the sensitivity of individual accommodation providers was assessed as low.

Tourist Routes

12.4.37 VisitScotland promotes a series of 12 sign-posted tourist routes throughout Scotland. The National Tourist Routes are designed to provide tourists with an alternative to the main trunk roads and motorways. The closest of these to the site is the Galloway Tourist Route which stretches from Gretna, through Dumfries and the Galloway Forest Park, ending in Ayr. The route follows the A713 approximately 15 km to the east of the site and does not pass along any of the roads close to the proposed development.

12.4.38 The sensitivity of the route can be assessed by considering the length of the route in relation to the scale of the proposed development. The length of the route is relevant because the sensitivity to change will vary in proportion to how much of the route will be significantly altered by the proposed development. This suggests that the longer the route, the less sensitive it is likely to be to changes that will only affect a small proportion of the route. As the Galloway Tourist Route is 155 km in length, the sensitivity of the route can be assessed as low.

12.4.39 Sustrans is a charity dedicated to sustainable travel choices. It publicises a network of national long-distance cycle routes including 10 in Scotland. The closest cycle route to the proposed development is the route known as Lochs and Glens South stretching from Carlisle to the centre of Glasgow, part of National Route 7 linking Sunderland and Inverness. A stretch of the route passes through the Galloway Forest Park to the east of the proposed development and continues through Maybole towards Ayr. The route is 344 km in length and as such it is reasonable to expect that the cycle route would have the capacity to absorb change without significantly altering its
present character. For this reason, the sensitivity of this route was also assessed as low.

12.4.40 There are several low level walking trails within a 5 km radius of the proposed development. These are promoted by Ayrshire Paths on their website (www.ayrshirepaths.org.uk). The paths closest to the site are concentrated towards the periphery, at Dailly to the north of the proposed development and Barr to the south. There are five routes listed in and around Barr and four around Dailly. The walks range from 4.5 km in length to over 10 km and many of the routes are marked. All of these routes are of local significance and as such can be assessed as having low sensitivity.

12.4.41 In addition to these routes there is also a network of core paths in the local area. Under the Scottish access legislation, each local authority and national park authority in Scotland has a duty to draw up a plan of core paths in their area. These plans are informed by consultation with local communities, land managers and path users. Core path number 46 from Lindsayton east of Dailly passes through a section of the site towards the west, following the access track of the existing Hadyard Hill wind farm. Core path 55 follows the unclassified track between Crosshill in the north and the Stinchar valley in the south. Although core paths can be used by anyone, including tourists and day visitors, in practice the routes included tend to be those that are most popular with local residents and as such should be considered primarily as local leisure assets rather than tourism assets. In addition, none of the core paths would be blocked during construction and if there is a need for diversion it would be temporary to ensure a safe walking route. For these reasons the core paths can be assessed as having low sensitivity to change.

12.4.42 Scotways, The Scottish Rights of Way and Access Society identify a right of way SKC7, also known as the Old Road through Straiton, for consideration in their response to the EIA Scoping Report. The path is almost 19 km in length and passes the south-east corner of the site, just south of Dalquhaim. This right of way is promoted for its historic interest by the Heritage Paths project (www.heritagepaths.co.uk) and in the “Scottish Hill Tracks” book, which is published by Scotways and is available to buy. It is not however mentioned specifically by common walking information sites or the Ayrshire Paths website. As such it is likely to be of interest primarily to leisure users with prior knowledge of the local area. As the walking route is likely to be of local importance only and due to the length of the route, the sensitivity to change has been assessed as low.

12.5 Likely Significant Effects

Construction Effects

12.5.1 During the construction phase the potential significant effects of the proposed development could include:

- temporary beneficial effects on local tourism businesses as a result expenditure by workers involved with the proposed development spending money on items such as food and accommodation; and
- temporary beneficial effects on the local, regional and national economy as a result of expenditure associated with the construction of the proposed development.
Construction Expenditure

12.5.2 The proposed development is expected to include 31 turbines, each with capacity of up to 3.4MW with a combined installed capacity of up to 105.4MW. Based on research undertaken by BiGGAR Economics on behalf of the Department of Energy and Climate Change (DECC) and RenewableUK (BiGGAR Economics, 2012), the average expenditure on the development and construction of wind farms is at least £1.2 million per MW. Therefore the total development and construction cost (Capex) of the proposed development was estimated at £126.6 million.

12.5.3 The capital expenditure consists of four main categories of contracts and the proportion of construction spending on each type of contract is based on the DECC research. The values of these contracts for the proposed development were estimated by applying these percentages to the total construction expenditure. The values of these contract categories are given in the table below.

<table>
<thead>
<tr>
<th>Table 12.5: Capital Expenditure by Contract Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Capex</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Development and Planning</td>
</tr>
<tr>
<td>Balance of Plant</td>
</tr>
<tr>
<td>Turbine</td>
</tr>
<tr>
<td>Grid Connection</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Source: BiGGAR Economics, February 2015

12.5.4 The economic effect of the development and construction phase was estimated for South Ayrshire and Scotland. In order to do this it was necessary to estimate the proportion of each type of contract that could be secured in each of the study areas. This analysis was based on the averages from the DECC report and analysis of the industries and professions in each of the study areas as identified in the economic baseline. To estimate the expenditure for each contract in each of the study areas these percentages are applied to the estimated size of each component contract. The capital expenditure by study area and contract type is given in the table below.

<table>
<thead>
<tr>
<th>Table 12.6: Capital Expenditure by Study Area and Contract Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Development and Planning</td>
</tr>
<tr>
<td>Balance of Plant</td>
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<td>Turbine</td>
</tr>
<tr>
<td>Grid Connection</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Source: BiGGAR Economics, February 2015
12.5.5 The largest opportunity for South Ayrshire would be with the balance of plant and development and planning contracts. Companies in South Ayrshire could secure a quarter of the balance of plant contracts worth up to £8.0 million and 23% of the development and planning contracts worth up to £2.4 million. In total, South Ayrshire could secure 11% of the value of the Capex worth up to £14.2 million.

