

**Drummuir Estate Wind Farm
Amendment To Planning Application**

2003

Volume II of III

PREFACE

This document has been prepared to provide details and environmental information on an amendment to the planning applications 02/02099/EIA and 02/02139/MIN for a proposed wind farm and three small borrow pits at Drummuir Estate, near Keith in Banffshire, Scotland.

This document has been prepared by Renewable Energy Systems Ltd in consultation with Moray Council and in collaboration with the following specialist consultants:

The document is contained within three separate volumes:

Volume I is the Non Technical Summary of the Assessment of the Amendment to the Application.

Volume II, this document, is the full Assessment of the Amendment to the Application and contains supporting information in appendices.

Volume III contains figures and plans referred to in the text of Volume II.

An updated planning policy statement has also been prepared to accompany the amendment to the application.

This document should be read in conjunction with the original Environmental Impact Assessment.

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Peat Depth Survey

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Copies of the full document may be viewed during normal opening hours at the following locations:

Moray Council

Planning Department
High Street
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Keith Library

Union Street,
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Copies of this document are available from Renewable Energy Systems Ltd, priced £50 each. A Non Technical Summary of this document is also available free of charge. The non technical summary can also be viewed on the RES web page www.res-ltd.com from the 'Download Factsheets' section.

Requests for this document or the Non Technical Summary should be made in writing, including payment if required, to either Renewable Energy Systems Ltd, Beaufort House, 23 Grosvenor Road, St Albans, Hertfordshire, AL1 3AW, Tel: 01727 797933 or Renewable Energy Systems Ltd, Unit 7000, Academy Park, Gower Street, Glasgow, G51 1PR. Tel: 0141 419 1730

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1.0 INTRODUCTION

1.1 BACKGROUND

In November 2002 Renewable Energy Systems Ltd (RES) applied for full planning permission to Moray Council to construct a wind farm comprising 21 wind turbines on land at Drummuir Estate in Banffshire approximately 6.5km South West of Keith. The turbines proposed were three bladed with a 60m high tower and a 80m rotor diameter with a nominal rated output of 2000kW (2MW) each. The proposed development would also have associated electricity transformers, access roads, a control building and substation compound and two wind monitoring masts. A separate consenting mechanism for the grid connection is being pursued.

During construction and commissioning there would be a number of temporary works including a construction compound, three road stone borrow-pits and up to five guyed metrological masts of up to 60 metres height.

This wind farm application was submitted with a full Environmental Statement and the wind farm and borrow pit applications were registered on 12th November 2002, application no's. 02/02099/EIA and 02/02139/MIN.

During the planning and consultation process several issues were raised by consultees. These included:

1. landscape and visual impacts, specifically from two key viewpoints namely from viewpoint 6 (Drummuir/Newburgh on B9115) and from viewpoint C1 (Ben Aigan) – consultation suggested reducing turbine clustering, avoiding turbines being 'visually isolated' from the main wind farm group and minimising the visual impact of access tracks, particularly from the latter viewpoint.
2. impacts on peatland – RES had not demonstrated that the layout had specifically addressed avoidance of more sensitive peatland locations
3. proximity of a particular turbine to a site previously used for nesting by an important bird species, and
4. lack of assessment of cumulative effects with Glens of Foudland wind farm in Aberdeenshire.

With regard to the first issue, RES expressly established that consultees did not have any significant concern with overall visibility, with the ability of the local landscape to accommodate development of the type proposed and with the size, number and visual splay of the proposed turbines.

These four issues were discussed by RES with Moray Council and SNH so that the concerns were fully understood and so that appropriate amendments to the proposal could be made.

To accord with statutory procedures such amendments to the proposed wind farm application require to be re-notified, re-advertised and re-consulted over 28 days to allow for receipt of representations and consultation responses. As such this document provides the details and environmental information on the amendments to the planning applications for both wind farm and borrow pits, 02/02099/EIA and 02/02139/MIN.

As described in Section 2, the wind farm layout has changed substantially and therefore all visualisations have been redone and are contained in this document along with reassessments by consultants of the amended layout for landscape and visual, archaeology, ecology, and hydrology. Other sections from the original ES remain unchanged and as such are not included in this document.

Likewise many drawings and figures remain unchanged such as those relating to location of surrounding designations, access route, road widening and designs for site tracks (cross sections), foundations, construction compound and substation. These drawings are not included within this document. In addition the borrow pit application details remain unchanged, except the locations have been amended slightly and these are shown on the amended layout plan. As such this document should be read in conjunction with the original ES and other documentation already submitted for the applications.

1.2 ADDRESSING THE CONSULTATION ISSUES

The third and fourth points outlined above (protection of nesting site and cumulative assessment with Glens of Foundland wind farm) are readily dealt with by including a protection zone and by providing further information respectively.

The other issues of visual design of turbine layout and visual consideration of track routing are more fundamental, and these have been addressed by RES in a correspondingly fundamental manner.

1.3 ADDRESSING VISUAL DESIGN OF THE WIND FARM

There are a number of ways in which a wind farm can be designed. The main three are outlined below. All three attempt to marry the conflicting interests of:

1. techno/economic requirements (high energy production from the turbines and low inter-turbine distortion of the wind flow),
2. non-visual environmental considerations (avoidance of significant effects of ecology, hydrology, micro-waves etc) and
3. visual aspects.

Design approaches are:

1. Establish and map constraints related to the non-visual environmental considerations, develop a layout that best satisfies techno/economic requirements and thereafter adjust design to improve visual appearance (this is the traditional wind farm design approach and was adopted for the initial Drummuir application)
2. Adopt a specific design strategy that addresses aesthetic and functionality targets and thereafter identify whether the impacts on other non-visual environmental interests are sufficiently severe to warrant compromising the visual design (this is a radical approach but one being advocated to some degree by the architectural and fine-arts fraternity)
3. Establish and map non-visual environmental constraints as per the first approach, but then develop a layout which achieves visual balance and harmony from key viewpoints, thereafter only compromising the design if essential engineering requirements are violated (e.g. if the fatigue loading on a turbine would be beyond what turbines are built to withstand)

The third approach, which is a compromise between the first and second is the approach that has been adopted for the amended design being proposed herein.

The approach has ensured that no non-visual constraint has been compromised – ecological, hydrological, archaeological interests etc have all been respected as previously.

The design approach has involved developing a layout that looks 'harmonious' from the two key viewpoints of the B9115 and Ben Aigan, and which is 'checked' visually from the other viewpoints. Harmony is judged by the degree to which the apparent spacing between turbines is uniform and the degree to which isolation of turbines and clustering of turbines is avoided.

Details of the design outcome for the layout are given later, but it should be noted that although engineering design margins for the turbines are now tighter than hitherto, they are still well within acceptable safety limits and there has been little need to adjust further the layout design.

1.4 ADDRESSING VISUAL DESIGN ASPECTS OF THE TRACK LAYOUT

Consultation responses suggested that more effort should be put into ensuring that the tracks had least visual impact from key viewpoints, these once again being Ben Aigan and the B9115.

Given the radically redesigned layout, a new track layout was needed anyway, but in developing a revised routing, visual appearance was given primary importance.

A wire-line inspection of the turbines from the Ben Aigan viewpoint demonstrated that the bases of most turbines would be hidden by topography, with the foundations generally being in the enclosed bowl formed by Machattie's Cairn/Knockan and Hill of Towie.

However, the closest turbines on Machattie's Cairn and Knockan would be fully visible and various options were considered in designing link tracks for minimum visual impact. Options considered, and their merits were:

1. run the tracks across the field of view of the observer; although it was hoped that this would lead in the case of excavated track construction to the tracks sitting down in the vegetation and hence disappearing from view, it was judged that since the tracks would be constructed across a slope, there would inevitably be a downslope embankment, which no matter how minimal would lead to an obvious linear feature spanning the entire visual splay of the development
2. run the tracks away from the observer so that they crest the topography and disappear from view in as short a distance as possible; although this would minimise the extent of track visibility, it was realised that all tracks would be very obvious since the observer would be looking at them in-line and there would be no opportunity of screening from verges
3. as per the second option, run the tracks generally away from the observer, but introduce a slight angle so as to obtain a good visual compromise between minimising the total length of track seen and using the ability of the raised verges to screen the track surface.

The third option was judged to be the most effective strategy and is the one that has been employed.

A number of additional subtleties have been used in choosing the track route:

1. The main 'trunk' track on the western part of the site has been routed over the highest ground of Machattie's Cairn and to the east of Knockan. This ensures shielding of the tracks from viewpoints in closer vicinity of the site where the development would be viewed from below and shields views from Ben Aigan by locating the track on the eastern side of Knockan.
2. The forestry to the south west of the site has been used as a screen for some tracks from the Ben Aigan viewpoint

Although the foregoing explanation has centred on the western side of the site, similar principles have been used in the design of the tracks on Hill of Towie on the eastern side.

1.5 ADDRESSING PROTECTION OF PEAT

In addressing protection of the peat land, two options were considered:

1. Develop a detailed picture of the peat depths across the entire site and categorise locations as being within a) areas where any construction would be too damaging to be acceptable, b) areas where construction would be acceptable with appropriate care/mitigation e.g. by use of floating road construction or c) areas of sufficiently shallow peat depth where invasive construction would have low environmental impact. Use this information to supplement the wider environmental constraints map for the site. This option was considered to be potentially very costly and time consuming to implement and also to be potentially restrictive with respect to implementing the visual design strategies.
2. Develop a visually optimised design as discussed previously, but thereafter carry out a detailed peat depth survey at all locations of intended construction. Should a turbine be on sensitive peat land, then exercise a judgement as to whether any adverse visual consequences of relocating the turbine would be greater than the direct impact on the peat land of leaving the turbine at that location. Should a track be over sensitive peat land, then depending upon the degree of sensitivity and the nature of alternatives, then either slightly reroute the track or adopt suitable construction methods.

The latter approach was adopted.

In the event, as outlined below, the depth of peat was significantly shallower than consultees had expected over all parts of the site where construction was proposed and therefore no meaningful adjustment of the design to protect peat land interests was needed.

It is worth noting however, that parts of the visual design approach probably directed the tracks to shallower peat locations, specifically the decision to site tracks on the crests of the hills on the western side of the development. Such locations will naturally have shallower peat coverage and additionally concentrating trunk tracks to such higher ground has good hydrological justification see section 3.4 below.

2.0 THE AMENDED PROPOSAL

2.1 THE LAYOUT

The wind farm site boundary is the same as the original scheme (see Figure 1). The amended wind farm would comprise 21 wind turbines with the same overall maximum tip height of 100m as proposed in the original application. The turbine and track layout have been amended using the design philosophies outlined in Section 2 above. Additionally, the location of the borrow pits, wind monitoring masts and construction compound have also slightly changed to be located adjacent to the new track layout, to minimise visual impact and to avoid areas of deeper peat. Figure 2 shows the amended layout. The total length of the amended access track layout is just less than 9.8km which translates to an estimated land take of just over 5.85 ha. Approximately 200m of the access track will be floated (see Appendix 1).

Following advice from the landscape consultant, the tracks on the western side of Knockan and Machattie's Cairn would be partly reinstated after construction to approximately 3.5m in width in

order to further minimise visual effects from Ben Aigan. Figure 2 shows the locations where the track width would be reduced following construction.

The method statement for reinstating the roads after construction is as follows:

- Strip topsoil to 5m-7m wide as required and set aside along side of track
- Excavate down to suitable formation and set sub soil aside along sides of track, away from topsoil.
- Cut drainage ditches as required, lay road stone and compact
- After completion of wind farm use set aside excavated soil to landscape sides of road and place set aside topsoil layer on top to allow natural re-vegetation. Place sub soil directly over road stone to reduce width to 3.5m and cover with topsoil to achieve a minimum depth of cover of 300mm to allow natural re-vegetation. Reinstatement any drainage ditches that have been disturbed.

If future access by large components is again required, the road would be reinstated in the same manner afterwards.

2.2 MATERIALS AND TRANSPORT

Due to the shorter length of access track required for the amended layout slightly less road stone will be required when compared to the original layout.

If imported stone is required, just over 23,420m³ of road stone would be needed to construct the site tracks (9760m length of track x 6m track width x 0.4m depth). Another 640m³ (1,600 x 0.4m) would be required for the construction compound. Just over 2,400 tipper lorry journeys (based on a lorry carrying 10m³) would be needed in total to deliver this stone. This would form the majority of traffic to the site from a local quarry and would be concentrated in the initial construction period of 3-4 months. However, if suitable stone can be won on site this could possibly be reduced to approximately 424, i.e. the construction of approximately 1.5km of access track plus the construction compound would need imported material until stone can be won on-site (around the construction compound location and beyond) for subsequent tracks, see Table 1.

TABLE 1 Traffic Movements During Construction

Activity And Duration	Journeys Per Turbine	Total Journeys (No. of Turbines X Journeys Per Turbine)	Average Journeys Per Day (Total Journeys / No. Days)
Access Track Construction (11 weeks) (assumes all roadstone imported)	N/A	2400	36
Access Track Construction (4 weeks) (assumes borrow pits provide roadstone)	N/A	424	18

2.3 PEAT DEPTH SURVEY AND PEAT ENHANCEMENT PLAN

As requested by SNH during the consultation process, a peat depth survey of this amended layout was undertaken and the report is contained in Appendix 1. The main findings of the peat depth survey were that all proposed turbines in the amended layout and the track layout are located in firm dry ground with shallow peat of less than 0.6m in depth. The mean peat depth over the whole site was only 0.24m and there was no indication of significant areas of deep peat. Two short lengths of the track alignment are proposed over wetter areas. During the peat depth field surveys alternative routes were investigated but it was not possible to avoid these two areas. As such floating road construction is proposed in these two locations. The borrow pit locations were amended following the peat depth survey to be adjacent to the new track layout and to avoid areas of deeper peat.

Although the measured peat depths over the site and in the area of the proposed amended layout are very shallow RES commissioned the ecological consultant to draw up a peat enhancement plan for part of the site. This is to ensure that any minor effects on the existing peat through the development of the wind farm are mitigated through enhancement of peat on part of the site. The peat enhancement plan is included within the mitigation section of the ecologists reassessment (see below).

3.0 ENVIRONMENTAL ASSESSMENTS OF AMENDED LAYOUT

3.1 LANDSCAPE AND VISUAL ASSESSMENT

3.1.1 Background

In addition to a reassessment of the landscape and visual effects of the amended layout which is included below, the Local authority and SNH requested several additional pieces of information and alterations to the visualisations submitted with the original application:

- a method statement of how photomontages are created. This is included in Appendix 2. The photographic specification used by ENVIROS is included in Appendix 3.
- all the photomontages produced for the amended layout to show the sky an enhanced blue colour to show a worst case scenario. This has been taken on board and all the photomontages of the amended layout show this enhanced sky colouring.
- a new photomontage from viewpoint 15 Loch Park. This has been produced and is included in the Figures Volume III of this document.
- Cumulative ZVI including Glens of Foudland. This has been produced and is included in the Figures Volume III of this document and has been used in the landscape and visual impact assessment (LVIA) of the amended layout.
- Larger versions of original Figures 4.5, 4.6 and 4.7 and the new cumulative ZVI described above. Larger versions at A1 size have been produced and are included in the Figures Volume III of this document.
- 4 new wirelines considering Drummuir, Pauls Hill, Cairn Uish and Glens of Foudland from The Bin Forest, Tap O'Noth, The Buck and from Leys of Dummuies NJ558 377 to represent views of Glens of Foudland and Drummuir along the A96(T). Wirelines of these have been produced and are included in the Figures Volume III of this document.
- that viewpoint 12 on the A96(T) near Newtack also be considered for cumulative visual effects for southbound travellers. A wireline of this has been produced and is included in the Figures Volume III of this document.
- Cumulative wirelines C1, C2, C3 and C4 to be rerun to consider Glens of Foudland wind farm.
- 2 standard ZVIs for the Aultmore and Clashindarroch proposed wind farms to be produced and considered. These are included in Appendix 4.

For ease of comparison the Figure numbers used in the original ES for the landscape and visual assessment have been used again in this document and hence the numbering of the figures which illustrate and are referred to in the assessment below are numbered Figures 4.3 – 4.26. Figures 4.1 and 4.2 have not changed from the original assessment however Figure 4.1 has been included in this document for ease of reference as it illustrates the viewpoint locations. In addition Figure 4.27 has been created which is a cumulative ZVI showing Drummuir, Pauls Hill, Cairn Uish and Glens of Foudland.

3.1.2 Introduction

Enviros Consulting were commissioned by RES to reassess a revised layout for the Drummuir Wind Farm following further optimisation of the wind farm design. This chapter provides a re-assessment of the landscape and visual effects of the proposed Drummuir Wind Farm based on the new layout and should be read in conjunction with full Drummuir Wind Farm Environmental Statement which includes the methodology, baseline assessment, references etc for the full Landscape and Visual Assessment.

The report concentrates on the changes associated with the revised layout. Consideration has also been given to the potential cumulative effects of Glens of Foudland Wind Farm. Aultmore Wind Farm and Clashindarroch Wind Farm have also been considered in Appendix 4¹

The re-assessment is illustrated in revised Figures 4.3 to 4.27, showing ZVI maps, wireframes and photomontages for the new layout and cumulative wind farm sites.

3.1.3 Layout Changes

The Drummuir planning application wind farm layout, submitted in November 2002, consisted of 21 turbines with a 60metre high tower and 80metre rotor diameter, arranged in an approximate arc between the summits of Knockan to the west and the Hill of Towie to the east of the minor road which crosses the site. Planning application consultation with SNH raised concerns about the consistency of the turbine spacing and relationships of clustered groups or isolated turbines in the array. These concerns were particularly noted at Viewpoint 6 (Drummuir / Newburgh on the B9115) as a settlement in close proximity to the wind farm, and at Viewpoint C1 (Ben Aigan) as a nearby elevated viewpoint. At this viewpoint further concerns were expressed by SNH with regards to the routing and design of the access tracks which connect the wind turbines, as the viewpoint is more elevated than the wind farm and offers a clear view over the site layout.

The layout of the Drummuir turbines and access tracks has been through further visual optimisation following the planning application consultation response from SNH. A more cohesive layout, avoiding clustering of turbines and isolated turbines has been produced in order to address SNHs concern that a more consistent layout would be more acceptable on the landscape and visual amenity of the area.

In the planning application layout, the cluster of turbines on the western half of the site around Knockan, together with turbine 15 and turbine 16 in the centre of the array, caused the clustering of turbines evident in the views from viewpoint 6. The new layout positions turbine 15 with the turbines in the western half of the array and turbine 16 has been moved to join the eastern group of turbines on the Hill of Towie. The detailed composition of the western half of the array was subsequently improved by micro-siting turbines to achieve the best visual appearance from the viewpoints raised in the SNH planning application consultation, while keeping check on the 'knock on' changes to the layout at other viewpoints. Turbines 17 – 21, in the eastern section of the array around the Hill of Towie, have been retained in the same positions as the planning application layout.

The site tracks connecting turbines at the site have been re-routed in order to minimise landscape and visual effects. In the western half of the array the turbines are connected via a main link track running north – south along Knockan. This is routed to the east of the ridge so that it will not be visible from Ben Aigan and similar views from the west. Spur tracks run directly downslope from this main track to turbine 3, turbine 7, turbine 9 and turbine 11 on the western side of Knockan. This minimises visibility of the site tracks in views from the west as they are in line with the turbines. As a

¹ It should be noted that neither Aultmore nor Clashindarroch have been submitted for planning. As such and following guidance given in PAN45 less weight has been given to these two wind farms compared to Glens of Foudland which is consented. As such Aultmore and Clashindarroch are considered but the figures and discussion on Aultmore and Clashindarroch are included within the appendices to this document and are not a main part of the reassessment.

further mitigation measure, the width of these site tracks connecting turbine 3, turbine 7, turbine 9, turbine 11 and the stretch between turbine 13 and the borrow pit will be reduced from 5metres to approximately 3.5metres (farm track width) after construction of the wind farm. In so doing, the visual effect of the site tracks on the western side of Knockan, will be minimised from Ben Aigan and similar viewpoints to the west. The construction method used for reinstatement of the road edges to these turbines is detailed in Section 2.1 of this document.

In the eastern side of the site the turbines are connected via a main link track from the minor road up to turbine 21 on the Hill of Towie. Spur tracks extend to turbine 18 on the southern slope of the hill and turbine 20.

The resulting layout, as shown in Figure 2 and illustrated in the visualisation Figures 4.13 and 4.23, is considered to be based on a clearly discernible pattern with a consistent array of turbine spacing that relates to the landform of Knockan and the Hill of Towie.

3.1.4 ZVI Analysis

3.1.4.1 Drummuir ZVI

The theoretical zone of visual influence (ZVI) for the new layout of the Drummuir Wind Farm is illustrated in figures 4.3 to 4.6, which are as follows:

- 7km ZVI based on the visibility to the nacelles of the turbines (Figure 4.3);
- 7km ZVI based on the visibility to the blade tips of the rotor blades on the turbines (Figure 4.4);
- 25km ZVI based on the visibility to the nacelles of the turbines (Figure 4.5); and
- 25km ZVI based on the visibility to the blade tips of the rotor blades on the turbines (Figure 4.6).

The change in the layout has caused little change in the ZVI analysis as described in section 4.6.2 of the Environmental Statement.

3.1.5 Cumulative Effects

3.1.5.1 Drummuir, Cairn Uish and Pauls Hill effects

The cumulative ZVI for the new layout of the Drummuir Wind Farm and the proposed wind farms at Cairn Uish and Pauls Hill is illustrated in figure 4.7.

The change in the Drummuir layout has caused little change to the cumulative ZVI analysis described in section 4.6.4 of the Environmental Statement.

3.1.5.2 Drummuir, Cairn Uish, Pauls Hill and Glens of Foudland cumulative effects

The cumulative impacts of the proposed Drummuir Wind Farm with the permitted development at Glens of Foudland were not addressed in the original Environmental Statement. The permitted development at Glens of Foudland is located outwith the 25km Drummuir study area boundary, approximately 26km from Drummuir. Planning application consultation with SNH raised concerns about the cumulative effect of both developments on the landscape and visual amenity of the area. As such, assessment of cumulative effects of Glens of Foudland, together with Drummuir, Pauls Hill and Cairn Uish is provided below and illustrated in Figure 4.27.

3.1.5.3 Drummuir and Glens of Foudland cumulative effects

The areas with cumulative visual impact of both Drummuir and Glens of Foudland are generally situated between the two sites, often from the most elevated parts of the landscape which offer wider panoramic views of the region. These areas include:

- Hill of Towie, at the Drummuir site itself, with visibility of the Drummuir site itself at close distance and of Glens of Foudland at a distance of approximately 25km. Due to the long distance and nature of intervening forestry which further reduces visibility to Glens of Foudland, cumulative effects at this location are not significant;
- Areas with scattered settlement to the south of Black Hill around Grange Crossroads near the B9018, with visibility of Drummuir at 12km and of Glens of Foudland at over 20km. At this distance cumulative effects around this location are not significant;
- A95 between Thornton and Glenbarry, for a relatively short stretch of road. Visibility of Drummuir at 12km and Glens of Foudland at approximately 18km. At this distance cumulative effects around this location are not significant;
- Carran Hill and other high ground east of Milltown of Auchindoun. This area lies approximately 4km from Drummuir and over 20km away from Glens of Foudland. At this distance cumulative effects around this location are not significant;
- Few areas on the A96 where both wind farms are visible in succession, i.e. at the same time, with the exception of a stretch to the south of Keith, near Den of Pitlurg and The Balloch, and a stretch near Leys of Dummuies to the south east of Huntly. This area is approximately 18km from Drummuir and 6km from Glens of Foudland. Further assessment of cumulative effects at viewpoint AC4 (Leys of Dummuies) are provided within this re-assessment report and illustrated in Figure Additional Cumulative Viewpoint 4 in Volume III of this document. At this distance cumulative effects of the two wind farms in succession are not significant, and it is considered that there will be no significant effects of the two wind farms on the A96. Sequential views of the two wind farms are, however, available on the A96, i.e. where the observer has to move to another viewpoint to see the second wind farm after already having seen a previous wind farm at another point. The individual views of Glens of Foudland from the A96 would be relatively close distance near the site, while longer (always over 5km) distance to Drummuir. The distance separating those stretches of the A96 nearest the two wind farms is approximately 19km, which is likely to be about 15 minutes travel time on the road by car;
- The Bin Forest, around the summit of The Bin. The area is approximately 14km from Drummuir and 12km from Glens of Foudland. At these distances the wind farms will occupy a small angle of the wider panorama and cumulative effects at this location are not significant. Further assessment of cumulative effects at viewpoint AC1 (The Bin) are provided within this re-assessment report and illustrated in Figure Additional Cumulative Viewpoint 1 in Volume III of this document;
- The summit area of Tap o'Noth, with visibility of Drummuir at a distance of approximately 20km and of Glens of Foudland at a distance of 13km. At these distances the wind farms will take up a small angle of the overall panorama view and cumulative effects at this location are not significant. Further assessment of cumulative effects at viewpoint AC2 (Tap o'Noth) are provided within this re-assessment report and illustrated in Figure Additional Cumulative Viewpoint 2 in Volume III of this document;
- The summit area of the Buck, with visibility of both sites at distances over 20km. At these distances the wind farms will take up a small angle of the overall panorama view and cumulative effects at this location are not significant. Further assessment of cumulative effects at viewpoint

AC3 (The Buck) are provided within this re-assessment report and illustrated in Figure Additional Cumulative Viewpoint 3 in Volume III of this document;

- The summit areas of Knock Hill and Lurg Hill, with visibility of both sites at distances over 20km. At these distances the wind farms will take up a small angle of the overall panorama view and cumulative effects at this location are not significant;
- Fourman Hill, north of Huntly, with visibility of Drummuir at a distance of approximately 20km and Glens of Foudland at 20km. At these distances the wind farms will take up a small angle of the overall panorama view and cumulative effects at this location are not significant; and
- The Gartly Moor area, near Glens of Foudland, with short distance views of Glens of Foudland but Drummuir is more than 20km from this location. At such distance the cumulative effect of Drummuir in the view is not significant.

It can be seen that the areas likely to be affected by cumulative visibility of Drummuir and Glens of Foudland consist of high ground that does not contain residential development or major transport routes. In all areas of cumulative visibility, the distances to the furthest wind farm are long, often over 20km, and as such the cumulative visual impacts of Drummuir and Glens of Foudland are minor.

3.1.5.4 Drummuir, Glens of Foudland and Cairn Uish cumulative effects

The areas with cumulative visual impact of both Drummuir, Glens of Foudland and Cairn Uish Wind Farms are very limited in distribution. The only areas identified as having cumulative visibility of these three wind farms in succession, i.e. at the same time, are:

- Thin linear section along the summits of Carran Hill and the Hill of Bellyhack. Drummuir is located approximately 4km from this location, Cairn Uish 20km and Glens of Foudland 22km. At such distances the horizontal angle of Cairn Uish and Glens of Foudland in the view will be very small and the cumulative effect is not significant; and
- Thin linear section along the summits of Hill of Mackalea and the Scalp. Drummuir is located approximately 7km from this location, Cairn Uish 11km and Glens of Foudland 23km. At such distances the horizontal angle of Cairn Uish and Glens of Foudland in the view will be very small and the cumulative effect is not significant.

It can be seen that the areas likely to be affected by cumulative visibility of Drummuir, Glens of Foudland and Cairn Uish in succession are very limited in extent and offer long distance visibility of at least two wind farms in the view. As such, the wind farms will occupy a small angle in the overall panorama view from these hill tops. The cumulative visual impacts of Drummuir, Glens of Foudland and Cairn Uish in succession are minor.

3.1.5.5 Drummuir, Glens of Foudland, Cairn Uish and Pauls Hill cumulative effects

There is a small area on the cumulative ZVI where Drummuir, Glens of Foudland, Cairn Uish and Pauls Hill 25km study areas overlap to the south of Drummuir near the Scalp. Although the four 25km study areas overlap the ZVI shows there is no visibility of all 4 wind farms within this area.

3.1.6 Viewpoint Assessment

A total of 19 viewpoints were chosen for detailed assessment in the Environmental Statement; 15 of these for the proposed Drummuir Wind Farm alone, and 4 cumulative viewpoints with potential views of Drummuir, Cairn Uish and Pauls Hill. This report addresses the changes in the visual effects caused by the new Drummuir layout from these original viewpoints. It also includes additional cumulative

assessment of the Glens of Foudland Wind Farm at the 4 original cumulative viewpoints. A further 5 additional cumulative viewpoints have also been included in the re-assessment at the request of Aberdeenshire Council and SNH in order to assess potential cumulative effects of Glens of Foudland, Pauls Hill and Cairn Uish Wind Farm.

The selected viewpoints are listed in Table 2 below and the locations of viewpoints 1 – 15 and C1 – C4 are shown in Figure 4.1. The revised predicted views from each of these viewpoint locations are shown in wireframes and photomontages in Figures 4.8 to 4.27. The 5 additional cumulative viewpoints are also list in Table 2 below and are shown in wirelines in the Additional Cumulative Viewpoint Figures 1-5 in the A3 Figures Volume III that accompanies this document. The locations of the 5 additional viewpoints are also illustrated in the Additional Cumulative Viewpoint Location Plan included in the A3 Figures Volume III that accompanies this document.

TABLE 2: Viewpoints Included In The Re-Assessment

Viewpoint Number	Viewpoint name	Distance to nearest visible turbine at Drummuir	Grid reference	Receptors	Landscape character type
1	C55H Minor road through site	392 metres	336589 846627	Road users	Upland Moor
2	West edge of Keith on B9014	3.9km	341360 849316	Road users	Agricultural Foothills
3	Southern edge of Keith	5.5km	342799 849997	Residents	Agricultural Foothills
4	West edge of Dufftown in park area	6.4km	332058 840107	Residents	Agricultural Foothills
5	Charlestown of Aberlour	9.4km	326252 842358	Residents Road users	Straths and Valleys
6	Drummuir / Newburgh on B9115	2.4km	339104 844474	Residents Road users	Upland Moor
7	Balvenie Castle	N/A	332650 840900	Tourists / Visitors	Agricultural Foothills
8	Buckie	N/A	342860 864730	Residents	Coastal Plain
9	Minor road to north of A95 between Loanhead and Bushfarms	3.1km	338803 850319	Road users	Agricultural Foothills

10	A95 west of site near entrance to Knockan	1.7km	333363 847179	Road users	Agricultural Foothills
11	A941 SW of site near Midtown of Buchcromb	4.6km	331301 843197	Road users	Agricultural Foothills
12	A96(T) between Keith and Huntly near Newtack	N/A	344124 846413	Road users	Agricultural Foothills
13	A96(T) between Keith and Fochabers	7.2km	338694 854447	Road users	Agricultural Foothills
14	B9103 near Inchberry	9.4km	330478 55938	Road users	Coastal Plain
15	B9014 at turn off to minor to Loch Park Activity Centre	2.5km	336788 843463	Road users	Straths and Valleys
Cumulative Viewpoints					
C1	Ben Aigan	4.3km	330997 48174	Hill Walkers	Upland Forestry Plantation
C2	Ben Rinnes	14.0km	325510 835462	Hill Walkers	Upland Moor
C3	B9102 to the east of Archieston	9.6km	325334 844814	Road users	Upland Forestry Plantation
C4	Elgin (Monument)	20.7km	321182 862795	Residents	Coastal Plain
Additional Cumulative Viewpoints					
AC1	Bin Forest	12.7km	350300 843730	Walkers	Upland Agriculture
AC2	Tap o'Noth	20.6km	348480 829300	Walkers	Upland Forestry Plantation
AC3	The Buck	23.0km	341250 823450	Walkers	Upland Moor

AC4	Leys of Dummuies	18.0km	355800 837700	Road users	Upland Agriculture
AC5	A96(T) between Keith and Huntly near Newtrack	N/A	344124 846413	Road users	Agricultural Foothills

Viewpoint 1: C55H Minor Road Through Site

Figure 4.8

Predicted view

There will be 21 turbines visible from this viewpoint, with turbines on either side of the minor road through the site. To the east, the wind farm layout consists of 6 evenly spaced turbines, with towers and rotor blades of all 6 turbines visible. Turbine (T) 15 has been re-positioned to the south of the western side of the site. Access tracks will be seen between the turbines, an anemometer mast will be positioned between T19 and T20, and the substation building will be seen between T17 and T18. To the west, the wind farm layout consists of 15 consistently spaced turbines, with towers and rotor blades of 11 turbines visible, and just nacelles / rotor blades of 4 turbines visible from behind the ridgeline. Access tracks will be seen between the turbines, an anemometer mast is positioned between T11 and T12, and the compound building will be seen in the foreground. The layout of the turbines is consistent and balanced within the landscape, but prominent due the short viewing distance between viewpoint and turbines. Towers and rotor blades of the turbines will mainly be seen against a background of sky.

Magnitude of change

The towers and rotor blades of 21 turbines will be visible from this location, with the closest visible turbine at a distance of 392 metres. The array of turbines covers a horizontal angle of 264°. The proposed wind farm development will be extremely prominent from this viewpoint, with the layout on both the eastern and western side of the viewer. The associated magnitude of change is considered to be **substantial**.

Effects on visual amenity

The viewpoint is representative of views from within the application site, experienced by road users on the minor road between the A95 and the B9014. Road users are considered to be of **medium** sensitivity, because travelling in vehicles shortens the duration of time available to view the landscape. The effect on visual amenity of the proposed wind farm on road users on the C55H is considered to be **major**.

Viewpoint 2: West Edge of Keith on B9014

Figure 4.9

Predicted view

There will be 5 turbines visible from this viewpoint. The turbines will be seen as blade tips, rotor blades and tops of towers appearing over the ridgeline from the eastern side of the site. As the photomontage demonstrates it is likely that intervening buildings and vegetation on the ridgeline in the foreground of the existing view will screen the blade tips to the right of the view as shown on the wireframe in figure 4.9.

Magnitude of change

The rotor blades of 5 turbines will be visible from this location, with the closest visible turbine at a distance of 3.9km. The array of turbines covers a horizontal angle of 18.2°. The proposed wind farm development will be visible but not prominent from this location, with the majority of the layout screened behind the landform and the visible turbines appearing as upper towers and/or blade tips over the ridgeline. The associated magnitude of change is considered to be **moderate**.

Effects on visual amenity

The viewpoint is representative of views experienced by road users travelling on the B9014 to the north east of the site. Road users are considered to be of **medium** sensitivity, because travelling in vehicles at speed shortens the duration of time available to view the landscape. The effect on visual amenity of the proposed wind farm on road users at this viewpoint is considered to be **moderate**.

Viewpoint 3: Southern Edge of Keith

Figure 4.10

Predicted view

There will be 16 turbines visible from this viewpoint. The appearance of the proposed wind farm from this location is mainly as towers and rotor blades on the horizon, with 3 turbine blade tips visible in the array. The layout of turbines is consistent with even distribution through the array, and it appears visually stable as a distinct group on the horizon of the upland landscape behind coniferous plantation.

Magnitude of change

The towers, rotors or blade tips of 16 turbines will be visible from this location, with the closest visible turbine at a distance of 5.5km. The array of turbines covers a horizontal angle of 19.2°. The proposed wind farm development will be seen against a background of sky as the viewpoint is lower in elevation than the ridge where the proposed wind farm is located and blade movement will be visible. The associated magnitude of change is considered to be **moderate**.

Effects on visual amenity

The viewpoint is representative of views experienced by residents on the southern edge of Keith. Residents are considered to be of **high** sensitivity, because of the duration and permanence of change in the view experienced from a primary place of residence. In relation to the horizontal angle and stability of the design of the proposed turbines, the effect on visual amenity of the proposed wind farm on residents at this viewpoint is considered to be **moderate**.

Viewpoint 4: West Edge of Dufftown in Park Area

Figure 4.11

Predicted view

There will be 13 turbines visible from this viewpoint. Almost half of the turbines are screened by the landform of Scout Hill and Newton Hill. The appearance of the proposed wind farm from this location is mainly as upper towers and rotor blades on the horizon, with 3 turbine blade tips visible in the array. The layout of turbines displays a fairly even distribution through the array, and it appears visually stable as a distinct group on the horizon of the upland landscape behind coniferous plantation. There are residential structures in the foreground of the view, therefore the turbines will be viewed in relation to existing built elements, which provide an indication of scale and distance.