12.5.6 Scotland could secure up to 44% of the total Capex worth £55.6 million. This assumes that the towers for the turbines are secured from a Scottish manufacturer, which has been the case for SSE Renewables projects in recent years and which SSE Renewables is committed to maintain.

12.5.7 The contracts awarded in each area would represent an increase in the turnover of businesses in these areas. The effect of this increased turnover on employment was estimated using the average turnover per employee in appropriate sectors derived from the Business Register and Employment Survey (ONS, 2014). The people who are employed on the project will also have an effect on the wider economy when they spend their salaries. The economic effect of the increased expenditure was estimated using the average GVA/turnover ratio and turnover per employee as reported in the Annual Business Survey.

12.5.8 The total economic effect (including income effects) in the construction phase is estimated to be £14.7 million GVA and 136 job years\(^1\) in South Ayrshire and £52.1 million GVA and 439 job years in Scotland.

12.5.9 At the Scottish level, the creation of around 440 job years and an additional £52 million GVA would be barely distinguishable, therefore the magnitude of this change was assessed as negligible. For the South Ayrshire economy, this would be more significant so the magnitude of the effect was assessed as low.

12.5.10 Combining this with the sensitivity of the regional and national economies implies that the overall effect of the proposed development would be negligible at the national level and minor at the regional level and therefore **not significant** in environmental impact assessment terms. However, this is because of the scale of the economy as a whole and an economic impact of this scale would be regarded as welcome to any local or regional economy.

**Expenditure on Food and Accommodation**

12.5.11 The proposed development would have a beneficial effect on the local tourism sector during the construction phase as a result of workers involved with the project staying locally or buying food in the local area. Given the number of workers likely to be involved the magnitude of this effect is likely to be low for the sector as a whole but could be medium for the individual businesses concerned. This effect is most likely to benefit tourism accommodation providers located within 5 km of the site. The potential magnitude of this effect for individual businesses could be medium. When combined with the low sensitivity of these businesses to change this suggests that the overall effect would be minor and therefore **not significant**.

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\(^1\) A job year is defined as the equivalent of one full time job lasting for one year. This is a term that is commonly used in economic impact assessments. This allows for the full employment impacts to be taken account of, including both those positions that will be available during the entire construction period (for example, construction management) and those that will be available for part of the construction (for example, transport of turbines).
Operational Effects

12.5.12 During the operational phase the potential significant effects of the proposed development could include:

- beneficial effects on the regional and national economy as a result of on-going operations and maintenance expenditure associated with the proposed developments;
- beneficial effects on the local economy as a result of any additional public expenditure that could be supported by the additional tax revenue that would be generated by the proposed development; and
- beneficial effects on the local economy and community that could be supported by any community benefit funding that might be provided by the applicant.

12.5.13 The section also considers whether there could be any effects on the tourism sector in the local area.

Operations and Maintenance Expenditure

12.5.14 The operations and maintenance effect of the proposed development was estimated annually as the effect that would persist throughout the 25 year life-span of the proposed development. Annual expenditure on operations and maintenance was estimated by multiplying the installed capacity by the industry average annual expenditure per MW on operations and maintenance. The average annual expenditure per MW was found to be £52,659 in the DECC report. The proposed development is expected to have an installed capacity of up to 105.4MW, which implies that the annual operations and maintenance expenditure of the proposed development is estimated to be £5.6 million. This would amount to £138.8 million over the 25 year life span of the proposed development.

12.5.15 Each study area will be able to secure a proportion of the operation and maintenance contracts. Based on the analysis of the South Ayrshire economy undertaken as part of the baseline assessment, it is estimated that South Ayrshire could secure 35% of the contracts, amounting to £1.9 million and 90% of the contracts could be secured from within Scotland, amounting to £5.0 million.

12.5.16 The total economic effect during the operations and maintenance phase can be estimated in a similar way to the construction phase, using data from the Annual Business Survey. This gives a total annual economic effect of £2.0 million GVA and 14 jobs in South Ayrshire and £5.3 million GVA and 35 jobs in Scotland.

12.5.17 At the Scottish level, the creation of 35 jobs and an additional £5.3 million GVA/year would be relatively small, therefore the magnitude of this change was assessed as negligible. For the South Ayrshire economy the effect would be greater but still small so the magnitude of the effect was also assessed as negligible.

12.5.18 By combining this with the sensitivity of the Scottish and South Ayrshire economies to change, the economic effect of the proposed development during the operational phase was assessed as having a negligible and therefore not significant effect on the Scottish and South Ayrshire economies, in environmental impact assessment terms. However, this is because of the scale of the economy as a whole and the creation of this many jobs in an economy in rural South Ayrshire would usually be welcomed.
Taxation Revenue

12.5.19 The proposed development would contribute to public finances because the operator would be required to pay non-domestic rates. The rate that the proposed development would be required to pay is dependent on the load factor of the proposed development and the total installed capacity. Analysis of data in the Renewables Obligation database (www.ofgem.gov.uk/environmental-programmes/renewables-obligation-ro/renewables-obligation-data-and-statistics accessed 18th February 2015) suggests that the average load factor of Scottish wind farms is 30% so it was assumed that the load factor of the proposed development would also be around 30%. Guidance produced by the Scottish Assessors Association (Scottish Assessors Association, 2011) suggests that the rateable value for a wind farm of this scale and load factor would be calculated on the basis of £24,271 per annum per MW. The total installed capacity of the proposed development would be up to 105.4 MW, which implies a total rateable value of £2.56 million. Non-domestic rates are charged/£ of rateable value at a poundage rate that is currently set at £0.471/£. This implies that the proposed development would be liable to non-domestic rates of up to £1.20 million/year, which amounts to a total of £30.12 million during the 25 year life time of the proposed development.