Magnitude of change

The towers, rotors or blade tips of 13 turbines will be visible from this location, with the closest visible turbine at a distance of 6.4km. The array of turbines covers a horizontal angle of 6.3°. The proposed wind farm development will be seen against a background of sky as the viewpoint is lower in elevation than the ridge where the proposed wind farm is located and will be seen above residential buildings on the horizon. Blade movement will be visible. The associated magnitude of change is considered to be **moderate**.

Effects on visual amenity

The viewpoint is representative of views experienced by residents on the western edge of Dufftown and park users in park area near Dufftown Football Club. Residents and park users are considered to be of **high** sensitivity, because of the duration and permanence of change in the view experienced from a primary place of residence. In relation to the distance of the proposed turbines from this

viewpoint and their visibility in relation to the prominent foreground hills, the effect on visual amenity of the proposed wind farm on residents and park users at this viewpoint is considered to be **moderate**.

Viewpoint 5: Charlestown of Aberlour

Figure 4.12

Predicted view

There will be 12 turbines visible from this viewpoint. 9 of the turbines are screened by the landform. The appearance of the proposed wind farm from this location is mainly as towers and rotor blades on the horizon, but there are 2 turbine blade tips visible in the array. The layout of turbines is consistent with even distribution through the array, and it appears visually stable as a distinct group on the horizon of the upland landscape behind coniferous plantation. There is deciduous woodland in the foreground of the view, which is likely to screen the blade tips to the south of the layout.

Magnitude of change

The towers, rotors or blade tips of 12 turbines will be visible from this location, with the closest visible turbine at a distance of 9.4km. The array of turbines covers a horizontal angle of 11.2°. The proposed wind farm development will be seen against a background of sky as the viewpoint is lower in elevation than the ridge where the proposed wind farm is located. It will be seen behind coniferous plantation and deciduous woodland which will provide some screening of blade tips. Blade movement will be visible. The associated magnitude of change is considered to be **moderate**.

Effects on visual amenity

The viewpoint is representative of views experienced by residents and road users in Charlestown of Aberlour. Residents are considered to be of **high** sensitivity, because of the duration and permanence of change in the view experienced from a primary place of residence. Road users are considered to be of **medium** sensitivity because travelling in vehicles at speed shortens the duration of time available to view the landscape. The effect on visual amenity of the proposed wind farm on residents at this viewpoint is considered to be **moderate**. The effect on the visual amenity of road users at this viewpoint is considered to be **moderate / minor**.

Viewpoint 6: Drummuir/Newburgh on B9115

Figure 4.13

Predicted view

There will be 21 turbines visible from this viewpoint. The appearance of the proposed wind farm from this location is mainly as full towers and rotor blades on the landform in the near distance, but there are 4 turbines where the tops of towers and rotor blades are visible to the west of the array. The layout of turbines is consistent with even distribution through most of the array. The new layout positions turbine 15 with the turbines in the western half of the array and turbine 16 with the eastern half of the array, and the detailed composition has been improved by micro-siting turbine positions to achieve the best visual appearance from this viewpoint. As such, the array of turbines shown in figure 4.13 is considered to be based on a clearly discernible pattern with a consistent array of turbine spacing that relates to the landform of Knockan and the Hill of Towie. There are existing tall structures such as electricity pylons in the view, which provide an indication of the scale of the turbines.

Magnitude of change

The towers and rotors of 21 turbines will be visible from this location, with the closest visible turbine at a distance of 2.4km. The array of turbines covers a horizontal angle of 54.0°. The proposed wind farm development will be seen against a background of sky as the viewpoint is lower in elevation than the ridge where the proposed wind farm is located and will be seen behind a variety of landscape elements and built structures. Blade movement will be visible. The associated magnitude of change is considered to be **substantial**.

Effects on visual amenity

The viewpoint is representative of views experienced by residents and road users in Drummuir / Newburgh. Residents are considered to be of **high** sensitivity, because of the duration and permanence of change in the view experienced from a primary place of residence. Road users are considered to be of **medium** sensitivity because travelling in vehicles at speed shortens the duration of time available to view the landscape. The effect on visual amenity of the proposed wind farm on residents at this viewpoint is considered to be **major**. The effect on the visual amenity of road users at this viewpoint is considered to be **major / moderate**.

Viewpoint 7: Balvenie Castle

Figure 4.14

Predicted view

There will be no turbines visible from this location and the predicted view will be the same as the existing view.

Magnitude of change

The proposed wind farm development will create **no change** to the existing view from this location.

Effects on visual amenity

The viewpoint is representative of views experienced by tourists and visitors visiting Balvenie Castle. Tourists / visitors are considered to be of **high** sensitivity as the receptors attention may be focused on the landscape and place a high value on the scenic quality of the area in which they are visiting. Nevertheless, the effect on visual amenity of the proposed wind farm on residents at this viewpoint is considered to be **none**, as it is not visible.

Viewpoint 8: Buckie

Figure 4.15

Predicted view

There will be no turbines visible from this location and the predicted view will be the same as the existing view.

Magnitude of change

The proposed wind farm development will create **no change** to the existing view from this location.

Effects on visual amenity

The viewpoint is representative of views experienced by residents in Buckie. Residents are considered to be of **high** sensitivity, because of the duration and permanence of change in the view experienced from a primary place of residence. Nevertheless, the effect on visual amenity of the proposed wind farm on residents at this viewpoint is considered to be **none**, as it is not visible.

Viewpoint 9: Minor Road Between Loanhead and Bush Farm

Figure 4.16

Predicted view

The wireframe in figure 4.16 indicates that there will be 18 turbines visible from this viewpoint. The appearance of the proposed wind farm from this location shows a combination of towers, rotor blades and blade tips on the ridgeline in the near distance. There are two full towers in the array, but the majority of turbines appear as rotor blades and tops of towers or blade tips behind coniferous woodland on the horizon. The proposed wind farm will be seen in relation to existing built structures in the view, such as a distillery and main road and rail corridors.

Magnitude of change

The wireframe in figure 4.16 indicates that the towers and rotors of 18 turbines will be visible from this location, with the closest visible turbine at a distance of 3.1km. The array of turbines covers a

horizontal angle of 42.7°. The proposed wind farm development will be seen against a background of sky as the viewpoint is lower in elevation than the ridge where the proposed wind farm is located and will be seen behind coniferous woodland plantation. It is likely that the existing coniferous woodland plantation will screen 6 turbine blade tips shown on the wireframe in figure 4.16, thus reducing the total number of turbines visible. Blade movement will be visible. The associated magnitude of change is considered to be **substantial**.

Effects on visual amenity

The viewpoint is representative of views experienced by road users travelling on the minor road between Bush Farm and the A95 to the north east of the site. Road users are considered to be of **medium** sensitivity, because travelling in vehicles at speed shortens the duration of time available to view the landscape. The effect on visual amenity of the proposed wind farm on road users at this viewpoint is considered to be **major / moderate**.

Viewpoint 10: A95 near Knockan

Figure 4.17

Predicted view

The wireframe in figure 4.17 indicates that there will be 12 turbines visible from this viewpoint. The appearance of the proposed wind farm from this location shows a combination of towers, rotor blades and blade tips on the ridgeline in the near distance. There will be 10 towers and rotors shown in the wireframe visible in the array and 2 blade tips just appearing over the ridgeline, however these will be screened by intervening woodland on the horizon, therefore only 10 turbines will be visible from this location. The layout of turbines is consistent, with even distribution through the array, and the turbines will be seen in behind farm buildings, deciduous woodland and coniferous woodland.

Magnitude of change

The wireframe in figure 4.17 indicates that the towers and rotors of 12 turbines will be visible from this location, however 2 blade tips in the array will be screened by existing woodland, therefore 10 turbines will be visible from this location. The closest visible turbine is at a distance of 1.7km and the array covers a horizontal angle of 60.6°. The proposed wind farm development will be seen against a background of sky as the viewpoint is lower in elevation than the ridge where the proposed wind farm is located and will be seen behind deciduous woodland and farm buildings. Blade movement will be visible. The associated magnitude of change is considered to be **substantial**.

Effects on visual amenity

The viewpoint is representative of views experienced by road users travelling on the A95 to the west of the site. Road users are considered to be of **medium** sensitivity, because travelling in vehicles at speed shortens the duration of time available to view the landscape. The effect on visual amenity of the proposed wind farm on road users at this viewpoint is considered to be **major / moderate**.

Viewpoint 11: A941 near Midtown of Buchromb

Figure 4.18

Predicted view

The wireframe in figure 4.18 indicates that there will be 8 turbines visible from this viewpoint. The appearance of the proposed wind farm from this location is as blade tips appearing just over the ridgeline, with no towers evident. The majority of the blade tips shown in the wireframe are likely to be screened by coniferous woodland which covers the ridgeline, and it is likely that just two turbine blade tip to the east of the array will be visible in an area where woodland cover is less dense.

Magnitude of change

The wireframe in figure 4.18 indicates that blade tips of 8 turbines will be visible from this location, however the majority of blade tips in the array will be screened by existing coniferous woodland, therefore it is likely that only the tips of two turbines will be visible from this location between areas

of plantation woodland. The closest turbine is at a distance of 4.6km and the array covers a horizontal angle of 17°. Blade movement of tips of turbines will be visible. The associated magnitude of change is considered to be **negligible**.

Effects on visual amenity

The viewpoint is representative of views experienced by road users travelling on the A941 to the south west of the site. Road users are considered to be of **medium** sensitivity, because travelling in vehicles at speed shortens the duration of time available to view the landscape. The effect on visual amenity of the proposed wind farm on road users at this viewpoint is considered to be **minor / none**.

Viewpoint 12: A96(T) Between Keith and Huntly Near Newtack

Figure 4.19

Predicted view

There will be no turbines visible from this location and the predicted view will be as described above.

Magnitude of change

The proposed wind farm development will create **no change** to the existing view from this location.

Effects on visual amenity

The viewpoint is representative of views experienced by road users travelling on the A96(T) between Keith and Huntly, to the east of the site. Road users are considered to be of **medium** sensitivity, because travelling in vehicles at speed shortens the duration of time available to view the landscape. Nevertheless, the effect on visual amenity of the proposed wind farm on residents at this viewpoint is considered to be **none**, as it is not visible.

Viewpoint 13: A96(T) Between Keith and Fochabers

Figure 4.20

Predicted view

There will be 15 turbines visible from this viewpoint. The appearance of the proposed wind farm from this location is mainly as towers and rotor blades on the horizon, with three turbine blade tips visible. The layout of turbines is generally consistent with even distribution through the array, although there is a larger gap between the turbine blade tip to the east of the array and the remaining group of turbines. It is likely that the blade tip to the east will be screened by coniferous woodland, therefore the array will appear as a distinct group and is largely consistent with the main visual elements in the view, forming a simple and clean image in a uniform afforested landscape. There are existing tall structures such as electricity pylons in the view, which provide an indication of the scale of the turbines.

Magnitude of change

The towers and rotors of 15 turbines will be visible from this location, with the closest visible turbine at a distance of 7.2km. The array of turbines covers a horizontal angle of 11.4°. The proposed wind farm development will be seen against a background of sky as the viewpoint is lower in elevation than the ridge where the proposed wind farm is located and will be seen as a consistent distinct group of turbines in a uniform and simple afforested landscape. Blade movement will be visible. The associated magnitude of change is considered to be **moderate**.

Effects on visual amenity

The viewpoint is representative of views experienced by road users travelling on the A96(T) to the north / north east of the site. Road users are considered to be of **medium** sensitivity, because travelling in vehicles at speed shortens the duration of time available to view the landscape. The effect on visual amenity of the proposed wind farm on road users at this viewpoint is considered to be **moderate**.

Viewpoint 14: B9013 near Inchberry

Figure 4.21

Predicted view

There will be 20 turbines visible from this viewpoint. The appearance of the proposed wind farm from this location is as a combination of towers, rotor blades and blade tips on the horizon. The layout of turbines consists of a group of 5 turbines to the east of the layout, slightly separated from a group of 15 turbines to the west of the layout. Generally the turbines are distributed evenly through the array, although there are six turbines which appear paired to another turbine due to the angle of the view.

Magnitude of change

The towers and rotors of 20 turbines will be visible from this location, with the closest visible turbine at a distance of 9.4km. The array of turbines covers a horizontal angle of 16.9°. The proposed wind farm development will be seen against a background of sky as the viewpoint is lower in elevation than the ridge where the proposed wind farm is located. The associated magnitude of change is considered to be **moderate**.

Effects on visual amenity

The viewpoint is representative of views experienced by road users travelling on the B9013 to the north / north west of the site. Road users are considered to be of **medium** sensitivity, because travelling in vehicles at speed shortens the duration of time available to view the landscape. The effect on visual amenity of the proposed wind farm on road users at this viewpoint is considered to be **moderate**.

Viewpoint 15: B9014 at Turn Off to Loch Park Activity Centre

Figure 4.22

Predicted view

There will be 21 turbines visible from this viewpoint. The appearance of the proposed wind farm from this location is as a combination of towers, rotor blades and blade tips. There are 5 blade tips present in the array. The layout of turbines consists of a group of 14 turbines to the west of the layout, slightly separated from a group of 6 turbines to the east of the layout, with one turbine blade in the centre of the view slightly isolated from both groups. The turbines are generally distributed evenly through the array, forming a layout that occupies the lower parts of the ridgeline and appears visually stable on the landform. There are however, three clustered turbines and an isolated turbine in the central section of the array. The proposed wind farm will be seen in relation to existing built structures, particularly Drummuir Castle to the east of the view, which is just visible in the photograph.

Magnitude of change

The towers and rotors of 21 turbines will be visible from this location, with the closest visible turbine at a distance of 2.5km. The array of turbines covers a horizontal angle of 57.6°. The proposed wind farm development will be seen against a background of sky as the viewpoint is lower in elevation than the ridge where the proposed wind farm is located. Blade movement will be visible. The associated magnitude of change is considered to be **substantial**.

Effects on visual amenity

The viewpoint is representative of views experienced by road users travelling on the B9014 to the south of the site. Road users are considered to be of **medium** sensitivity, because travelling in vehicles at speed shortens the duration of time available to view the landscape. The effect on visual amenity of the proposed wind farm on road users at this viewpoint is considered to be **major / moderate**.

Cumulative Viewpoint C1: Ben Aigan

Figure 4.23

Predicted view

There will be 21 turbines of the proposed Drummuir Wind Farm visible from this viewpoint. The appearance of the proposed wind farm from this location is as a distinct group of towers set in a landscape of upland moor and forestry plantation. The turbines are distributed evenly through the array, forming a layout which is consistent with the surrounding landform. Site tracks connecting turbines at the site will be seen from this viewpoint due to its elevation, offering a clear view over the site. As such, tracks have been routed in order to minimise landscape and visual effects. The main link track running north-south along Knockan will not be seen from this viewpoint as it is routed on the eastern side of the ridge along Knockan. Spur tracks run directly downslope from this main track to turbines 3, 7, 9, 11 and 13, and will be seen in line with the turbines rather than running across the hillside. Furthermore, the width of these tracks will be reduced through reinstatement from 5metres to 3.5metres (farm track width) after construction of the wind farm in order to minimise visual effects from Ben Aigan and similar viewpoints to the west. The wider panorama of the view to a variety of landscape types are the dominant elements rather than the proposed wind farm, which appears as a single and medium scale feature in the wider view.

Magnitude of change

The towers and rotors of 21 turbines will be visible from this location, with the closest visible turbine at a distance of 4.3km. The array of turbines covers a horizontal angle of 28.7°. The proposed wind farm development will be seen against a background of landscape as the viewpoint is higher in elevation than the ridge where the proposed wind farm is located. The wind farm will be seen as a distinct element in wider panoramic view which encompasses a variety of landscape character types and features. Blade movement will be visible. The associated magnitude of change is considered to be **moderate**.

Effects on visual amenity

The viewpoint is representative of views experienced by hill walkers on Ben Aigan. Hill walkers are considered to be of **high** sensitivity, because they are engaged in activity which focuses attention on the landscape and places high importance on the scenic quality of views. The effect on visual amenity of the proposed Drummuir Wind Farm on hill walkers at this viewpoint is considered to be **major / moderate**.

Cumulative magnitude of change

From this location the closest turbines of the other proposed wind farms are those at Cairn Uish, at a distance of 12.2km. 28 turbines will be visible at Cairn Uish Wind Farm to the west of the viewpoint, occupying a horizontal angle of 8.7°. Cairn Uish Wind Farm will not be seen in the same direction of view as the proposed Drummuir Wind Farm to the east; instead it is present in the view north west from this viewpoint as a single feature in the wider panoramic view. 25 turbines will be visible at the proposed Paul's Hill Wind Farm, 19.4km to the west of the viewpoint. These turbines occupy a horizontal angle of 6.2° and will be seen in the view north west towards Cairn Uish Wind Farm, but will not be seen in the same direction of view as the proposed Drummuir Wind Farm to the east. In the view east, the visibility analysis and wireframe indicate visibility of Glens of Foudland wind farm. It is, however, located at a distance of 31.4km from this viewpoint, and is unlikely to be recognised as a wind farm at such distances because it will form such a small element. Overall, there will be four wind farms theoretically visible in the 360° panorama from Ben Aigan; Drummuir situated 4.4km to the east; Cairn Uish 12.2km to the west; Paul's Hill situated 19.4km to the west and Glens of Foudland 31.4km to the east. The total horizontal angle of the view occupied by these wind farms is 45.7°. Given the distances and angle of view occupied by the wind farms, the magnitude of cumulative change is considered to be **substantial**.

Cumulative effects on visual amenity

The cumulative effect on visual amenity arising from the proposed wind farm at Drummuir is considered to be **major / moderate** for hill walkers on Ben Aigan.

Viewpoint C2: Ben Rinnes

Figure 4.24

Predicted view

There will be 21 turbines of the proposed Drummuir Wind Farm visible from this viewpoint. The appearance of the proposed wind farm from this location is as a distinct group of towers set in a landscape of upland moor and forestry plantation. The turbines are distributed evenly through the array, forming a layout which is consistent with the surrounding landform. The wider panoramic elements of the view to a variety of landscape types are the dominant rather than proposed wind farm, which appears as a single, small scale feature in the wider view.

Magnitude of change

The towers and rotors of 21 turbines will be visible from this location, with the closest visible turbine at a distance of 14.0km. The array of turbines covers a horizontal angle of 9.4°. The proposed wind farm development will be seen against a background of landscape as the viewpoint is higher in elevation than the ridge where the proposed wind farm is located. The wind farm will be seen as a distinct element in wider panoramic view which encompasses a variety of landscape character types and features. The wider view is large scale and distant. Blade movement will be difficult to distinguish. The associated magnitude of change is considered to be **slight**.

Effects on visual amenity

The viewpoint is representative of views experienced by hill walkers on Ben Rinnes. Hill walkers are considered to be of **high** sensitivity, because they are engaged in activity which focuses attention on the landscape and places high importance on the scenic quality of views. The effect on visual amenity of the proposed wind farm on hill walkers at this viewpoint is considered to be **moderate / minor**.

Cumulative magnitude of change

From this location the closest turbines at the other proposed wind farms are those at Cairn Uish, at a distance of 15.7km. 28 turbines will be visible at Cairn Uish, to the north of the viewpoint, occupying a horizontal angle of 6.8°. The proposed Cairn Uish Wind Farm will be seen in the same general direction of view as the proposed Drummuir Wind Farm to the north east. 21 turbines will be visible at Pauls Hill at a distance of 13.9km to the west of Cairn Uish but in the same general direction of view. The viewpoint analysis and wireframe show 21 turbines at Glens of Foudland Wind Farm visible, but at a distance of 34.8km from the viewpoint in the view east. At such distances the wind farm is not likely to be recognisable as it is such a small element, occupying only 2.1° of the horizontal angle of the view. Overall, there will be two wind farms visible in the 180° panorama to the north from Ben Rinnes; Drummuir and Cairn Uish, and they would be at similar distances and occupy similar portions of the panorama. Given the distances involved and extent of the wider view from Ben Rinnes, it is considered that the magnitude of cumulative change is **slight**.

Cumulative effects on visual amenity

The cumulative effect on visual amenity arising from the proposed wind farm at Drummuir is considered to be **moderate / minor** for hill walkers on Ben Aigan.

Viewpoint C3: B9102 to the East of Archieston

Figure 4.25

Predicted view

There will be 14 turbines of the proposed Drummuir Wind Farm visible from this viewpoint. The appearance of the proposed wind farm from this location is as a combination of towers, rotor blades and blade tips on the horizon. Generally the turbines are distributed evenly through the array, although there are 2 blade tips evident on the wireframe in figure 4.25. The array appears visually stable on the landform, behind coniferous woodland plantation.

Magnitude of change

The towers and rotors of 14 turbines of the proposed Drummuir Wind Farm will be visible from this location, with the closest visible turbine at a distance of 9.6km. The array of turbines covers a horizontal angle of 12.6°. The proposed wind farm development will be seen against a background of sky as the viewpoint is lower in elevation than the ridge where the proposed wind farm is located. Blade movement will be difficult to distinguish at this distance. The associated magnitude of change is considered to be **moderate**.

Effects on visual amenity

The viewpoint is representative of views experienced by road users travelling on the B9102 to the west of the site. Road users are considered to be of **medium** sensitivity, because travelling in vehicles at speed shortens the duration of time available to view the landscape. The effect on visual amenity of the proposed wind farm on road users at this viewpoint is considered to be **moderate**.

Cumulative magnitude of change

From this location, the proposed Cairn Uish, Pauls Hill and Glens of Foudland Wind Farm developments will not be visible. There will therefore be **no** magnitude of cumulative change.

Cumulative effects on visual amenity

*The cumulative effect on visual amenity arising from the proposed wind farm at Drummuir is considered to be **none** for road users on the B9102 to the east of Archieston.*

Viewpoint C4: Elgin (Monument)

Figure 4.26

Predicted view

There will be 7 turbines of the proposed Drummuir Wind Farm visible from this viewpoint. The appearance of the proposed wind farm from this location is as rotor blades and blade tips on the distant horizon. The array appears just over the horizon which has extensive coniferous woodland cover.

Magnitude of change

The rotors and blade tips of 7 turbines of the proposed Drummuir Wind Farm will be visible from this location, with the closest visible turbine at a distance of 20.7km. The array of turbines covers a horizontal angle of 4.8°. The proposed wind farm development will be seen against a background of sky as the viewpoint is lower in elevation than the ridge where the proposed wind farm is located. Blade movement will not be visible at this distance. The associated magnitude of change is considered to be **negligible**.

Effects on visual amenity

The viewpoint is representative of views experienced by residents in Elgin. Residents are considered to be of **high** sensitivity, because of the duration and permanence of change in the view experienced from a primary place of residence. The effect on visual amenity of the proposed wind farm on residents in Elgin is considered to be **minor**.

Cumulative magnitude of change

From this location the closest turbines at the other proposed wind farms are those at Cairn Uish, at a distance of 11.7km. 28 turbines will be visible at Cairn Uish Wind Farm, to the south of the viewpoint, occupying a horizontal angle of 6.8°. The proposed Cairn Uish Wind Farm will be seen in the same 180° view south towards the proposed Drummuir Wind Farm, situated to the west of the panorama. The proposed Pauls Hill Wind Farm and Glens of Foudland Wind Farm are not visible from this viewpoint. Overall, there will be two wind farms visible in the 180° panorama to the south of Elgin; Drummuir situated 20.6km to the south east and Cairn Uish 11.7km to the south. Given these distances the magnitude of cumulative change is considered to be **negligible**.

Cumulative effects on visual amenity

The cumulative effect on visual amenity arising from the proposed wind farm at Drummuir is considered to be **minor** for residents in Elgin.

Viewpoint AC1: Bin Forest

Figure: Additional Cumulative Viewpoint 1

Magnitude of change

21 turbines at Drummuir wind farm visible at a distance of 12.7km to the nearest turbine, occupying horizontal angle of 9.2°. Magnitude of change considered to be **slight**.

Effects on visual amenity

Walkers at the Bin Forest are considered to be of high sensitivity to change. Resulting effect on visual amenity is considered to be **moderate / minor**.

Cumulative magnitude of change

- Cairn Uish - Wind Farm not visible.
- Pauls Hill - According to the viewpoint assessment and wireframe, 20 turbines visible at a distance of 37.5km occupying a horizontal angle of 2.9°.
- Glens of Foudland - 21 turbines visible at a distance of 12.2km, occupying 5.3° horizontal angle of the view.

Drummuir will be seen in the view west and Glens of Foudland will be seen in the view east. Cumulative magnitude of change in relation to this, the distances involved and the small portion of the view that they occupy is considered to be **slight**.

Cumulative effects on visual amenity

Cumulative effect on visual amenity is considered to be **moderate / minor**.

Viewpoint AC2: Tap o'Noth

Figure: Additional Cumulative Viewpoint 2

Magnitude of change

19 turbines at Drummuir Wind Farm visible at a distance of 20.6km occupying 9.0° horizontal angle of the view. Magnitude of change considered to be **negligible**.

Effects on visual amenity

Walkers at Tap o'Noth considered to be of high sensitivity to change. Resulting effect on visual amenity is **minor**.

Cumulative magnitude of change

- Cairn Uish – Viewpoint analysis and wireframe show 21 turbines visible at a distance of 36.0km from the viewpoint, occupying a horizontal angle of 2.5°.
- Pauls Hill – Wind Farm not visible
- Glens of Foudland – 21 turbines visible at a distance of 13.8km from the viewpoint, occupying a horizontal angle of 7.1°.

Drummuir and Cairn Uish will be seen in the same direction of view to the north west, but at distances of over 20km to Drummuir and over 35km to Cairn Uish. Glens of Foudland seen in the view north east at shorter distance, but still over 13km from the viewpoint. Given the distances involved and the small portion of view occupied by the wind farms, the magnitude of cumulative change is considered to be **slight**.

Cumulative effects on visual amenity

Cumulative effect on visual amenity is considered to be **minor**.

Viewpoint AC3: The Buck

Figure: Additional Cumulative Viewpoint 3

Magnitude of change

21 turbines at Drummuir Wind Farm visible at a distance of 23.0km occupying 8.3° horizontal angle of the view. Magnitude of change considered to be **negligible**.

Effects on visual amenity

Walkers at The Buck considered to be of high sensitivity to change. Resulting effect on visual amenity is **minor**.

Cumulative magnitude of change

- Cairn Uish – Viewpoint analysis and wireframe show 14 turbines visible at a distance of 34.9km from the viewpoint, occupying a horizontal angle of 2.0°.
- Pauls Hill – Wind Farm not visible
- Glens of Foudland – 21 turbines visible at a distance of 23.0km from the viewpoint, occupying a horizontal angle of 4.5°.

Drummuir and Glens of Foudland will be seen in the same general direction of view to the north, but at distances of over 20km. Cairn Uish unlikely to be recognisable in the view at a distance of approximately 35km. Given the distances involved and the small portion of view occupied by the wind farms, the magnitude of cumulative change is considered to be **negligible**.

Cumulative effects on visual amenity

Cumulative effect on visual amenity is considered to be **minor**.

Viewpoint AC4: Leys of Dummuies

Figure: Additional Cumulative Viewpoint 4

Magnitude of change

10 Turbines at Drummuir Wind Farm visible at a distance of approximately 18km. Magnitude of change considered to be **negligible**.

Effects on visual amenity

Road users on the A96 near Leys of Dummuies are considered to be of medium sensitivity to change. Resulting effect on visual amenity is **minor**.

Cumulative magnitude of change

- Cairn Uish – Wind Farm not visible
- Pauls Hill – Wind Farm not visible
- Glens of Foudland – Turbines visible at a distance of approximately 6km from the viewpoint

Drummuir will be seen in the view over long distances to the north west and Glens of Foudland will be seen in the view at medium distances to the south east. Wind farms will be seen from the main road in opposite directions therefore opportunities for views of both wind farms at the same time are limited. Given the distances involved, the nature of the viewing angles from the road and the small portion of view occupied by the wind farms, the magnitude of cumulative change is considered to be **slight**.

Cumulative effects on visual amenity

Cumulative effect on visual amenity is considered to be **minor**.

Viewpoint AC5: A96(T) near Newtack between Keith and Huntly

Figure: Additional Cumulative Viewpoint 5

Magnitude of change

Drummuir Wind Farm not visible from this viewpoint.

Effects on visual amenity

Road users on A96 near Newtack considered to be of medium sensitivity to change. Resulting effect on visual amenity is **none**.

Cumulative magnitude of change

- Cairn Uish – Wind Farm not visible
- Pauls Hill – Wind Farm not visible
- Glens of Foudland – Wind Farm not visible

Magnitude of cumulative change is considered to be **none**.

Cumulative effects on visual amenity

Cumulative effect on visual amenity is considered to be **none**.

3.1.7 Summary

TABLE 3: Summary Of Effects On Visual Amenity At Viewpoints

No	Viewpoint Name	No. of turbines visible	Nearest visible turbine	Horizontal angle (°)	Magnitude of change	Receptor sensitivity	Effects on visual amenity
1	C55H minor road through site	21	392 metres	264	Substantial	Road users – Medium	Major
2	West edge of Keith on B9104	5	3.9km	18.2	Moderate	Road users – Medium	Moderate
3	Southern edge of Keith	16	5.5km	19.2	Moderate	Residents – High	Moderate
4	West edge of Dufftown	13	6.4km	6.3	Moderate	Residents – High	Moderate
5	Charlestown of Aberlour	12	9.4km	11.2	Moderate	Residents – High Road users – Medium	Moderate Moderate / minor
6	Drummuir / Newburgh on B9115	21	2.4km	54.0	Substantial	Residents – High Road users – Medium	Major Major / moderate
7	Balvenie Castle	0	N/A	0	No change	Tourists / visitors – High	None

8	Buckie	0	N/A	0	No change	Residents – High	None
9	Minor road between Loanhead and Bushfarms	18	3.1km	42.7	Substantial	Road users – Medium	Major / moderate
10	A95 near Knockan	12	1.7km	60.6	Substantial	Road users – Medium	Major / moderate
11	A941 near Midtown of Buchromb	8	4.6km	17.0	Negligible	Road users – Medium	Minor / none
12	A96(T) between Keith & Huntly near Newtack	0	N/A	0	No change	Road users – Medium	None
13	A96(T) between Keith & Fochabers	15	7.2km	11.4	Moderate	Road users – medium	Moderate
14	B9013 near Inchberry	20	9.4km	16.9	Moderate	Road users – Medium	Moderate
15	B9014 at turn off to minor road to Loch Park Activity Centre	21	2.5km	57.6	Substantial	Road users – Medium	Major / moderate

TABLE 4: Summary Of Cumulative Effects On Visual Amenity At Cumulative Viewpoints

No	Viewpoint Name	Nearest visible turbine: Drummuir	Magnitude of change	Receptor sensitivity	Effect on visual amenity	Cumulative magnitude of change	Cumulative effect on visual amenity
C1	Ben Aigan	4.3km	Moderate	Walkers – High	Major / moderate	Substantial	Major / moderate
C2	Ben Rinnes	14.0km	Slight	Walkers – High	Moderate / minor	Slight	Moderate / minor
C3	B9102 to the east of Archieston	9.6km	Moderate	Road users – Medium	Moderate	No change	None
C4	Elgin Monument	20.7km	Negligible	Residents – High	Minor	Negligible	Minor

TABLE 5: Summary of cumulative effects on visual amenity at additional cumulative viewpoints

No	Viewpoint Name	Nearest visible turbine: Drummuir	Magnitude of change	Receptor sensitivity	Effect on visual amenity	Cumulative magnitude of change	Cumulative effect on visual amenity
AC1	Bin Forest	12.7km	Slight	Walkers – High	Moderate / minor	Slight	Moderate / minor
AC2	Tap o'Noth	20.6km	Negligible	Walkers – High	Minor	Slight	Minor
AC3	The Buck	23.0km	Negligible	Walkers – High	Minor	Negligible	Minor
AC4	Leys of Dummuies	18km	Negligible	Road users – Medium	Minor	Slight	Minor
AC5	A96(T) near Newtack	N/A	None	Road users – Medium	None	None	None

3.1.8 Conclusions

Enviros Consulting were commissioned by RES to reassess a revised layout for the Drummuir Wind Farm following further optimisation of the wind farm design. This report concentrates on the changes associated with the revised layout. Consideration has also been given to the potential cumulative effects of Glens of Foudland Wind Farm, Aultmore Wind Farm and Clashindarroch Wind Farm.

The layout of the Drummuir turbines and access tracks has been through further visual optimisation following the planning application consultation response from SNH. A more cohesive layout, avoiding clustering of turbines and isolated turbines has been produced in order to address SNHs concern that a more consistent layout would be more acceptable on the landscape and visual amenity of the area.

The site tracks connecting turbines at the site have been re-routed in order to minimise landscape and visual effects. As a further mitigation measure, the width of these site tracks connecting turbine 3, turbine 7, turbine 9, turbine 11 and the stretch between turbine 13 and the borrow pit will be reduced from 5metres to approximately 3.5metres (farm track width) after construction of the wind farm.

The change in the layout has caused little change in the ZVI analysis as described in section 4.6.2 of the Environmental Statement.

A re-assessment of the viewpoint assessment has been carried out for the new Drummuir layout. It has caused small changes to the number of turbines visible at each viewpoint, and the portion of the view that the wind farm occupies. It has also improved the visual appearance of the wind farm from certain key viewpoints. These changes are discussed in the predicted view and magnitude of change sections for each viewpoint in this report. The re-positioning of turbines in the layout has not changed the assessment of impact significance detailed in the ES for any of the Drummuir viewpoints (VP1 to VP15).

The change in the Drummuir layout has caused little change to the cumulative ZVI analysis described in section 4.6.4 of the Environmental Statement for Drummuir Wind Farm, Cairn Uish Wind Farm and Pauls Hills Wind Farm.

A cumulative assessment of Glens of Foudland Wind Farm, together with the ES cumulative sites (Drummuir, Cairn Uish and Pauls Hill) has been carried out using a cumulative ZVI and the four ES cumulative viewpoints (C1 – C4).

The areas likely to be affected by cumulative visibility of Drummuir and Glens of Foudland are generally situated between the two sites, often from the most elevated parts of the landscape which offer wider panoramic views of the region, but do not contain residential development or major transport routes. In all areas of cumulative visibility, the distances to the furthest wind farm are long, often over 20km, and as such the cumulative visual impacts of Drummuir and Glens of Foudland are minor, and considered acceptable.

The areas likely to be affected by cumulative visibility of Drummuir, Glens of Foudland and Cairn Uish in succession are very limited in extent and offer long distance visibility of at least two wind farms in the view. As such, the wind farms will occupy a small angle in the overall panorama view from these hill tops. The cumulative visual impacts of Drummuir, Glens of Foudland and Cairn Uish in succession are minor, and considered acceptable.

There is a small area on the cumulative ZVI where Drummuir, Glens of Foudland, Cairn Uish and Pauls Hill 25km study areas overlap to the south of Drummuir near the Scalp. Although the four 25km study areas overlap the ZVI shows there is no visibility of all 4 wind farms within this area.

At two of the viewpoints (C1 – Ben Aigan and C2 – Ben Rinnes), Glens of Foudland is shown as visible in the viewpoint analysis software and wireframe, however in both cases the wind farm is at a distance of over 31km from the viewpoint. At the other two viewpoints (C3 – Archieston and C4 – Elgin) Glens of Foudland will not be visible. On the whole, the inclusion of Glens of Foudland in the cumulative viewpoint assessment does not change the original assessment of cumulative effects as stated in the ES. There will be significant cumulative effects at C1 – Ben Aigan, however at the other viewpoints the cumulative effect is not considered to be significant.

A cumulative assessment has been carried out at four additional viewpoints in Aberdeenshire and for one of the original Drummuir only viewpoints (Viewpoint 12 – A96 near Newtack). In all cases the cumulative effects of Drummuir, Cairn Uish, Pauls Hill and Glens of Foudland are moderate / minor, minor or negligible. Given the distances involved and the small portion of view occupied by wind farms the cumulative effects are considered to be acceptable at these locations.