12.5.20 Non-domestic rates are not retained within the local authority where they are gathered so this additional revenue will not be used directly to fund local services. The additional revenue would however increase the total amount of funding available for public services in Scotland and would therefore have a beneficial effect. Given the indirect nature of the benefit the magnitude of this benefit was assessed as low. When combined with the medium sensitivity of the local economy however this could give rise to a low beneficial effect, which implies that the overall effect would be minor and therefore not significant.

Community Benefit

12.5.21 If approved then the proposed development would attract community benefit funding from the applicant. The applicant's policy on community investment, which has been formulated in consultation with a range of stakeholders, amounts to £5,000 per megawatt per annum, index linked, for the duration of the operation of the wind farm. This is split 50:50 between a specific local community benefit and a wider sustainable energy fund, equating to a combined total of £13.18 million over the 25 year operational period of the proposed development in today's values (although the cash value will be higher as a result of the indexation).

12.5.22 At the local level the magnitude of the socioeconomic effect that could be supported by investment of this scale would be medium. When combined with the medium sensitivity of the local economy to change this implies that the overall effect would be moderate and therefore significant at the local level.

12.5.23 As well as delivering community benefits the focus of the criteria for funding on issues such as skills development means that the funds could also have positive beneficial socio-economic effects, depending on the funding decisions made.

Accommodation Providers

12.5.24 Tourism accommodation providers located in and around Dailly may acquire additional views of up 8-14 turbines or, depending on their location up to 21 turbines (based on Figure 5.7c). Tourism accommodation providers in and around Barr could acquire additional views of 8-14 turbines (Figure 5.7c). The closest tourism
accommodation provider to the site is the Delamford Farm House B&B that may acquire additional views of 15-21 turbines (Figure 5.7c). The magnitude of this effect on these tourism businesses would depend on the extent to which the additional views that they may acquire may influence the behaviour of tourists visiting the businesses.

12.5.25 This effect was assessed with reference to the research evidence cited in section 12.3. This research found that after seeing a photomontage of a local wind farm before and after an extension was added, 7% of respondents said that it would affect their decision to visit the area again. It is reasonable to expect that the extent of this effect may increase in proportion to the extent of views of the proposed development. The magnitude of this effect for accommodation providers in Dailly and Barr was therefore assessed as low.

12.5.26 Other notable accommodation providers in the local area include the Trump Turnberry golf course and resort. However, the hotel is positioned with views over the links and out to sea and so there would be no effect on this provider.

12.5.27 The overall effect on accommodation providers in the local area was therefore assessed as negligible-minor and therefore not significant.

Tourist Routes

12.5.28 The Galloway Tourist Route passes along the A713 between New Galloway and Ayr. It is possible that the route may gain additional views of up to 14 turbines near Dalmellington and views of up to 31 turbines as it approaches Ayr. This would however only apply to very short sections of the route at a substantial distance from the site. The magnitude of the effect was therefore assessed as low. The overall effect was assessed as negligible and not significant.

12.5.29 The Lochs and Glens South cycle route passes through the Carrick Forest toward Maybole and sections of the route may gain views of up to 21 turbines. The potential extent of views from the route and the distance of the route from the site mean that the magnitude of this effect was assessed as medium. The overall effect was therefore assessed as minor and not significant.

12.5.30 The baseline identified a number of low level walking routes within 5 km of the site. The magnitude of any effect on these routes would depend on the extent to which the proposed development might be expected to alter the character of these routes. As there is already an operational wind farm at Hadyard Hill walkers using any of these routes would have a reasonable expectation of seeing wind turbines during their walk so wind turbines can be considered part of the existing character of the routes. The magnitude of the effect of any additional views of wind turbines that may be acquired as a result of the proposed development would therefore be low. When combined with the low sensitivity of the routes this implies that the overall effect would be negligible and therefore not significant.

Tourist Attractions

12.5.31 Brunston Castle Golf Course is primarily a local leisure resource rather than a tourism asset. This means that for most people the decision to use the course will be determined largely by the convenience of the location and the quality of the course itself. The proposed development would not influence this in anyway so therefore the magnitude of this potential impact was assessed as low and the overall effect would be negligible and therefore not significant.
12.5.32 If the proposed development proceeds then the Trump Turnberry Golf Course could acquire views of up to 16 further turbines. As the course already has views of existing turbines and this does not appear to have compromised its potential future performance, the magnitude of this impact was assessed as low. When combined with the low sensitivity of the links course this implies that the overall effect would be negligible and therefore **not significant**.

12.5.33 Potential tourism effects on the village of Barr could occur either as a result of any effects that the development could have on tourist routes, accommodation or attractions within the village. These effects were considered above and were assessed as not significant. There is therefore no reason to expect any significant effect on the village as a whole.

**Decommissioning Effects**

12.5.34 During the decommissioning phase the potential significant effects of the proposed development could include:

- temporary beneficial effects on local tourism businesses as a result expenditure by workers involved in decommissioning the proposed development spending money on food and accommodation; and
- temporary beneficial effects on the local, regional and national economy as a result of expenditure associated with the decommissioning of the proposed development.

12.5.35 Although to date there has been limited decommissioning of onshore wind farms in the UK, the DECC report found that wind energy developers anticipated decommissioning expenditure to be £34,555 per MW. It is therefore estimated that the decommissioning cost of the proposed development would be £3.6 million. It was assumed that South Ayrshire would be able to secure 50% of the decommissioning contracts, amounting to £1.8 million and Scotland could secure 90% of the contracts, amounting to £3.3 million.