3.2 ECOLOGY

3.2.1 Introduction

This report was commissioned by Renewable Energy Systems (RES) to reassess a revised layout for the proposed Drummuir wind farm and produce an outline peatland enhancement plan.

It follows the same assessment methodology as the ecology chapter of the Environmental Statement. It provides an update on all of the information that has changed as a result of the revision of the layout, principally the numbers of birds within the potential disturbance zone (within 300m of the proposed wind turbine locations), and the details of the revised habitat take. It also includes information from a peat depth survey carried out subsequent to the submission of the original application.

The second part of the report provides an outline plan for peatland enhancement. RES have agreed to implement such a plan, the aim of which will be to mitigate the small loss of peatland habitat by re-wetting bog areas that have been damaged by drainage. It is not the intention of this report to produce a definitive prescribed final plan but rather to provide an outline plan that will be discussed with the appropriate consultees, and appropriate action agreed and implemented.

3.2.2 Update To Ornithological Impact Assessment

The numbers of pairs of breeding birds found within the potential disturbance zone (within 300m of the proposed wind turbines) of the revised layout is shown in Table 6, and the numbers from the ES layout for comparison. This Table updates Table 5.8 of the ecology chapter of the ES.

Overall the revised layout did not alter the bird numbers in this zone substantively. Two additional species were found in the revised zone, mallard and carrion crow, though neither of these have any specific conservation importance. Two species in the ES zone (woodpigeon and song thrush) were not found in the revised zone. Overall numbers were also very similar; of the two most abundant species, skylark and meadow pipit, there were 3 additional pairs of the former and 7 less pairs of the latter. This Table has also been updated to reflect the changes in the Birds of Conservation Concern list that has recently been published (RSPB *et al.* 2002 ²): four further species have been classed as low sensitivity as they are now amber-listed.

In the ES it was reported that the only Schedule 1 species that may (from the surveys and past records) breed within the proposed wind farm area is merlin. Though it was not found breeding in 2001 (or indeed in 2000), it had bred in the area during 1990-99. Following consultations with RSPB and SNH, RES have updated their proposed layout to increase the separation distance between a traditional breeding site that this species has used and the nearest turbines (from just over 100m to over 300m). Therefore the likelihood of any impact on this species, should it return to breed at this site, would be further reduced (and hence clearly would not be significant). It would still be advisable however, if construction were planned during the bird breeding season, to carry out a survey of possible Schedule 1 species (including merlin) within 1km of the development site immediately prior to construction, so that construction activity does not take place in close proximity to active nest sites, to ensure compliance with the 1981 Wildlife and Countryside Act.

TABLE 6. Conservation importance of the breeding birds at Drummuir within 300m of the proposed turbine locations, updated to the May 2003 layout. Subscript numbers indicate contribution to breeding bird community score. This Table provides an update to Table 5.8 of the ecology chapter of the ES.

Species	Total breeding pairs within 300m of turbines		EU Birds Directive Annex 1	UK BAP priority species	Red List	Amber List	Conservation importance in zone of possible disturbance effect
	ES layout	New May 2003 layout					
Mallard	0	1					
Red Grouse ¹	21	21					LOW
Pheasant	5	4					
Snipe ²	3	3				✓	LOW
Curlew ²	3	2				✓	LOW
Woodpigeon	1	0					
Skylark	28	31		✓	✓		MEDIUM
Meadow Pipit	198	191					[Low]
Wren	3	2					
Robin	2	2					
Stonechat ²	2	1				✓	LOW

² RSPB *et al.* 2002. Birds of conservation concern in the United Kingdom, Channel Islands and Isle of Man 2002-2007. RSPB, Sandy.

Wheatear ²	3	3				
Blackbird	1	1			✓	LOW [None]
Song Thrush	1	0	✓	✓		(MEDIUM)
Mistle Thrush	1	1				[Low]
Willow Warbler	4	1				[Low]
Coal Tit	2	1				
Carrion crow	0	1				
Chaffinch	11	8				
Siskin	4	4				
Linnet	2	2	✓	✓		MEDIUM
Redpoll	3	1				[Low]

Square brackets indicate updated species status (RSPB et al. 2002); round brackets indicate species that were no longer found in the potential disturbance zone.

3.2.3 Update To Other Ecological Impacts

The updated figures for the loss of habitat that would occur as a result of the revised development are shown in Table 7. This Table updates Table 5.9 of the ecology chapter of the ES.

A peat depth survey of the proposed turbine locations and access track routes has been undertaken subsequent to the submission of the application. The report of this survey is contained in Appendix 1. This survey has enabled the habitats that will be lost to be more precisely identified, particularly in relation to the area of wet heath and bog that was mapped as a mosaic in the Phase 1/NVC survey. The main reason for the lack of a distinct boundary between the heath and the bog is that much of the peat is around the heath/bog threshold peat depth of 0.5m. All proposed turbines in the amended layout and the track layout are located in firm dry ground with shallow peat of less than 0.6m in depth. The mean peat depth over the whole site was only 0.24m and there was no indication of significant areas of deep peat.

Overall with the revised layout, there are only small differences to the losses that would have resulted from the ES layout:

- One more turbine would be located on the wet dwarf shrub heath, and one less on the wet heath/blanket bog mosaic (though the peat depth survey indicated that this would be on the shallower peat within this mosaic, i.e. on heath rather than bog).
- The length of access track would be slightly less on the dry and the wet dwarf shrub heath and a little higher on the wet heath/blanket bog mosaic (though the peat depth survey indicated that most of the route across this mosaic was actually over shallower peat heath rather than bog).
- Two of the three proposed borrow pits would now be located on the wet heath/blanket bog mosaic (rather than wet heath as before), though the peat depth survey has shown that the area in which they will be located is actually wet heath.
- The site compound would be on habitat mapped as wet rather than dry dwarf shrub heath.

Thus overall there would be no material differences in the habitat take to that which would have occurred as a result of the ES layout, and no significant impacts are predicted. There would be a minor loss of peatland habitats, but this will be mitigated by the proposed peatland enhancement plan outlined below.

TABLE 7. Direct habitat loss that will occur as a result of the proposed development, updated to the May 2003 layout. Areas are given in hectares. This Table provides an update to Table 5.9 of the ecology chapter of the ES.

Habitat	Turbine bases [no. of turbines]	Site tracks	Borrow pits	Site compound	Substation
<i>Dry dwarf shrub heath</i>					
Previous layout	2.0 [8]	2.7	1.0	1.0	0.4
May 2003 layout	2.0 [8]	2.2	1.0	-	0.4
<i>Wet dwarf shrub heath</i>					
Previous layout	0.5 [2]	0.6	2.0	-	-
May 2003 layout	0.8 [3]	0.4	-	1.0	-
<i>Blanket bog</i>					
Previous layout	0.5 [2]	0.1	-	-	-
May 2003 layout	0.5 [2]	0.1	-	-	-
<i>Wet heath/blanket bog mosaic*</i>					
Previous layout	2.3 [9]	2.0	-	-	-
May 2003 layout	2.0 [8]	2.1	2.0	-	-
<i>Acid flush</i>					
Previous layout	-	0.1	-	-	-
May 2003 layout	-	0.1	-	-	-

* Areas have been selected to avoid deeper peat, so the parts of this mosaic lost will be primarily wet heath; track will be floating road over more sensitive areas where it has not been possible to avoid them.

3.2.4 Updated Summary Of Assessment Of Ecological Effects

The updated assessment of the potential effects of the proposed wind farm on the features of ecological interest is summarised in Tables 8 and 9. These update the information provided in Tables 5.10 and 5.11 of the ecology chapter of the ES. The conservation importance of each species/community occurring in the study area is given, together with an assessment of the magnitude and significance of collision, habitat loss and disturbance effects.

Overall there was no material difference to the ecological assessment of the updated layout in comparison with that in the ES. No ornithological or other ecological impacts are likely to occur as a result of the development that would be considered significant under the EIA Regulations.

TABLE 8. Summary of effects of the Drummuir proposed wind farm on regionally and locally important features of ornithological interest. Note predicted magnitude of effects is based on a reasonable (i.e. possible) worst case. This Table provides an update to Table 5.10 of the ecology chapter of the ES. Bold indicates changes from the ES.

Species	Sensitivity	Collision risk		Habitat loss		Disturbance		Benefits: Peatland enhancement
		Magnitude	Significance of effect	Magnitude	Significance of effect	Magnitude	Significance of effect	
Species breeding in the study area:								
Red grouse	Low	Low	Very low	Low	Very low	Medium	Low	✓
Snipe	Low	Low	Very low	Low	Very low	Medium	Low	✓
Curlew	Low	Low	Very low	Low	Very low	Medium	Low	✓
Skylark	Medium	Low	Low	Low	Low	Low	Low	
Meadow pipit	Low	Low	Very low	Low	Very low	Low	Low	✓
Dunnock	Low	Negligible	Very low	Low	Low	Low	Very low	
Stonechat	Low	Negligible	Very low	Low	Very low	Low	Very low	
Song thrush	Medium	Negligible	Very low	Low	Low	Negligible	Very low	
Mistle thrush	Low	Negligible	Very low	Negligible	Very low	Low	Very low	
Willow warbler	Low	Negligible	Very low	Negligible	Very low	Low	Very low	
Linnet	Medium	Negligible	Very low	Negligible	Very low	Low	Low	
Redpoll	Low	Negligible	Very low	Negligible	Very low	Low	Very low	
Other species:								
Hen harrier	High	Negligible	Low	Negligible	Low	Negligible	Low	✓
Other schedule 1 species	Medium	Low/negligible	Low	Low/negligible	Low	Low/negligible	Low	✓
Black grouse	Medium	Negligible	Very low	Negligible	Very low	Low/negligible	Low	✓
Migrants	Medium (max.)	Low	Low	Nil	-	Nil	-	
Kestrel	Low	Low	Very low	Negligible	Very low	Low	Very low	✓
Other low sensitivity species	Low	Low	Very low	Negligible	Very low	Low	Very low	

TABLE 9. Summary of the Drummuir proposed wind farm effects on other ecological interests. This Table provides an update to Table 5.11 of the ecology chapter of the ES.

	Sensitivity	Magnitude of effect	Significance of effect	Benefits: <i>Peatland enhancement</i>
Plant communities				
Blanket bog (M19)	Medium	Low	Low	✓
Blanket bog pool (M2)	Medium	Negligible	Very low	✓
Wet dwarf shrub heath (H13)	Medium ¹	Low	Low	✓
Acid flush (M6)	Medium ¹	Low	Low	
Dry dwarf shrub heath (H12)	Medium ¹	Low	Low	
Plant species				
Lesser twayblade	Medium	Low	Low	
Chickweed wintergreen	Low	Low	Very low	
Round-leaved sundew	Low	Low	Very low	
Marsh lousewort	Low	Low	Very low	
Common cow-wheat	Low	Low	Very low	
Marsh cinquefoil	Low	Low	Very low	
Bog mosses	Low	Low	Very low	✓
Non-avian fauna				
Badger	Medium	Low*	Low*	

* The predicted low magnitude effect on badgers assumes that no setts would be damaged. This would need to be confirmed by pre-construction surveys and micro-siting of turbines away from any setts, if present.

¹ Wet and dry dwarf shrub heath and acid flush habitats have been updated to medium sensitivity through their listing as UK BAP priority habitats.

3.2.5 Peatland Enhancement Plan

As some small loss of peatland habitats will be inevitable, blocking existing drains to re-wet parts of the peatland areas is being proposed to ensure a net gain in peatland condition. This could also have ornithological and other ecological benefits, providing enhanced invertebrate availability and increased feeding opportunities for, e.g. curlew, snipe and red grouse.

The purpose of this section of the report is not to describe the final detailed prescriptions that will be undertaken but rather to outline the principles and objectives of the peatland enhancement plan, which will be refined and agreed through consultations with SNH and RSPB and through further field survey (to confirm the most appropriate locations).

The total loss of habitat resulting from the development would be about 15 ha. Therefore the peatland enhancement plan will aim to deliver an improvement to at least the same area.

Some initial potential peatland enhancement areas have been identified in Figure 3. These areas have been selected as they have been more directly affected by drainage and they have drains that could be readily blocked. In order to ensure that the most appropriate areas are finally chosen, it would be important to carry out a further field survey, in conjunction with use of recent colour aerial photographs, to finally determine the best location(s).

The existing man-made drains in these areas would be blocked to promote peatland regeneration (English Nature 2001³). It will probably be sufficient to fill these with peat from the wind farm construction works, though some of the main drains are likely to also need to be reinforced with boards to block key points in the drains (Burgess *et al.* 1995⁴).

A further measure that may be worth consideration is the removal of invading conifers; these can further reduce peatland viability as the trees mature and further increase water loss from the peatland (Burgess *et al.* 1995). It may be desirable to retain small numbers of native pines (to be determined through consultations with SNH and RSPB) but invading exotic species from the neighbouring coniferous plantations could be removed.

The progress of the peatland enhancement should be monitored. Regular (e.g. once every 3 years) measurement of the cover of key peatland indicator plant species (e.g. *Sphagnum* bog mosses) would probably be the best way to undertake such monitoring.

3.3 ARCHAEOLOGY

3.3.1 Introduction

In May 2003 RES commissioned CFA Archaeology to assess a revised layout proposal for the proposed wind farm at Drummuir. This Section considers the likely effects on cultural heritage interests of the construction and operation of the revised wind farm proposals, and identifies measures that should be undertaken to mitigate any predicted adverse effects.

Figure 4 depicts the study area for the assessment and the proposed locations of key development features, along with the locations of archaeological sites and monuments identified by the baseline study conducted for the original Environment Impact Assessment. The proposed development would

³ English Nature 2001. The Upland Management Handbook: Information Note 9 Moorland grip blocking. English Nature, Peterborough.

⁴ Burgess, N., Ward, D., Hobbs, R. and Bellamy, D. 1995. Reedbeds, fens and acid bogs. In "Managing Habitats for Conservation" Sutherland, W.J. and Hill, D.A. (eds). Cambridge University Press, Cambridge.

comprise 21 turbines, two anemometer masts, a compound, a substation and three borrow pits. These features would be connected by a network of access roads, of which it is proposed certain lengths will be constructed as floating roads.

With the exception of confirming that no unscheduled archaeological sites previously identified within or close to the study area had been scheduled since the last cultural heritage assessment took place (in August 2002), no additional baseline study has been conducted as part of this reassessment. The cultural heritage baseline is therefore considered to be the same as that identified in the original Environmental Statement (Section 6). The planning and legislative background for cultural heritage, the methods statement for the baseline study, the description and evaluation of the baseline resource, and the consideration of archaeological potential of the assessment area, are included in the original Environmental Statement (Sections 6.2-6.5), and are not repeated here.

3.3.2 Impacts

A consideration of the potential direct and indirect effects of the construction and operation of the proposed wind farm upon cultural heritage interests is included in Section 6.6.1 of the original Environmental Statement. Table 17 summarises the nature, magnitude and significance of predicted effects of the proposed development upon cultural heritage resources present within the study area.

3.3.2.1 Direct Effects

Direct effects are predicted in relation to eight sites identified by the study. They relate to the minor disturbance of post-medieval tracks (**9, 16, 21-23, 25, 30**) and a field bank (**2**) from a range of proposed development features. In all cases only localised (low or medium magnitude) disturbance would occur to sites of Local or Lesser Importance (medium or low sensitivity), and thus the effects are predicted to be not significant. The routes of track **21** and field bank **2** would be the most severely affected by proposed development.

The predicted effects of the proposed development on two lines of post-medieval grouse butts (**3, 12**) are uncertain, as it is not known whether proposed site tracks intersecting the alignments of hides would coincide with any built features. As only one element of each line of butts is potentially under threat and because these landscape features are considered to be of only Local Importance, it is considered that any effects of the proposed development would be not significant.

The revision of the proposed wind farm layout has not altered the number or general range of archaeological sites that would be affected directly by the construction of the development. However, the revised layout avoids the area of site **14**, and thus the only potentially significant direct effect predicted in relation to the previous layout has been prevented. Therefore the revised layout would have a lesser overall direct effect upon cultural heritage than the previously assessed layout.

3.3.2.2 Indirect Effects on External Receptors

The revision of the wind farm layout does not alter the nature and magnitude of indirect effects predicted in relation to the previously assessed layout. The visual effects of the proposed development upon key external receptors considered in the Environmental Statement (Section 6.6.2.2) would be of low or negligible magnitude, and therefore it is not considered that those receptors would undergo significant, indirect environmental effects.

3.3.2.3 Uncertain Effects

The revision of the wind farm layout does not alter the prediction made in relation to the previously assessed layout that the potential for ground-breaking operations associated with the construction of the wind farm to disturb buried archaeological remains is low.

Probing conducted by RES since the previous layout assessment has revealed that peat is less than 0.6m deep at all the proposed turbine positions. The potential for sources of significant palaeoenvironmental information to be disturbed during the construction of the wind farm is therefore considered to be low.

3.3.3 Mitigation

A range of mitigation measures is proposed to prevent or offset the adverse effects predicted above, where appropriate, and replaces the proposals included in the original Environmental Statement.

Should planning consent be granted for the development, a Written Scheme of Investigation (WSI) for archaeological mitigation works would be prepared for approval by the planning authority. This would feature the following elements:

- Field survey of proposed development feature locations in the south-west part of the site (and outside the study area proposed at the time of the previous field survey), principally T1-2 and interconnecting access road. This would identify any previously unrecorded archaeological features that might be affected by the proposed wind farm. Although the likelihood of any significant archaeological remains being present is considered to be low, based upon the results of fieldwork already conducted, appropriate mitigation proposals would be brought forward in relation to significant discoveries.
- Protection of Site **18**, which lies close to T12, during the construction period. The cairn should be marked off to prevent any accidental damage occurring to it. No specific mitigation is proposed in relation to other sites for which direct effects have been predicted as the effects are not considered to be significant and sufficient records of the sites already exist.
- Archaeological watching briefs to be conducted during ground-breaking operations in archaeologically sensitive areas, according to a sampling strategy to be agreed with Aberdeenshire Council Archaeology Service. Based upon the proposed development layout and the distribution of significant archaeological sites, only the area around Site **14** (ie Turbines T3 and T7) can be considered as being potentially archaeologically sensitive on the basis of baseline data.
- Issue of guidelines for use by construction contractors, outlining the need to avoid causing unnecessary damage to known archaeological sites. This document would also contain arrangements for calling upon professional archaeological support in the event that buried remains they consider to be of potential archaeological interest are discovered in areas not subject to archaeological monitoring (such as buried buildings, human burials, artefacts etc).