12.5.36 As before, the scale of this impact was compared to the overall scale of the economy in each of the study areas in order to assess the magnitude of the effect. For the Scottish and South Ayrshire study areas the effect was assessed as negligible. When combined with the sensitivity of the economies to change, this implies that the proposed development would have a negligible and therefore not significant effect on the Scottish and South Ayrshire economies.

### 12.6 Mitigation

12.6.1 This assessment has not identified any significant adverse effects associated with the proposed development. As such mitigation has not been identified as required. The assessment has however identified potential beneficial effects so it is reasonable to consider how these effects could be enhanced.

12.6.2 These effects would all arise as a result of additional expenditure made by the applicant, appointed contractors and their employees. The magnitude of these beneficial effects in the local area will depend on the proportion of expenditure that occurs in the local area so in order to maximise these beneficial effects the applicant would need to take steps to ensure that local businesses secure as high a proportion of available contracts as possible.
12.6.3 Such steps will include engaging with local businesses to ensure that they are aware of and know how to find out about new business opportunities. This will be achieved by participating in supplier engagement events that give interested businesses the opportunity to meet the applicant and key suppliers and contacting local trade organisations. SSE Renewables has a track record in maximising local supply chain impacts and as the developer, constructor and operator of the proposed development is in a position to ensure that aspirations to maximise the local benefits are realised.

12.7 Residual Effects

12.7.1 The residual significance of the potential effects that could occur during the construction, operational and decommissioning phases that were considered in this chapter are either negligible or minor and therefore not significant.

12.8 Cumulative Effects

12.8.1 As noted in the baseline, the main attraction of the local area for tourists is the landscape. While some limited significant effects on landscape and visual receptors are identified in Chapter 5: Landscape and Visual, there is no evidence to suggest that wind farm developments have a significant effect on tourism (as described in the baseline section (paragraphs 12.4.11 – 12.4.18). The assessment of operational effects of the proposed development found that effects on tourism would be either negligible or minor and not significant. It follows that no significant cumulative effects on tourism would result from the addition of the proposed development to other consented or proposed wind farms. Chapter 5, Landscape and Visual provides a detailed assessment of potential cumulative effects on the landscape and visual receptors.

12.8.2 The proposed development also has the potential to generate beneficial cumulative effects. This could occur if the cumulative result of the various energy related developments in the local area was to encourage the development of a significant local supply chain.

12.8.3 As part of the proposed development the applicant proposals to invest in existing on-site operations and maintenance infrastructure. At present this consists of some temporary constructions that are used as a base for maintenance activity. If the proposed development is approved then the applicant proposes to invest in these facilities to create a more permanent base. This is one way in which the proposed development could contribute to the growth of the local supply chain.

12.8.4 The development of a strong local supply chain would help to increase the economic benefits of these projects in the local area, which could help to increase the magnitude of the long-term beneficial economic effects considered in this chapter. The applicant has a track record of encouraging the development of local supply chains.

12.9 Summary

12.9.1 Potential effects on tourism were taken into account during the design stage of the proposed development and as a result a number of turbines were dropped. Any remaining potential adverse effects on tourism have been assessed as either minor or negligible and therefore not significant.

12.9.2 It is however possible that the proposed development could give rise to temporary beneficial effects on the tourism sector, specifically for accommodation providers.
within 5 km of the site. These effects are however likely to be minor in regional and national terms and therefore not significant.

12.9.3 This assessment has also considered the potential socioeconomic effects of the proposed development. While it has found evidence to suggest that there would be beneficial effects, during all phases of the development, the overall significance of these effects is expected to be negligible-minor and therefore not significant in regional and national terms. Despite this there are steps that the applicant could take to enhance these effects. These steps have been highlighted in section 12.6.

12.9.4 While the socioeconomic effects have been assessed as not significant in environmental impact assessment terms, the proposed development would deliver a range of positive effects for the local economy and the local community. The proposed development represents a major investment in the South Ayrshire and Scottish economies that would deliver a substantial economic effect.

12.9.5 During the construction phase the total economic effect is estimated to be £14.7 million GVA and 136 job years in South Ayrshire and £52.1 million GVA and 439 job years in Scotland.

12.9.6 During the operations and maintenance phase the total annual economic effect is estimated to be £2.0 million GVA and 14 jobs in South Ayrshire and £5.3 million GVA and 35 jobs in Scotland.

12.9.7 The proposed development is also expected to generate a number of other positive economic benefits including, non-domestic rates estimated at more than £30 million during over the 25 year life time of the proposed development and community benefit equating to a combined total of £13.18 million over the 25 year operational period of the proposed development, which have been assessed as significant at the local level.

12.10 References


Moffat Centre (March 2008), The Economic Impacts of Wind Farms on Scottish Tourism, The Scottish Government.


National Statistics (December 2014), Claimant Count, Office for National Statistics.


Scottish Tourism Alliance (June 2012), Tourism Scotland 2020, Scottish Tourism Alliance.


VisitScotland Insight Department (2012), Wind Farm Consumer Research, VisitScotland.


Chapter 13: Aviation

13.1 INTRODUCTION 1
13.2 ISSUES IDENTIFIED DURING CONSULTATION 1
13.3 BASELINE CONDITIONS 2
13.4 CURRENT BASELINE 2
13.5 FUTURE BASELINE 2
13.6 POTENTIAL EFFECTS 3
13.7 MITIGATION 4
13.8 CUMULATIVE EFFECTS 4
13.9 CONCLUSIONS 5
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Appendices
None

Figures
None
13 Aviation

13.1 Introduction

13.1.1 This technical appendix presents a summary of the potential effects on aviation interests in the area of the proposed development.