Provision would be made for the excavation and recording of any archaeological remains identified either during watching briefs or by construction contractors in areas not subject to archaeological monitoring. This provision would include the consequent production of written reports on the findings of the archaeological work conducted, with post-excavation analyses and publication of the results of the work where appropriate.

After taking into account the mitigation measures proposed above, no currently identified sites would undergo significant environmental effects as a result of the proposed wind farm development.

Table 17 provides a summary of proposed mitigation measures and an assessment of residual effects after mitigation has been taken into account.

3.3.4 Conclusions

The revised development proposals have been assessed against the cultural heritage baseline, in so far as this has been established. Direct effects, none significant, have been predicted in relation to eight sites identified by the study. It is considered that the construction and operation of the wind farm would not have any significant indirect effects upon cultural heritage interests. Effects upon currently unidentified buried archaeological remains are difficult to predict, but are likely to be minor. The revised layout would have a lesser overall direct effect upon the cultural heritage than the previously assessed layout, whereas the predicted scales of indirect and uncertain effects remain the same.

In overall terms, it is concluded that the revised development proposals would have no significant effects upon the known cultural heritage baseline and do not conflict with the aims of national, regional and local planning policy as regards cultural heritage.

3.4 HYDROLOGY

3.4.1 Introduction and Scope

This section assesses the hydrological impacts of the revised layout for the Drummuir Wind Farm. The assessment has been undertaken by Entec UK Ltd (Entec). It considers the effects of the revised wind farm layout on the hydrology of the existing site and surroundings. Entec has already undertaken a baseline study and assessment and this should be referred to in conjunction with this report. This section highlights changes to the assessment and evaluation of residual effects on hydrology and does not address the baseline environment. The baseline environment and mitigation measures are outlined in detail in Section 7 (Hydrological Assessment) of the original Environmental Statement (ES) and Figures remain unchanged and are shown in Volume III of the original ES.

3.4.2 Assessment of Residual Effects

3.4.2.1 Introduction

This section describes the likely residual effects following the incorporation of mitigation measures. Therefore it addresses those effects that could occur as a result of the development.

3.4.2.2 Construction Phase

Access Tracks

There is less length of access track in the revised layout and the tracks now avoid the damp areas in the headwaters or the Burn of Towie. The revised track layout also minimises the amount of tracks that run parallel to contour lines, reducing the need for roadside drainage. The effects of the revised access track layout will be to minimise further the predicted construction impacts.

Wind Turbines and Crane Pads

Following a geotechnical investigation of soil conditions at the site, it has been confirmed that peat thicknesses are less than 0.6m at each of the turbine bases. Since soils are reasonably shallow there will be minimal impacts during the excavation for turbine bases. The overall effects on soil hydrology will continue to be not significant.

Electric Cables

No changes to the effects of cable laying are predicted due to the revised layout.

Borrow Pits

No changes to the effects of borrow pits are predicted due to the revised layout.

Site Working Practices

No changes to the effects of site working practices are predicted due to the revised layout.

3.4.2.3 Operational Phase

Access Tracks

The same effects as predicted in Section 3.4.2.2 are applicable to the operation phase of the development.

The access tracks of the revised layout will continue to divert drainage from its natural flow path. However there has been a slight reduction in area from which runoff would be diverted. It is now predicted that the access tracks located in the catchment of the Burn of Tauchers and the Burn of Rosaire will divert only a negligible quantity of natural runoff to the Burn of Towie. This will further protect water quality in these channels protecting the quality of the abstraction made by the Glentauchers Distillery.

Wind Turbines and Crane Pads

No changes to the effects of wind turbines and crane pads are predicted due to the revised layout

Site Activities

No changes to the effects of site activities are predicted due to the revised layout

3.4.2.4 Evaluation of Residual Effects

Four criteria have been used in evaluating the residual hydrological effects of the proposed development. These are:

- the type of effect, i.e. whether it is positive, negative, neutral or uncertain;
- the probability of the effect occurring based on the scale of certain, likely or unlikely;
- the sensitivity or importance in policy of the feature affected, expressed geographically as follows :
 - international (trans-national boundaries);
 - national (Scotland wide);
 - regional (North East Scotland);
 - district (more than 2 km but less than 20 km from the site boundary);
 - local (within a 2 km radius of the site boundary).
- the magnitude of the effect in relation to the resource that has been evaluated, i.e. high, medium, low or no effect.

The findings in relation to all of these criteria are brought together to give an assessment of significance for each residual effect, the results of which are summarised within Table 10. Residual effects are considered to be of negligible, low, moderate or major significance. Only residual effects that are moderate/major or major are considered to be significant. This assessment relies on professional judgement rather than any scoring of the criteria.

TABLE 10 Residual Effects and Evaluation of Significance

Hydrology	Type Of Effect	Probability Of Effect Occurring	Policy Importance or Sensitivity	Magnitude of Effect	Significance	
					Level	Rationale
Construction Phase						
Input of sediment to the Burn of Towie during access track construction	-ve	Likely	Local	Minor	Low	Access tracks and construction methods have been designed to minimise runoff and hence erosion potential. High levels of background suspended sediment currently exist.
Accidental spillages of oils or diesel entering surface water or groundwater	-ve	Unlikely	Local	Minor	Negligible	Best management site practices will be adopted throughout the construction phase
Operation Phase						
Erosion of track surfaces during heavy rainfall	-ve	Likely	Local	Minor	Negligible	Access tracks have been designed to minimise runoff and hence erosion potential
Sediment input from access track drainage entering the Burn of Towie	-ve	Likely	Local	Minor	Low	High levels of sediment and peaty material currently exist within the Burn of Towie
Reduction in the catchment of the Burn of Tauchers and Rosaire Burn due to access track drainage	-ve	Certain	Local	Minor	Negligible	Reduction in flows will be negligible and it was important to protect the quality of runoff to these watercourses
Accidental spillages of oils or diesel entering surface water or groundwater	-ve	Unlikely	Local	Minor	Negligible	Best management site practices will be adopted
Key:	Type	Probability	Policy Importance	Magnitude	Significance	
	-ve = Negative	Certain	International	Major	Major	
	+ve = Positive	Likely	National (UK)	Medium	Moderate	
	? = Unknown	Unlikely	Regional	Minor	Low	
	0 = Neutral		District	None	Negligible	
			Local			
Note: Shading denotes effects that are considered to be significant						

3.4.3 Summary

This chapter describes the assessment of residual effects and their significance on hydrology for the revised wind farm layout.

The Burn of Tauchers and Burn of Rosaire continue to be the most sensitive receptors since water is abstracted from these burns by the Glentauchers Distillery. It is also known that the streams to the south of the site provide water for private water supplies and hence these are also important to protect.

The assessment has demonstrated that the residual effects of the development on hydrology will be minimal and are in fact slightly less for the revised layout and the hydrological effects continue to be considered not significant.

3.5 NOISE

3.5.1 Introduction

This section assesses the acoustic impacts of the revised layout for the Drummuir Wind Farm. A baseline study and assessment has already been undertaken for the original ES and this should be referred to in conjunction with this report. This section highlights changes to the layout and noise assessment and does not address the methodology or the background noise measurements of the baseline environment. The introduction, methodology and baseline environment sections remain unchanged from the original assessment which are outlined in detail in Section 9 (Acoustic Assessment) of the original Environmental Statement (ES). The Figures within Volume III of the original ES also remain unchanged however two new figures have been created and these are contained within Volume III of the Amendment to the Application document. The Appendices also remain unchanged. This section therefore needs to be read in conjunction with the original ES.

3.5.2 Calculation of Noise Levels at Nearby Neighbours

3.5.2.1 Turbine Locations and Nearby Neighbour Locations

The turbine locations of the amended layout are listed in Table 11, and the locations of the nearby neighbours in Table 12. The distances from each house to the nearest turbine are given in Table 13. It can be seen that for each house, by design, the nearest turbine is at least 1000m away. Figure 5 shows the locations of nearby dwellings.

TABLE 11 - Location of Turbines (Absolute Coordinates)

Turbine No.	E-W Location	N-S Location	Elevation (m AOD)
1	334968	845966	410
2	335198	845634	390
3	334839	846286	416
4	335252	846268	421
5	335484	845924	398
6	335894	846066	368
7	335032	846624	420
8	335529	846563	406
9	335234	846971	411
10	335943	846642	370
11	335355	847366	414
12	335771	847245	423

13	335514	847900	413
14	335701	847574	419
15	336401	845966	348
16	336980	846594	340
17	337315	846754	351
18	337707	846489	321
19	337686	846968	370
20	337765	847349	371
21	338105	847094	386

TABLE 12 - Location of Nearby Neighbours (Absolute Coordinates)

House Name	E-W Location	N-S Location	Elevation (m AOD)
Knockan	333943	847008	255
Tombain	333643	846175	275
Easterton	336983	845094	269
Tenanton	337365	845124	231
Gateside	336755	847587	270
Ardoch	334303	848674	228
Curlusk	336555	849029	207
Cabbachs	336848	848683	209
Mains of Boddinfinnoch	337388	848593	221
Mains of Towiebeg	338446	845644	206
Cachenhead	337726	845302	222
Mill of Towie Farm	339991	847155	210

TABLE 13 - Distance from Each Dwelling to Nearest Turbine

House Name	Distance (m)
Knockan	1151
Tombain	1201
Easterton	1048
Tenanton	1280
Gateside	1003
Ardoch	1437
Curlusk	1535
Cabbachs	1547
Mains of Boddinfinnoch	1300
Mains of Towiebeg	1123
Cachenhead	1187
Mill of Towie farm	1887

3.5.2.2 Calculation of Noise Levels at Nearby Neighbours

Five wind speeds have been considered; 6 ms⁻¹, 7 ms⁻¹, 8 ms⁻¹, 9 ms⁻¹, & 10 ms⁻¹ at 10m height. Table 14 shows predicted noise levels at nearby dwellings due to the operation of the wind farm alone (no background noise). Predicted noise levels at all speeds are relatively low, with the maximum level for any house and any wind speed never exceeding 35.8 dB(A). Predicted noise levels at a wind speed of 8 ms⁻¹ are also low, being a maximum of 34.9dB(A) at Gateside, and a minimum of 22.3 dB(A) at Mill of Towie Farm. At 10 ms⁻¹, the maximum noise level is 35.8 dB(A) at Gateside, and the minimum is 23.2dB(A) at Mill of Towie Farm. Figure 6 shows predicted noise levels.

TABLE 14 - Predicted Noise Levels At Nearby Dwellings (dB(A) re 20 μ Pa)

House Name	Reference Wind Speed (v_{10}) / ms^{-1}				
	6	7	8	9	10
Knockan	31.0	31.8	32.4	32.9	33.3
Tombain	29.7	30.5	31.1	31.6	32.0
Easterton	25.6	26.4	27	27.5	27.9
Tenanton	25.8	26.6	27.2	27.7	28.1
Gateside	33.5	34.3	34.9	35.4	35.8
Ardoch	26.6	27.4	28	28.5	28.9
Curlusk	27.0	27.8	28.4	28.9	29.3
Cabbachs	28.0	28.8	29.4	29.9	30.3
Mains of Boddinfinnoch	28.8	29.6	30.2	30.7	31.1
Mains of Towiebeg	26.6	27.4	28	28.5	28.9
Cachenhead	28.3	29.1	29.7	30.2	30.6
Mill of Towie Farm	20.9	21.7	22.3	22.8	23.2

3.5.3 Noise Assessment

Table 15 shows a comparison of the predicted noise levels with the recommended daytime noise limits for each house. The term ΔL is used to denote the difference between the predicted wind farm noise level and the recommended limit. A negative value indicates that the predicted noise level is within the limit. Table 16 shows a comparison with the recommended night time noise limits.

Noise levels at all houses are within the daytime limit and night time noise limits at all wind speeds.

At reference wind speed, 8 ms^{-1} , the noise levels are between 2.8 and 20.8 dB(A) below the required daytime limits, while at 10 ms^{-1} , the margins are between 8.1 and 26.8 dB(A). Night-time margins are at least 7.6 dB(A) at all dwellings and at all wind speeds.

3.5.4 Conclusions

The acoustic impact for the amended layout on the local environment has been assessed in accordance with the latest guidance on wind farm noise assessment as issued in the DTI publication 'The Assessment and Rating of Noise from Wind Farms'.

An assessment has been made of the noise impact of the proposed wind farm at Drummuir. Noise levels were predicted at 12 properties. At all of these properties the predicted noise levels was 35.8 dB(A) or below at all investigated wind speeds.

Background noise measurements were made at Gateside, Easterton and Knockan. The measured background noise levels were used to determine required noise limits, as specified by the DTI's Noise Working Group (ETSU/DTI, 1996).

The DTI NWG Guidelines recommend that the allowable wind farm noise limit be set to 5dB(A) above the measured background noise level, except where the background noise level falls below 30dB(A) to 35dB(A) in which case the limit should be fixed at an absolute level of between 35dB(A) and 40dB(A). Which limit is actually selected depends on a number of factors including the number of dwellings in the neighbourhood of the wind farm, the effect of the noise limits on the number of kWh generated and the duration and level of exposure. A higher noise level is permissible during night-time hours than during day-time ones, as it is assumed that residents would be indoors.

Noise levels at all houses are comfortably within the day-time limit and night-time noise limits at all wind speeds. At reference wind speed, 8 ms^{-1} , noise levels are at between 2.8 and 20.8 dB(A) below

the daytime noise limit. At the highest considered wind speed, 10 ms^{-1} , the noise levels are between 8.1 and 26.8 dB(A) below the required daytime limits. Night-time margins are at least 7.6 dB(A) at all dwellings and at all investigated wind speeds.

This assessment indicates that the increase in noise levels resulting from the operation of the proposed wind farm would be low at neighbouring dwellings in all wind speeds. The proposed wind farm would result in the recommended noise limits of the NWG being satisfied at all locations. The effect of the wind farm on the amenity of the local properties would therefore be minor.

TABLE 15 Comparison of Predicted Noise Levels and Recommended Day-Time Noise Limits (dB(A) re 20 µPa)

HOUSE NAME	REFERENCE WIND SPEED (v_{10}) / ms^{-1}														
	6			7			8			9			10		
	L_p	Limit	DL	L_p	Limit	DL	L_p	Limit	DL	L_p	Limit	DL	L_p	Limit	DL
Knockan	31.0	37.5	-6.5	31.8	43.4	-11.6	32.4	45.5	-13.1	32.9	48.1	-15.2	33.3	50.9	-17.6
Tombain	29.7	37.5	-7.8	30.5	43.4	-12.9	31.1	45.5	-14.4	31.6	48.1	-16.5	32.0	50.9	-18.9
Easterton	25.6	37.5	-11.9	26.4	39.4	-13.0	27.0	42.9	-15.9	27.5	46.5	-19.0	27.9	50.0	-22.1
Tenanton	25.8	37.5	-11.7	26.6	39.4	-12.8	27.2	42.9	-15.7	27.7	46.5	-18.8	28.1	50.0	-21.9
Gateside	33.5	37.5	-4.0	34.3	37.5	-3.2	34.9	37.7	-2.8	35.4	40.8	-5.4	35.8	43.9	-8.1
Ardoch	26.6	37.5	-10.9	27.4	43.4	-16.0	28.0	45.5	-17.5	28.5	48.1	-19.6	28.9	50.9	-22.0
Curlusk	27.0	37.5	-10.5	27.8	37.5	-9.7	28.4	37.7	-9.3	28.9	40.8	-11.9	29.3	43.9	-14.6
Cabbachs	28.0	37.5	-9.5	28.8	37.5	-8.7	29.4	37.7	-8.3	29.9	40.8	-10.9	30.3	43.9	-13.6
Mains of Boddinfinnoch	28.8	37.5	-8.7	29.6	37.5	-7.9	30.2	37.7	-7.5	30.7	40.8	-10.1	31.1	43.9	-12.8
Mains of Towiebeg	26.6	37.5	-10.9	27.4	39.4	-12.0	28.0	42.9	-14.9	28.5	46.5	-18.0	28.9	50.0	-21.1
Cachenhead	28.3	37.5	-9.2	29.1	39.4	-10.3	29.7	42.9	-13.2	30.2	46.5	-16.3	30.6	50.0	-19.4
Mill of Towie farm	20.9	37.5	-16.6	21.7	39.4	-17.7	22.3	42.9	-20.6	22.8	46.5	-23.7	23.2	50.0	-26.8

TABLE 16 Comparison of Predicted Noise Levels and Recommended Night-Time Noise Limits (dB(A) re 20 µPa)

HOUSE NAME	REFERENCE WIND SPEED (v_{10}) / ms^{-1}														
	6			7			8			9			10		
	L_p	Limit	DL	L_p	Limit	DL	L_p	Limit	DL	L_p	Limit	DL	L_p	Limit	DL
Knockan	31.0	43.0	-12.0	31.8	43.0	-11.2	32.4	43.8	-11.4	32.9	47.1	-14.2	33.3	51.3	-18.0
Tombain	29.7	43.0	-13.3	30.5	43.0	-12.5	31.1	43.8	-12.7	31.6	47.1	-15.5	32.0	51.3	-19.3
Easterton	25.6	43.0	-17.4	26.4	43.0	-16.6	27.0	43.0	-16.0	27.5	44.3	-16.8	27.9	47.6	-19.7
Tenanton	25.8	43.0	-17.2	26.6	43.0	-16.4	27.2	43.0	-15.8	27.7	44.3	-16.6	28.1	47.6	-19.5
Gateside	33.5	43.0	-9.5	34.3	43.0	-8.7	34.9	43.0	-8.1	35.4	43.0	-7.6	35.8	43.4	-7.6
Ardoch	26.6	43.0	-16.4	27.4	43.0	-15.6	28.0	43.8	-15.8	28.5	47.1	-18.6	28.9	51.3	-22.4
Curlusk	27.0	43.0	-16.0	27.8	43.0	-15.2	28.4	43.0	-14.6	28.9	43.0	-14.1	29.3	43.4	-14.1
Cabbachs	28.0	43.0	-15.0	28.8	43.0	-14.2	29.4	43.0	-13.6	29.9	43.0	-13.1	30.3	43.4	-13.1
Mains of Boddinfinnoch	28.8	43.0	-14.2	29.6	43.0	-13.4	30.2	43.0	-12.8	30.7	43.0	-12.3	31.1	43.4	-12.3
Mains of Towiebeg	26.6	43.0	-16.4	27.4	43.0	-15.6	28.0	43.0	-15.0	28.5	44.3	-15.8	28.9	47.6	-18.7
Cachenhead	28.3	43.0	-14.7	29.1	43.0	-13.9	29.7	43.0	-13.3	30.2	44.3	-14.1	30.6	47.6	-17.0
Mill of Towie farm	20.9	43.0	-22.1	21.7	43.0	-21.3	22.3	43.0	-20.7	22.8	44.3	-21.5	23.2	47.6	-24.4

3.6 SUMMARY

The summary of effects table included within the original EIS has been updated to summarise the effects of the amended layout, see Table 17 below. The full key and explanation of significance is contained within the original EIS and should be referred to when reading the table below.

TABLE 17 Summary of Effects (for quick reference only, please read in conjunction with relevant sections of the original EIS)

Topic Area	Description of Possible Effect	Sensitivity of Baseline Environment	Magnitude	Significance	Mitigation Measure(s)	Significance after Mitigation/ Residual Impact
Landscape and Visual	1. Minor road through site C55H (panorama)	Medium	Substantial	Major	See Section 4 of the EIS	Major
	2. West edge of Keith on B9014	Medium	Moderate	Moderate	See Section 4 of the EIS	Moderate
	3. Keith Centre (Reidhaven Square)	High	Moderate	Moderate	See Section 4 of the EIS	Moderate
	4. West edge of Dufftown	High	Moderate	Moderate	See Section 4 of the EIS	Moderate
	5. Charlestown of Aberlour	Residents – High Road users - Medium	Moderate	Moderate	See Section 4 of the EIS	Moderate / minor
	6. Drummuir/Newburgh on B9115 (at high point)	Residents – High Road users - Medium	Substantial	Major Major / moderate	New layout re-positions turbines 15 and 16, plus micro-sites other turbines to achieve the best visual appearance from this viewpoint.	Major Major / moderate
	7. Balvenie Castle	High	No change	None	See Section 4 of the EIS	None
	8. Buckie	High	No change	None	See Section 4 of the EIS	None
	9. Minor road to north of A95 north of site between Loanhead Cottages and Bush Farm	Medium	Substantial	Major / moderate	See Section 4 of the EIS	Major / moderate
	10. A95 West of site nr entrance to Knockan or Tombaan	Medium	Substantial	Major / moderate	See Section 4 of the EIS	Major / moderate
	11. A941 SW of site nr Midtown of Buchrumb	Medium	Negligible	Minor	See Section 4 of the EIS	Minor
	12. A96(T) Between Keith and Huntly nr Newtack	Medium	No change	None	See Section 4 of the EIS	None
	13. A96(T) Between Keith and Fochabers(set back lay-by on west side of road at/near Forgie)	Medium	Moderate	Moderate	See Section 4 of the EIS	Moderate
	14. B9103 near Inchberry (road entrance to Deanshillock)	Medium	Moderate	Moderate	See Section 4 of the EIS	Moderate
	15. B9014 at turn off to minor road to Loch Park Activity Centre	Medium	Substantial	Major / moderate	See Section 4 of the EIS	Major / moderate
Cumulative Visual	C1 Ben Aigan (trig point)	High	Moderate	Major / moderate	Routing of main site track on east side of Knockan. Use of spurs downslope behind turbines. Reinstatement of turbine tracks on west side of site from 5m to 3.5m width to minimise visual effect.	Major / moderate

TABLE 17 Summary of Effects (cont). (for quick reference only, please read in conjunction with relevant sections of the full ES)

Topic Area	Description of Possible Effect	Sensitivity of Baseline Environment	Magnitude	Significance	Mitigation Measure(s)	Significance after Mitigation/ Residual Impact
Cumulative Visual (cont.)	C2 Ben Rinnes (trig point)	High	Slight	Moderate / minor	See Section 4 of the EIS	Moderate / minor
	C3 East of Archiestown (on B9102 between Ladycroft and Auld Mill)	Medium	No cumulative change	No cumulative significance Moderate effect on visual amenity	See Section 4 of the EIS	No cumulative significance Moderate effect on visual amenity
	C4 Elgin (monument)	High	Negligible	Minor	See Section 4 of the EIS	Minor
Additional Cumulative Viewpoints	AC1 Bin Forest	High	Slight	Moderate / minor	See Section 4 of the EIS	Moderate / minor
	AC2 Tap o'Noth	High	Slight	Minor	See Section 4 of the EIS	Minor
	AC3 The Buck	High	Negligible	Minor	See Section 4 of the EIS	Minor
	AC4 Leys of Dummuies	Medium	Slight	Minor	See Section 4 of the EIS	Minor
	AC5 A96(T) between Keith and Huntly near Newtack	Medium	None	None	See Section 4 of the EIS	None
Ecology	Plant communities: loss of habitat					
	Blanket bog (M19)	Medium	Up to medium	Low	Design, floating road, PEP	Very low
	Blanket bog pool (M2)	Medium	Negligible	Very low	Design, PEP	Very low
	Wet dwarf shrub heath (H13)	Medium	Low	Low	Design, PEP	Very low
	Acid flush (M6)	Medium	Low	Low	Design, floating road, PEP	Very low
	Dry dwarf shrub heath (H12)	Medium	Low	Low	Design	Very low
	Plant species: loss					
	Lesser twayblade	Medium	Low	Low	Design	Low
	Chickweed wintergreen	Low	Low	Very low	None required	Very low
	Round-leaved sundew	Low	Low	Very low	None required	Very low
	Marsh lousewort	Low	Low	Very low	None required	Very low
	Common cow-wheat	Low	Low	Very low	None required	Very low
	Marsh cinquefoil	Low	Low	Very low	None required	Very low
	Bog mosses	Low	Low	Very low	None required	Very low
	Non-avian fauna: damage to setts					
	Badger	Medium	Low	Low	Design, pre-construction survey and micro-siting	Low
Ornithology	Direct habitat loss					
		Up to high	Low	Up to low	None required	Up to low
	Collisions risk - species breeding in the study area:					
	Red Grouse	Low	Low	Very low	None required	Very low
Snipe	Low	Low	Very low	None required	Very low	

Note: PEP = Peatland Enhancement Plan

TABLE 17 Summary of Effects (cont). (for quick reference only, please read in conjunction with relevant sections of the full ES)

Topic Area	Description of Possible Effect	Sensitivity of Baseline Environment	Magnitude	Significance	Mitigation Measures(s)	Significance after Mitigation/Residual Impact	
Ornithology (cont)	Curlew	Low	Low	Very low	None required	Very low	
	Skylark	Medium	Low	Low	None required	Low	
	Meadow pipit	Low	Low	Very low	None required	Very low	
	Dunnock	Low	Negligible	Very low	None required	Very low	
	Stonechat	Low	Negligible	Very low	None required	Very low	
	Mistle thrush	Low	Negligible	Very low	None required	Very low	
	Song thrush	Medium	Negligible	Very low	None required	Very low	
	Willow warbler	Low	Negligible	Very low	None required	Very low	
	Redpoll	Low	Negligible	Very low	None required	Very low	
	Linnet	Medium	Negligible	Very low	None required	Very low	
	Collision risk - other species:						
	Hen harrier	High	Negligible	Low	None required	Low	
	Other schedule 1 species	Medium	Low/ negligible	Low	None required	Low	
	Black grouse	Medium	Negligible	Very low	None required	Very low	
	Migrants	Medium (max.)	Low	Low	None required	Low	
	Kestrel	Low	Low	Very low	None required	Very low	
	Other low sensitivity species	Low	Low	Very low	None required	Very low	
	Disturbance-species breeding in study area						
	Red Grouse	Low	Medium	Low	None required	Low	
	Snipe	Low	Medium	Low	None required	Low	
	Curlew	Low	Medium	Low	None required	Low	
	Skylark	Medium	Low	Low	None required	Low	
	Meadow pipit	Low	Low	Low	None required	Low	
	Dunnock	Low	Low	Very low	None required	Very low	
	Stonechat	Low	Low	Very low	None required	Very low	
	Mistle thrush	Low	Low	Very low	None required	Very low	
	Song thrush	Medium	Negligible	Very low	None required	Very low	
	Willow warbler	Low	Low	Very low	None required	Very low	
Redpoll	Low	Low	Very low	None required	Very low		
Linnet	Medium	Low	Low	None required	Low		

TABLE 17 Summary of Effects (cont). (for quick reference only, please read in conjunction with relevant sections of the full ES)

Topic Area	Description of Possible Effect	Sensitivity of Baseline Environment	Magnitude	Significance	Mitigation Measures(s)	Significance after Mitigation/Residual Impact
Ornithology Cont.	Disturbance - other species:					
	Hen harrier	High	Negligible	Low	None required	Low
	Other schedule 1 species	Medium	High (if nesting <500m from turbines during construction)	High	Pre-construction survey and avoid construction in that area during breeding season if present at that time	Low
	Black grouse	Medium	Low/ negligible	Low	None required	Low
	Migrants	Medium (max.)	Nil	-	None required	-
	Kestrel	Low	Low	Very low	None required	Very low
	Other low sensitivity species	Low	Low	Very low	None required	Very low
Cultural Heritage and Archaeology	Site 1 – no effects predicted	Unknown	Negligible	Negligible to low	None required	N/a
	Site 2 – access tracks to T17-T19 and T21 will intersect this field bank	Medium	Medium	Moderate	None proposed, an adequate record of this site has already been obtained	N/a
	Site 3 – access track between T17 and T18 will intersect the line of grouse butts	Medium	Uncertain	Uncertain	None proposed, an adequate record of this site has already been obtained	N/a
	Site 4 – no effects predicted	Medium	Negligible	Negligible/low	None required	N/a
	Site 5 – no effects predicted	Low	Negligible	Negligible	None required	N/a
	Site 6 – no effects predicted	Unknown	Negligible	Negligible to low	None required	N/a
	Site 7 – no effects predicted	Low	Negligible	Negligible	None required	N/a
	Site 8 – no effects predicted	Unknown	Negligible	Negligible to low	None required	N/a
	Site 9 – T15 lies on the line of this former track	Low	Low	Low	None proposed, an adequate record of this site has already been obtained	N/a
	Site 10 – no effects predicted	Unknown	Negligible	Negligible to low	None required	N/a
	Site 11 – no effects predicted	Medium	Negligible	Negligible/low	None required	N/a
	Site 12 – access tracks between T5 and T6 will intersect the line of grouse butts	Medium	Uncertain	Uncertain	None proposed, an adequate record of this site has already been obtained	N/a
	Site 13 – no effects predicted	Medium	Negligible	Negligible/low	None required	N/a

TABLE 17 Summary of Effects (cont.) (for quick reference only, please read in conjunction with relevant sections of the full ES)

Topic Area	Description of Possible Effect	Sensitivity of Baseline Environment	Magnitude	Significance	Mitigation Measures(s)	Significance after Mitigation/Residual Impact
Cultural Heritage and Archaeology cont.	Site 14 – no effects predicted	Unknown	Negligible	Negligible to low	Watching brief at T3 and T7 in vicinity	Negligible to low
	Site 15 – no effects predicted	Unknown	Negligible	Negligible to low	None required	N/a
	Site 16 – this track will be disturbed by an access track to T8	Low	Low	Low	None proposed, an adequate record of this site has already been obtained	N/a
	Site 17 – no effects predicted	Unknown	Negligible	Negligible to low	None required	N/a
	Site 18 – no effects predicted	Medium	Negligible	Negligible/low	Mark off cairn close to T12 during construction to avoid accidental damage	Negligible/low
	Site 19 – no effects predicted	Low	Negligible	Negligible	None required	N/a
	Site 20 – no effects predicted	Unknown	Negligible	Negligible to low	None required	N/a
	Site 21 – the route of this track will be disturbed by a borrow pit and T17, and will be intersected by access tracks to T18-19	Low	Medium	Low/moderate	None proposed, an adequate record of this site has already been obtained	N/a
	Site 22 – the route of this track will be disturbed by T21 and possibly also intersected by an access track to T21	Low	Low	Low	None proposed, an adequate record of this site has already been obtained	N/a
	Site 23 – the route of this track will be intersected by the access track between T16 and T17	Low	Low	Low	None proposed, an adequate record of this site has already been obtained	N/a
	Site 24 – no effects predicted	Low	Negligible	Negligible	None required	N/a
	Site 25 – the route of this track will be disturbed by T6 and intersected by three access tracks	Low	Medium	Low/moderate	None proposed, an adequate record of this site has already been obtained	N/a
	Site 26 – no effects predicted	Low	Negligible	Negligible	None required	N/a
	Site 27 – no effects predicted	Low	Negligible	Negligible	None required	N/a
	Site 28 – no effects predicted	Medium	Negligible	Negligible/low	None required	N/a
Site 29 – no effects predicted	Low	Negligible	Negligible	None required	N/a	
Site 30 – a track will be intersected by the access track to T13 and T14	Low	Low	Low	None proposed, an adequate record of this site has already been obtained	N/a	

TABLE 17 Summary of Effects (cont.) (for quick reference only, please read in conjunction with relevant sections of the full ES)

Topic Area	Description of Possible Effect	Sensitivity of Baseline Environment	Magnitude	Significance	Mitigation Measures(s)	Significance after Mitigation/Residual Impact
Hydrology	Increase in runoff volumes	Medium	Low	Low/ Moderate	<ul style="list-style-type: none"> Access track layout designed to minimise changes in runoff volumes 	Negligible
	Increase in erosion leading to sediment input in to watercourses	Medium	Low	Low/ Moderate	<ul style="list-style-type: none"> Access tracks have been designed to quickly shed runoff and avoid surface erosion Runoff entering borrow pits will be filtered and discharge with SEPA approval Drainage will be designed to minimise flow rates 	Low
	Increase in pollution risk to watercourses	Medium	Low	Low/ Moderate	<ul style="list-style-type: none"> Turbines have been located away from watercourses Best practice guidance will be adhered to, to include SEPA guidance Watercourse crossings have been avoided Activities in the Burn of Tauchers and Burn of Rosaire catchment have been minimised 	Negligible
	Increase in pollution risk to groundwater	Medium	Low	Low/ Moderate	<ul style="list-style-type: none"> Sulphate resistant concrete will be used for turbine foundations Best practice guidance will be adhered to, to include SEPA guidance 	Negligible
	Impedement to flows	Medium	Low	Low/ Moderate	<ul style="list-style-type: none"> Lateral road drainage will allow for continued drainage of the site Floating roads and drainage pipes beneath these sections will avoid impedement 	Negligible
	Change in channel morphology	Medium	Low	Low/ Moderate	<ul style="list-style-type: none"> Watercourse crossing have been avoided so that no disturbance to channels occur 	Negligible

TABLE 17 Summary of Effects (cont.) (for quick reference only, please read in conjunction with relevant sections of the full ES)

Topic Area	Description of Possible Effect	Sensitivity of Baseline Environment	Magnitude	Significance	Mitigation Measures(s)	Significance after Mitigation/Residual Impact
Hydrology (cont.)	Changes to natural catchment areas	Medium	Negligible	Negligible/ Low	<ul style="list-style-type: none"> Minimal changes to the catchment areas of the Burn of Tauchers and Burn of Rosaire to protect water quality 	Negligible
Transport and Access	Disturbance to local residents during construction	Medium	Medium	Moderate	Traffic management and road widening	Low
	Driver distraction	Low	Low	Low	None required	Low
	Operation and maintenance traffic	Low	Negligible	Negligible	None required	Negligible
Acoustics	Noise levels at nearby dwellings	Medium	Low	Low/Moderate	None required	Low/Moderate
Socio-Economic	Effect on local economy	Medium	Low	Low/Moderate (positive)	None required	Low/Moderate (positive)
	Public safety	Low	Negligible	Negligible	None required	Negligible
	Public Access	Low	Negligible	Negligible	None required	Negligible (positive effect possible if opportunities for widening public access network with wind farm tracks pursued)
	Tourism	Medium	Low	Low/Moderate (positive)	None required	Low/Moderate (positive)
	Education	Medium	Low	Low/Moderate (positive)	None required	Low/Moderate (positive)
	Shadow flicker	Low	Low	Low	Separation distance from dwellings	Low
EMI	Interference with TV reception	Medium	Medium	Moderate	See Section 10 in EIS	Negligible
	Interference with radio/microwave communication	Medium	Medium	Moderate	Microwaves avoided by layout design	Negligible
	Interference with air traffic control	Low	Low	Negligible	None required	Negligible

APPENDICES

Appendix 1 Peat Depth Survey Report and Drawing

Appendix 2 Photomontage Method Statement

Appendix 3 Photographic Specification

Appendix 4 Aultmore and Clashindarroch Wind Farm Cumulative Visual Assessment



**Drummuir Estate Wind Farm Site Investigation
Report 24th & 25th March 2003**

Report No: 01184R00176

Issue No: 01

Classification: COMMERCIAL IN CONFIDENCE

Prepared: **Paula Clark** Signed Electronically 1 April 2003

Checked: **Danny Bonnett** Signed Electronically 1 April 2003

Approved: **Danny Bonnett** Signed Electronically 1 April 2003

1.0 INTRODUCTION

A site visit to the Drummuir Wind Farm site was undertaken by Paula Clark of RES and James Whiteford and Alistair Burns of Whiteford Geoservices on 24th and 25th March 2003. The purpose of the visit was to take peat depth measurements along the route of the proposed road alignment, at each turbine, and mast location, and at the borrow pit, substation and compound locations, with a view to refining the layout design. The weather was sunny and dry, with some cloud cover. The routes and locations investigated are based on turbine layout SCODRM024 and all turbine numbers referred to in this report relate to that particular layout. This report should be read in conjunction with drawing 01184D309-01.