13.1.2 Aviation interests may be affected by proposed wind farm developments in a number of ways:

- turbines can present a physical obstruction to low flying aircraft or those on approach/departure from airfields or other landing surfaces;
- turbines in close proximity to air-ground-air (AGA) communications facilities or air navigation beacons can cause disruption or interference to signals; and
- turbines within radar line of sight (LOS) to primary surveillance radar (PSR) facilities can cause false plots or "clutter" to be displayed on the systems that air traffic controllers use to provide services to aircraft. This clutter can obscure actual aircraft and cause the air traffic controllers to experience increased controller workload, leading to a degradation of aviation safety parameters. Phenomena such as receiver saturation, shadowing behind the wind turbines, and receiver desensitisation resulting in loss of aircraft targets can also be present (Civil Aviation Authority, 2013).

13.1.3 The aviation stakeholders which the proposed development has the potential to have a significant effect on include:

- Glasgow Prestwick Airport (GPA);
- Ministry of Defence (MOD); and
- NATS En-route plc (NERL);

13.1.4 No other aviation stakeholders have been identified as potentially affected.

13.2 Issues Identified during Consultation

13.2.1 Comments arising from consultation with aviation stakeholders are summarised in Table 3.1:

<table>
<thead>
<tr>
<th>Consultee</th>
<th>Issue</th>
<th>Where/How is this addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA</td>
<td>Turbines likely to be detected by PSR causing degradation to air traffic services.</td>
<td>SSER negotiation with GPA regarding a mitigation contract.</td>
</tr>
<tr>
<td>NATS (on behalf of NERL)</td>
<td>Potential visibility to the following radars:</td>
<td>NATS conducted a technical and operational impact assessment of NERL aviation navigation equipment.</td>
</tr>
<tr>
<td></td>
<td>- Cumbernauld;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Glasgow Airport;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Great Dun Fell;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Kincardine;</td>
<td></td>
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</tbody>
</table>
### Table 3.1 Issues Identified during Consultation

<table>
<thead>
<tr>
<th>Consultee</th>
<th>Issue</th>
<th>Where/How is this addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowther Hill; Perwinnes; Tiree. Potential impact on the following navigation/communications equipment; Turnberry DVOR/DME; AGA comms.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MOD</td>
<td>Presenting a physical obstruction within low flying tactical training area 20T (TTA 20T).</td>
<td>Reduction of proposed development turbine numbers from scoping application.</td>
</tr>
</tbody>
</table>

### 13.3 Baseline Conditions

13.3.1 The following description of the baseline conditions is based on consideration of key legislative and planning information.

### 13.4 Current Baseline

13.4.1 The proposed development lies within uncontrolled airspace designated as part of Tactical Training Area (TTA) 20T. Within this airspace fixed-wing military aircraft can low fly down to 100 feet (ft) minimum separation distance (MSD).

13.4.2 The proposed development lies within the area of operation of a number of radar facilities:
- GPA PSR is 15.8 nm (29.4 km) to the north;
- Lowther Hill PSR/Monopluse Secondary Surveillance Radar (MSSR) is 31 nm (57.4 km) to the east;
- Glasgow Airport PSR is 37.5 nm (69.5 km) to the north;
- Cumbernauld PSR is 45.3 nm (83.9 km) to the north-north-east;
- Kincardine PSR is 57.7 nm (106.9 km) to the north-north-east;
- Great Dun Fell PSR/MSSR is 82.9 nm (153.5 km) to the south-east;
- Perwinnes PSR/MSSR is 144.2 nm (267.1 km) to the north-east; and
- Tiree PSR/MSSR is 104.5 nm (193.6 km) to the north-west.

13.4.3 The proposed development lies, at its closest point, 5 nm (9.26 km) to the south-east of the Turnberry Dopplet VHF Omni-directional Range/Distance Measuring Equipment (DVOR/DME).

### 13.5 Future Baseline

13.5.1 It is anticipated that the airspace would continue to be used by the aviation stakeholders listed in Table 3.1 and that no major changes to aviation navigational
equipment would be made in the foreseeable future; therefore, the baseline would remain as detailed.

13.6 Potential Effects

Potential Construction Effects

13.6.1 The infrastructure required during construction would have no significant effect on radar systems as most systems require movement to identify and report a track. No effect on radar operations is expected until turbines become operational.

13.6.2 The construction infrastructure, given its height, would present a physical obstruction and have a significant effect on low flying aircraft in the vicinity of the proposed development.

Potential Operational Effects

Effects on GPA PSR

13.6.3 GPA air traffic controllers provide air traffic control (ATC) services utilising data from the airfield PSR. False aircraft returns would be seen in the vicinity of the proposed development as a result of wind turbine visibility. These unwanted returns would have the potential to obscure aircraft, and would have a major adverse effect on the availability and quality of ATC services.

Effects on Other PSR

13.6.4 In January 2015, NATS produced a technical and operational impact assessment of the proposed development on its ATC infrastructure. The assessment concluded that there would be no operational impact any of the other PSR identified, namely Lowther Hill, Glasgow Airport, Cumbernauld, Kincardine, Great Dun Fell, Perwinnes, and Tiree radar facilities.

Effects on MSSR

13.6.5 Aviation studies have shown that the effects of wind turbines are not observed on MSSR facilities unless the turbines are located at very close range to the radar receiver. Civil Aviation Authority (2013) suggests this range is 10 km, and Eurocontrol guidelines (EUROCONTROL, 2014) suggest this range is 16 km (based on a three bladed turbine of between 30-200 m to blade tip). Given that the proposed development is more than 50 km from the MSSR at Lowther Hill, no effects are predicted.

Effects on Other Navigation and Communications Equipment

13.6.6 NATS assessed the potential effect of the proposed development on the Turnberry DVOR/DME and found that there would be a technical impact but that it would be deemed as acceptable. It also concluded that there would be no effect on AGA communications.

Effects on Military Low Flying

13.6.7 The MOD have designated part of TTA 20T as a "preferred for windfarms" area. The proposed wind farm lies outside this designated area. An accumulation of wind turbines outside of this area would have the potential to restrict the MOD's low flying training area. The applicant consulted with the Defence Infrastructure Organisation (DIO) regarding the potential effects associated with the proposed development. The
DIO responded in January 2015 indicating that revised turbine layout “may” have an impact on low flying operations.

**Potential Decommissioning Effects**

13.6.8 The potential effects of decommissioning are considered to be equivalent to the worst case effects assessed during construction of the turbines.

**13.7 Mitigation**

**Standard Mitigation**

13.7.1 The following standard mitigation measures would be implemented at the proposed development:

- information on the height and aviation lighting configuration of construction infrastructure, such as cranes, would be provided to the Defence Geographic Centre for inclusion on aviation charts and to be notified to airspace users; and
- information on the location, dimensions and aviation lighting configuration of the proposed development would be notified to the Defence Geographic Centre for marking on aviation charts and for use in aviation documentation.

**Technical Mitigation Solution for GPA PSR**

13.7.2 The applicant has commenced negotiations with GPA in relation to a radar mitigation contract to allow a technical mitigation to rectify the impact of the proposed development on the PSR. Upon signing the agreement with the airport the applicant would commit to contributing towards the funding of the mitigation.

**Mitigation for Military Low Flying**

13.7.3 Following consultation with the DIO, it is understood that the MOD may request that the turbines are fitted with red or infrared aviation lighting. The applicant would continue to work with the MOD to agree suitable aviation mitigation, based on infrared lighting to avoid any potential visual effects associated with lighting.

**13.8 Cumulative Effects**

13.8.1 The proposed development when considered alongside the existing Hadyard Hill Wind Farm and the consented Assel Valley and Tralorg wind farms, would cause a decrease in the useable area of the military tactical low flying area (TTA 20T). The applicant has already decreased the area of the proposed development following the DIO response to scoping.

13.8.2 The inclusion of infrared aviation lighting at the proposed development would help aircrews identify the obstructions at night and the applicant would seek agreement with the MOD regarding a suitable aviation lighting scheme.

13.8.3 The availability of a technical aviation mitigation solution at GPA would not be impacted by the cumulative effects of proposed and consented developments in the region. The greater the number of developments that reach agreement with the airport regarding a technical mitigation contract could lead to the mitigation solution becoming more affordable for the airport.
13.9 Conclusions

13.9.1 No residual operational effects are anticipated following the implementation of the mitigation identified.

13.9.2 The applicant would continue its negotiations with GPA to agree an aviation mitigation contract as soon as practicable allowing the airport to raise no objection to the proposed development. The applicant and GPA agree that the proposed development would have a significant effect on the airport’s PSR and that an aviation mitigation contract to deliver a suitable mitigation solution would enable the airport to not object.

13.9.3 The DIO has stated that the proposed development "may" have an impact on low flying operations. The applicant will continue to engage with the DIO to agree a suitable aviation lighting scheme.

13.9.4 The NATS technical and operational assessment concluded that the proposed development would not have an impact on NATS radars, aviation navigation or air-ground-air communications facilities. Consequently, with mitigation, the site is not considered to be in an area that would have an operational significance to NATS, NERL and Glasgow Prestwick Airport.

13.10 References


13.11 Glossary

<table>
<thead>
<tr>
<th>AGA</th>
<th>Air-ground-air</th>
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<tbody>
<tr>
<td>ATC</td>
<td>Air Traffic Control</td>
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<tr>
<td>DIO</td>
<td>Defence Infrastructure Organisation</td>
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<tr>
<td>DME</td>
<td>Distance Measuring Equipment</td>
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<tr>
<td>DVOR</td>
<td>Doppler VHF Omni-directional Range</td>
</tr>
<tr>
<td>GPA</td>
<td>Glasgow Prestwick Airport</td>
</tr>
<tr>
<td>LOS</td>
<td>Line of Sight</td>
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<tr>
<td>MOD</td>
<td>Ministry of Defence</td>
</tr>
<tr>
<td>MSD</td>
<td>Minimum Separation Distance</td>
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<tr>
<td>MSSR</td>
<td>Monopulse Secondary Surveillance Radar</td>
</tr>
<tr>
<td>nm</td>
<td>Nautical mile</td>
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<tr>
<td>NERL</td>
<td>NATS En-route plc</td>
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<tr>
<td>PSR</td>
<td>Primary Surveillance Radar</td>
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<td>TTA</td>
<td>Tactical Training Area</td>
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</tbody>
</table>
Chapter 14: Summary

14.1 INTRODUCTION 1

14.2 SUMMARY OF MITIGATION AND RESIDUAL EFFECTS 1

Appendices

None

Figures

None
14 Summary

14.1 Introduction

14.1.1 The purpose of this chapter is to summarise the mitigation measures proposed in each of the technical chapters to avoid, reduce, or offset impacts which would otherwise give rise to significant residual environmental effects.

14.1.2 The main aim of the design process was to ‘design out’ potential for environmental effects as far as possible. This chapter does not summarise ‘mitigation by design’. This chapter covers the mitigation measures proposed to avoid, reduce or off-set design, construction, operation and decommissioning phase residual environmental effects of the proposed development. In the case of socio-economics, proposed mitigation measures would enhance beneficial effects.

14.1.3 The majority of the pre-construction and construction phase mitigation would be delivered through a Construction Environmental Management Plan (CEMP). The outline content of the proposed CEMP is provided in Technical Appendix 2.4: Construction Environmental Management Plan. Further detail on specific mitigation measures to be included in the CEMP is contained in each of the technical chapters.

14.2 Summary of Mitigation and Residual Effects

14.2.1 The predicted effects and mitigation measures have been compiled into Table 14.1. They are presented in the order in which they appear within this ES:

- Landscape and Visual Amenity;
- Noise;
- Hydrology and Hydrogeology;
- Archaeology and Cultural Heritage;
- Ecology;
- Ornithology;
- Transport;
- Socioeconomics and Tourism; and
- Aviation.
Table 14.1: Summary of Mitigation and Residual Effects

<table>
<thead>
<tr>
<th>Topic</th>
<th>Likely Significant Effect (without mitigation)</th>
<th>Mitigation Measures</th>
<th>Effect</th>
<th>Timing</th>
<th>Residual Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscape and Visual</td>
<td><strong>Construction</strong>&lt;br&gt;• Short-term and long-term physical effects on landscape elements, landscape character types (LCTs) and views.&lt;br&gt;• Short-term cumulative effects.</td>
<td>Mitigation has been achieved through design, through careful siting of the turbines and infrastructure. No additional mitigation measures have been identified.</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>• significant effects on parts of LCTs within 7 km (including corresponding parts of South Carrick scenic area and Bargany Garden and Designed Landscape (GDL));&lt;br&gt;• significant cumulative effects in localised parts of Middle Dale and Intimate Pastoral Valley LCT (scenario 2: considering application stage proposals as well as existing, in construction and consented proposals);&lt;br&gt;• significant effects on nine of 22 representative viewpoints (all within 10 km);&lt;br&gt;• significant cumulative effects on two representative viewpoints (scenario 2);&lt;br&gt;• significant effects in parts of the settlements of Barr and Dailly, with cumulative effects in Dailly (scenario 2);</td>
</tr>
<tr>
<td></td>
<td><strong>Operation</strong>&lt;br&gt;• Long term effects on landscape character, and views.&lt;br&gt;• Long term cumulative effects with other wind farms.</td>
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<tr>
<td></td>
<td><strong>Decommission</strong>&lt;br&gt;• Short-term physical effects on landscape elements.&lt;br&gt;• Short-term effects on landscape character.&lt;br&gt;• Short-term effects on views.</td>
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</table>

April 2015
### Table 14.1: Summary of Mitigation and Residual Effects

<table>
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<tr>
<th>Topic</th>
<th>Likely Significant Effect (without mitigation)</th>
<th>Mitigation Measures</th>
<th>Effect</th>
<th>Timing</th>
<th>Residual Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>Construction and Decommissioning</td>
<td>None.</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>No significant effects.</td>
</tr>
<tr>
<td></td>
<td>• None.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• Predicted noise levels for all activities comply with BS5228 criteria at all receptors.</td>
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<tr>
<td></td>
<td>Operation</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• None.</td>
<td></td>
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<tr>
<td></td>
<td>• Cumulative operational noise from the proposed development with the existing Hadyard Hill wind farm will meet the total ETSU-R-97 noise limits at all receptors.</td>
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</tbody>
</table>

- significant effects on short sections of the B741, B734, and cumulative effects on the B741(scenario 2).
### Table 14.1: Summary of Mitigation and Residual Effects

<table>
<thead>
<tr>
<th>Topic</th>
<th>Likely Significant Effect (without mitigation)</th>
<th>Mitigation Measures</th>
<th>Effect</th>
<th>Timing</th>
<th>Residual Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrology and Hydrogeology</td>
<td><strong>Construction, Operation and Decommissioning</strong></td>
<td>• None.</td>
<td>Monitoring.</td>
<td>Construction and decommissioning Phase.</td>
<td>• No significant effects.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Through successful mitigation by design and industry good practice measures it is considered that there are no likely significant effects associated with the proposed development.</td>
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<tr>
<td></td>
<td></td>
<td>No mitigation is required to address significant effects. Additional specific good practice management and monitoring measures are proposed including:</td>
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<tr>
<td></td>
<td></td>
<td>• Preparation and implementation of a site-specific and tailored programme of water quality monitoring to ensure that the effects on surface water quality and public and private water supplies are appropriately monitored.</td>
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</tr>
<tr>
<td>Archaeology and Cultural Heritage</td>
<td><strong>Construction and Decommissioning</strong></td>
<td>• Given the identification of known prehistoric, medieval and post-medieval assets within the site, there is a possibility that hitherto unknown buried archaeological remains survive within the site. These could be subject to potential direct effects;</td>
<td>Reduction and/or Avoidance of Effect.</td>
<td>Preconstruction and Construction Phases.</td>
<td>• No significant effects.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• the development layout and infrastructure have been finalised such as to avoid all</td>
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<td></td>
<td></td>
<td>A watching brief would be undertaken during groundworks associated with the access track to the met mast close to turbine 27, turbines 30 and 31, the met mast on Milton Hill and the access tracks which link between them to identify any potential direct effects on unknown assets, to assess their value and to mitigate any effect either through avoidance or preservation by record.</td>
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</tr>
</tbody>
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<tbody>
<tr>
<td>Archaeology and Cultural Heritage</td>
<td>direct impacts on known cultural heritage assets.</td>
<td>No mitigation is required to address significant effects on known assets. Additional good practice measures proposed include: • all known sites within 50 m of the proposed development (working areas) will be fenced off with a visible buffer under archaeological supervision prior to the start of construction work in order to avoid accidental damage by heavy plant movement.</td>
<td>Not applicable.</td>
<td>Not applicable.</td>
<td>• Significant indirect (setting) effects on 18th Century Dalquharran Castle (site 116).</td>
</tr>
<tr>
<td>Ecology</td>
<td>Operation</td>
<td>Mitigation has been achieved through design, through careful siting of the turbines and infrastructure. No additional mitigation is possible for Indirect (setting) effects.</td>
<td>Not applicable.</td>
<td>Not applicable.</td>
<td>• No significant effects.</td>
</tr>
<tr>
<td>Ecology</td>
<td>Construction and Decommissioning</td>
<td>Limited tree planting of suitable native trees along riparian zones in the lower reaches of upland watercourses (on-site) to restore and enhance available bat foraging habitats which provide commuting routes between bat roosts and feeding sites.</td>
<td>Reduction and/or Avoidance of Effect.</td>
<td>Construction and Post Construction.</td>
<td></td>
</tr>
</tbody>
</table>

Archaeology and Cultural Heritage

Operation
• Long term indirect ‘setting’ effects on cultural heritage assets, including scheduled monuments, listed buildings, Inventoried GDL and conservation areas.

Ecology
Construction and Decommissioning
• Effects on bats commuting and foraging, as a result of loss of coniferous forestry.
• Limited tree planting of suitable native trees along riparian zones in the lower reaches of upland watercourses (on-site) to restore and enhance available bat foraging habitats which provide commuting routes between bat roosts and feeding sites.
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<tr>
<td>Ecology</td>
<td></td>
<td>Clear-felling of coniferous plantation would remove the greatest risk of attracting commuting and foraging bats, and would be completed before turbines become operational. However, post-construction monitoring of mortality using best practice methods would be undertaken and, if required, a mitigation plan would be developed in consultation with SNH. The planting of riparian trees during the construction phase, carefully designed to steer bats away from turbines and towards lowland routes, would become increasingly effective.</td>
<td>Monitoring.</td>
<td>Post Construction.</td>
<td>• No significant effects.</td>
</tr>
<tr>
<td>Operation</td>
<td>Effects on bats resulting from collision risk/barotrauma, in particular <em>Nyctalus</em> species (assessed on an extremely precautionary basis).</td>
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</tr>
<tr>
<td>Ornithology</td>
<td>Construction and Decommissioning</td>
<td>No mitigation is required to address significant effects. Additional good practice measures proposed include: • pre-felling / pre-construction surveys to locate any breeding / nest sites, implement protection measures, demarcate areas potentially sensitive to disturbance during the</td>
<td>Reduction and/or Avoidance of Effect.</td>
<td>Pre-Construction and Construction.</td>
<td>• No significant effects.</td>
</tr>
<tr>
<td></td>
<td>• None.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• Effects associated with disturbance, displacement are not considered significant.</td>
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<tr>
<td>Ornithology</td>
<td>Operation</td>
<td>breeding season to prevent construction disturbance;</td>
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<td></td>
<td></td>
<td>• programme construction works to avoid areas of known during sensitive periods;</td>
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<tr>
<td></td>
<td></td>
<td>• monitoring of construction work by an experienced site ecologist.</td>
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<tr>
<td></td>
<td>Operation</td>
<td>No mitigation is required to address significant effects.</td>
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<tr>
<td></td>
<td></td>
<td>Additional good practice measures proposed include:</td>
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<td></td>
<td></td>
<td>• a post construction monitoring programme of carcass searches and breeding bird surveys would be implemented.</td>
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<td></td>
<td></td>
<td>• signs at entrances used by the public would promote responsible access to the site following the outdoor access code to help reduce the risk of disturbance to important nesting areas and sensitive winter roost sites.</td>
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</tr>
<tr>
<td>Transport</td>
<td>Construction and Decommissioning</td>
<td>Implementation of Construction Traffic Management Plan (CTMP), maintenance of access to Core Path SA46, application</td>
<td>Reduction and/or Construction and Decommissioning Phase.</td>
<td></td>
<td>No significant effects.</td>
</tr>
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<td></td>
<td>• Severance associated with increased traffic movements.</td>
<td>of speed limits, Abnormal Indivisible Loads (AILs) movements controlled through Traffic Management Plan (TMP), traffic management at site access, restricted delivery hours.</td>
<td>Avoidance of Effect.</td>
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<td></td>
<td>• Pedestrian Delay associated with AIL and construction traffic movements.</td>
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<tr>
<td></td>
<td>• Pedestrian Amenity associated with AIL and construction traffic movements.</td>
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<tr>
<td></td>
<td>• Fear and Intimidation associated with AIL and construction traffic movements.</td>
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<tr>
<td></td>
<td>• Accidents and Safety.</td>
<td></td>
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</tr>
<tr>
<td><strong>Operation</strong></td>
<td>• None.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Socioeconomics</strong></td>
<td>Construction and Operation</td>
<td>No mitigation is required to address significant effects. Additional good practice measures would be used to enhance beneficial effects including: • engaging with local businesses via supplier engagement events that give interested businesses the opportunity to meet the applicant and key suppliers.</td>
<td>Enhancement.</td>
<td></td>
<td>• significant beneficial local economic effect.</td>
</tr>
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<td></td>
<td>• local beneficial effect associated with employment during construction and operation, community benefit fund and non-domestic rates.</td>
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<tr>
<td>Aviation</td>
<td></td>
<td>• contacting local trade organisations.</td>
<td></td>
<td></td>
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<tr>
<td><strong>Operation</strong></td>
<td></td>
<td><strong>Aviation</strong></td>
<td><strong>Construction and Operation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work and Traffic</td>
<td>• Degradation of Glasgow Prestwick Airport (GPA) Primary Surveillance Radar (PSR).</td>
<td>The applicant has commenced negotiations with GPA in relation to a radar mitigation contract to allow a technical mitigation to rectify the effect on the PSR. The applicant would agree suitable aviation mitigation, based on infrared lighting to avoid any potential visual effects associated with lighting. Information on the height and aviation lighting configuration of construction infrastructure, such as cranes, and the proposed turbine and mast locations would be provided to the Defence Geographic Centre for inclusion on aviation charts and to be notified to airspace users.</td>
<td>Avoidance of Effect.</td>
<td>Construction and Operation Phases.</td>
<td>• No significant effects.</td>
</tr>
<tr>
<td>Military Low Flying</td>
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</tr>
<tr>
<td>Construction and Operation</td>
<td>• Aviation Safety.</td>
<td><strong>Construction and Operation</strong></td>
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</tr>
</tbody>
</table>

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