2.0 DESCRIPTION OF THE ROUTE

2.1 Site Entrance

The site is accessed from a C class road off the A95 approximately 4.5km west of Keith. This road separates the east and west site, and access to the site roads will be gained via a staggered junction on this road.

3.0 GENERAL DESCRIPTION OF THE SITE

The site comprises gently rolling terrain with maximum gradients of around 8%. The vegetation is predominantly heather with some young coniferous trees. The land bounding the site is either pasture or dense coniferous plantation. Several watercourses of varying sizes were encountered but most of these were dry and vegetated over at the time of the visit.

At many locations over the site, small rocks and cobbles were encountered on the ground surface. It was possible to observe the underlying geology at several locations (existing dirt tracks, dry stream beds and the excavations for met mast anchor blocks) where the upper peat layer had been removed. The geology at these locations appeared to be a shallow layer of peat over a layer of gravel and cobbles of hard metamorphic rock (two distinct types) overlying a layer of sedimentary rock (possibly shale) which is highly decayed at the surface.

4.0 OBSERVATIONS

Location	Comments	Conclusion
T1	Dry, firm ground with 0.5m peat	OK
T2	Dry, firm ground with shallow peat	OK
T3	Near to bridle way (in use) on dry, firm ground	OK
T4	Dry, firm ground with shallow peat	OK
T5	Dry, firm ground with shallow peat Road between T5 and T6 crosses several water course which were dry and vegetated at the time of the visit.	OK – install under track drainage where ditches are crossed
T6	Dry, firm ground with shallow peat Road between T6 and T15 skirts around wetland	OK Floating road

	area defined in hydrology report. The ground was investigated further south to avoid crossing this area, however, strips of wet ground extending out of this area towards the site boundary would still be crossed by this alternative route.	construction will be required.
T7	Dry, firm ground with shallow peat	OK
T8	Dry, firm ground with shallow peat Lots of small rocks on surface adjacent to road	OK Looks like good ground conditions for borrow pit
T9	Dry, firm ground with shallow peat	Ok
T10	Dry, firm ground with shallow peat	OK
T11	Dry, firm ground with shallow peat	OK
T12	Several small isolated ponds near T12, and near track alignment south of T12 Track crosses over man made ditches up to 1m deep just to north of T12	OK – under track drainage required where ditches are crossed
T13	Dry, firm ground with shallow peat	OK
T14	Dry, firm ground with shallow peat	OK
T15	Dry, firm ground outside of wetland area	OK
T16	Dry, firm ground at time of visit Road alignment between T16 and T17 crosses hydrology area requiring mitigation as defined in consultant's report. This appeared to be a, broad, shallow channel which was wetter than the surrounding ground, with wetland vegetation. This channel links a pond to the north and a tributary to the south.	OK – float road over wetland channel (up to 50m).
T17	Dry, firm ground with shallow peat	OK
T18	Dry, firm ground with shallow peat Observed lots of rock at surface on ground adjacent to T8 spur road – potentially good conditions for borrow pit.	OK
T19	Dry, firm ground with shallow peat	OK
T20	Dry, firm ground with shallow peat Spur road to T20 crosses small wet area	OK – extra drainage measures possibly required for road
T21	Dry, firm ground with shallow peat	OK
Mast 1 (near T11)	Dry, firm ground with shallow peat	OK
Mast 2 (near T20)	Dry, firm ground with shallow peat. Deeper vegetation.	OK
Substation	Gently rolling terrain, dry firm ground with shallow peat. B9115 road not visible from this location due to forestry to south and east.	OK

Temporary compound	Firm, flat, dry ground.	OK
Borrow Pit 1 (near T4)	Old borrow pit location close to T3 is visible from key viewpoint to west (Ben Aigen) and is located away from the new track alignment. New borrow pit location closer to T4 is on dry firm ground with shallow peat, and is at same elevation.	New borrow pit location OK.
Borrow Pit 2 (near T14)	Old borrow pit location visible form key viewpoint to west. Peat depths over 0.5meters. New borrow pit location to south east (near to T14) is on dry firm ground with very shallow peat.	New borrow pit location OK.
Borrow Pit 3 (near T17)	Old borrow pit location adjacent to road near T17 is on flat, dry firm ground. B9115 road cannot be seen from this location due to screening from forestry. New borrow pit location is at slightly lower elevation with deeper vegetation and less firm ground. Additional track required to link with main alignment. Peat depth over 0.5m.	Old borrow pit location OK. New borrow pit location does not seem as suitable. Could be investigated further with trial pit.

5.0 CONCLUSIONS

5.1 Turbine Locations

Turbine locations were located using a hand held GPS. All turbine locations were in firm dry ground with shallow peat of less than 0.6m depth. Table 1 below summarises the peat depth at each turbine location.

Turbine location number	Peat depth (m)
1	0.49
2	0.23
3	0.36
4	0.55
5	0.13
6	0.08
7	0.14
8	0.06
9	0.38
10	0.4
11	0.3
12	0.05
13	0.16
14	0.06
15	0.15
16	0.19
17	0.16
18	0.23
19	0.13
20	0.31
21	0.07

Table 1 – Peat depths at turbine locations

5.2 Site Roads

Gradients along the proposed alignment are acceptable. For the majority of the route the ground conditions are favorable for excavated road construction, with peat depths less than 0.6m, and dry, firm ground. The mean peat depth over the whole site was 0.24m, with 98.5% of locations tested giving measurements of less than 0.6m. The locations where peat depth exceeded 0.6m appeared to be isolated incidences, i.e. there was no indication of significant areas of deep peat. However, two short lengths of the alignment were over wetland, probably requiring floated road construction.

- The route between T15 and T6 was adjusted as the proposed alignment crosses an area of wetland identified in the hydrology consultant's report. The ground further south was investigated, with a view to changing the alignment. However curving the alignment further southwards adds approximately 100m to the road length (see 01184D309-01) and may still require floated construction since it crosses strips of wet ground which were found to extend out from the wetland area towards the site boundary.
- The alignment between T16 and T17 crosses a strip of wetland linking a pond to the north and tributary to the south. It will not be possible to avoid crossing this strip of land without major changes to the road alignment here, which would result in longer total track lengths.

5.3 Site Entrance and Access

The existing tarmac C road separating the east and west site has a 60mph speed limit and limited forward visibility in places due to a high degree of horizontal and vertical curvature. A staggered junction is proposed at the site entrance to prevent site traffic from cutting across this C road when traveling from one side of the site to the other.

The road to the north of the junction is fairly straight, however there is a degree of curvature to the south which may reduce visibility. This can be improved by moving the staggered junction further north along the road, this is shown on Figure 01184D309-01. Peat depths of the track accessing the eastern side of the site which has been relocated slightly to the north are expected to be similar to those prodded for the track slightly more to the south as peat depths appeared shallow and fairly uniform over the entire site.

5.4 Borrow Pit Locations

The borrow pit locations originally submitted for Planning were chosen due to their proximity to the original road alignment and ground condition suitability assessed on a site visit by an Engineer. However, these locations will likely be visible from the key view points Ben Aigen and the B9115 and the two pits in the west site are not close to the new road alignment. New locations have been proposed based on a desk study of the terrain and hydrology/ecology consultants' reports, with a view to keeping the pits close to the new road alignment.

The alternative locations have been sited relatively close to, and at the same elevation as, the original locations. The two new locations in the west site are suitable.

The new location in the east site does not appear to be as suitable as the original location in terms of ground conditions; both locations appear to be screened from the B91105 by forestry at present.

5.5 Substation Location

The proposed substation location is within an area of gently rolling terrain, with firm dry ground conditions. This location is screened from the B9115 by forestry and appears to be the most suitable location within the east part of the site.

5.6 Temporary Compound Location

The proposed temporary compound location originally submitted for Planning Approval is not close to the new road alignment and a new position is proposed to the west of this. The new location is suitable, on relatively flat, firm, dry terrain, outside the nearby water catchment area identified in the hydrology consultant's report.

6.0 RECOMMENDATIONS

6.1 Turbine Layout

No changes to layout PSCODRM024 are required.

6.2 Road Alignment

The road alignment between T15 and T6 should remain as proposed on the amended layout plan, since this avoids the majority of the wetland area without substantial increase to the total track length. A short length of road (approximately 150m) will need to be floated as indicated on 01184D309-01.

Approx 50m of road between T16 and T17 should also be floated – see drawing 01184D309-01.

6.3 Substation Location

No change is required to substation location.

6.4 Temporary Compound Location

The new compound location should be adopted.

6.5 Borrow Pit Location

The new borrow pit locations within the west site should be adopted. The original location (submitted for Planning Approval) for the borrow pit in the east site should be kept.

Appendix 2 Photomontage Method Statement

The purpose of a photomontage is to help assess the wind farms visual impact by giving an idea of what the built wind farm will look like.

Initially, several viewpoints are chosen from which the wind farm will be visible. The points are chosen to give a representative sample of views of the proposed wind farm within the landscape. Viewpoints frequented by members of the public such as public rights of way, car parks and popular viewpoints are usually chosen, along with views from nearby settlements.

A photographer will then go and take a number of photographs from each location. The photographs taken should cover an arc of view necessary to take in the whole wind farm site and some of the surrounding landscape to give context and be centred on the middle of the proposed wind farm. The extent of the arc covered depends on what is needed to be included. For instance, if there are multiple wind farms the included angle may be a full 360°. A small arc of view would be 50° as this is approximately the viewing angle of the human eye.

Each photograph taken should overlap by at least 30-50% for two reasons. Firstly this helps remove any distortion in the combined photograph as only the centre of the individual photographs are used (least distorted area) and secondly it makes it easier to join the photographs together. It is preferred that the photographs are taken on a digital camera as this removes the need to scan and crop the individual photographs before processing. For both options it is very important that the images are of a high resolution (600dpi +) otherwise the turbines will not be very detailed in the final photomontage. Before joining the photographs together each image is analysed and edited if necessary to ensure that each adjoining image is similar in brightness, contrast and colour balance.

Two methods are used to combine the photographs. Software that greatly automates the panoramic production is available but these still need input from the user. The second method is to use standard photo editing software such as Photoshop and gradually bring each image onto a large canvas and manually align and blend the images.

At this stage a wire line diagram of the wind farm and surrounding terrain is generated using the wind farm design software package RESoft WindFarm to show how the photomontage will look. WindFarm requires the digital terrain data for the area, the turbine layout locations and the turbine geometry.

When the photographs have been merged the resulting image is then also brought into WindFarm. The photograph acts as a backdrop to the terrain and turbine wire line. The settings in the software are then adjusted to ensure that the photograph and wire line agree. It may be that the wire line needs to be adjusted if for instance the photographer was not able to stand at the proposed location or the photograph may need to be cropped if it covered a larger angle of view. It is possible to add exclusion zones on the photograph to stop turbines being rendered in certain locations where they actually would not be seen. This could occur if there was a tree in the foreground of the photograph.

When the photograph and wire line agree, the turbines are rendered and the wire line switched off. The resulting photomontage is then exported as a bitmap.

The finalised photomontage may then be aligned with its corresponding wire line for presentation. The last step in the process is to calculate at what distance the image should be viewed from so as to ensure the turbines are representative of what the eye would see.

Appendix 3 Photographic Specification Used for Drummuir Estate Wind Farm

1. Viewpoints

Photographs should be taken from the 19 viewpoints. Grid references with site descriptions and map locations are supplied.

2. Weather

Suitable weather conditions with good visibility should be chosen insofar as possible.

3. Equipment

The following equipment should be used ⁵:

- Cameras: Medium format or 35mm SLR camera
- Lens: 50mm fixed focal length lens
- Film: any good quality film
- Tripod, marked with ° intervals
- Spirit level
- Silva compass with adjustment
- 1:25,000 OS map

4. Taking the Viewpoint Photographs

Camera

- Medium format or 35m SLR camera should be used, and photographs taken with 50mm fixed focal length lens.
- All photographs should be taken using a tripod-mounted camera, with the camera horizontal.
- 3 overlapping frames should be taken at each location to provide continuous panoramas with the middle frame centred on the site (except for four of the viewpoints where wider panoramas will be required).

Lighting

- Photographs should be taken at each location whenever possible with the angle of sun behind the camera and at right angles, or obtuse to, the landscape being photographed.

Record Sheet

- A viewpoint record sheet should be completed for all of the locations, and preferably photographs taken of each of the locations with identifiable features, in order that the exact locations can be easily identified by others.

5. Developing and Processing

- The film should be processed by a professional print house.
- 2 sets of prints of all photographs should be supplied.

6. Delivery of Package/Outputs

The output of photography trial will consist of the following:

- A completed record sheet (pro forma attached) and map showing the viewpoint illustration locations.
- Two sets of paper prints for each location.

Enviros Aspinwall
June 2001

⁵ Focal length: For the Drummuir Estate wind farm a 35mm SLR format camera was used by Enviros for the viewpoint photography with high quality 35mm negative film at 100ASA. A series of overlapping photographs were taken from each viewpoint using the 35mm film format with a 50mm fixed focal length lens, as advised in guidelines on photomontage production in appendix 9 of the Guidelines for Landscape and Visual Assessment (Landscape Institute / Institute for Environmental Management and Assessment, 2nd Edition 2002).

Appendix 4 Aultmore and Clashindarroch Wind Farm Cumulative Visual Assessment

Aultmore

The ZVI for the proposed Aultmore wind farm is included below ⁶. The visibility pattern shown on the ZVI can broadly be described as follows.

Areas of greatest visibility, of 24 – 31 turbines, are distributed as follows:

- Area around the application site, such as Black Hill, Addie Hill, Sheil Muir;
- Much of the land area within 5km of the site centre;
- Within 5 – 10km in areas around Keith, Meikle Balloch Hill, scattered settlement near Grange Crossroads, Lurg Hill, Bin of Cullen, Buckie to Spey Bay along the coast, and Whiteash Hill;
- Beyond 10km visibility mainly consists of the broad band in the coastal area between Spey Bay and Lossiemouth / Elgin, and scattered areas of high ground to the south west, south and east of the study area, such as Findlays Seat, Brylach hill, Knockmore, Ben Aigan, Knockan, Hill of Towie, The Scalp, Clashmach hill, Fourman Hill, Gallow Hill and Hill of Cilbirnie;
- Main settlements with visibility include Keith, Buckie, Lossiemouth, Elgin (all of 24 – 31 turbines), Cullen, Portsay (of 16 – 23 turbines), Fochaber and Rothes (of 1 – 7 turbines).
- Settlements with no visibility of the wind farm include Dufftown, Huntly, Banff, Portknockie and Aberlour;
- Main roads with visibility include the A96 between Keith and The Balloch, and from Fochabers to Elgin. The A98 between Fochabers and Buckie, and between Cullen and Portsoy. There is limited, intermittent or distant visibility on the A95, A97, A920 and A941, with long stretches of no visibility.

On the whole the areas of greatest visibility of Aultmore wind farm are within a 10km radius of the site and in an extensive stretch along the coast between Buckie and Elgin / Lossiemouth. The remaining areas of visibility tend to be confined to elevated ground beyond 10km distance from the wind farm.

The proposed Aultmore Wind Farm is located approximately 6km from Drummuir Wind Farm. The main locations where there will be cumulative visual overlap between the Aultmore ZVI and the Drummuir ZVI are as follows:

- Areas within each site such as Knockan and Hill of Towie at the Drummuir site and Addie Hill, Black Hill and Sheil Muir at the Aultmore site;
- Area between the two sites in Strath Isla, around Keith and along the A95;
- Elevated ground near the two sites, such as Whiteash Hill, Millstone Hill, Theifs Hill, Knock More, Ben Aigan, Meikle Balloch Hill, Knock Hill and Lurg Hill;
- Broad band in coastal area between Spey Bay and Lossiemouth / Elgin;
- Scattered areas of high ground to the west and south such as Findlays Seat, Brylach Hill, Hunt Hill and the Scalp;

⁶ The co-ordinates which were used to produce the Aultmore and Clashindarroch ZVIs are the co-ordinates of preliminary layouts available from AMEC in April 2003 at the time of producing this document.

- Towns of Keith, Elgin and Lossiemouth;

On the whole the areas of greatest visibility of Drummuir and Aultmore would be the areas between the two sites, such as along Strath Isla. Within a 10km radius around Aultmore, mainly to the south of the site, there is also cumulative visibility of Glens of Foudland and Cairn Uish Wind Farms, but over longer distances.

Clashindarroch

The ZVI for the proposed Clashindarroch Wind Farm is included below. The visibility pattern on the ZVI can be broadly described as follows.

Areas of greatest visibility, of 36 – 47 turbines, are distributed as follows:

- Areas within or near the site boundary, or within 5km of the site centre, such as Mount of Haddoch, Black Hill, Cransmill Hill, Quarry Hill and parts of Clashindarroch Forest;
- Elevated ground between 5 – 10km of the site, such as The Buck, Tap o'Noth, Clashmach Hill, The Scalp, Carn Chrom and Meikle Firbriggs;
- Elevated ground beyond 10km and up to 25km from the wind farm, such as Ben Aigan, Ben Rinnes, Meikle Conval, Corryhabble Hill, Cooks Cairn, Cairn Brallan, Hill of Three Stones, Sand Hill, Letterach, Ladylea Hill, Broom hill, Scar hill, Coillochbhar Hill, Brox Hill, Mire of Midgates, Suie Hill, Black Hill, Winds Eye, Hill of Foudland and Fourman Hill;
- Within 5km of the site centre visibility tends to drop off quickly with distance into areas of visibility of 1 – 10 turbines or 12 – 23 turbines;
- Settlements with visibility include the A941, between Ballochford and Rhynie, the A920 between Aultnapaddock and Milton of Cairnborrow, the A97 between Rhynie and Lumsden, and the A96 between Keith and the Bin Forest. These sections often tend to be relatively short sections of the overall length of the roads in the study area, and offer intermittent visibility. Long sections of these roads offer no visibility of the wind farm. The A944, A980 and most of the A95 offer no visibility of the wind farm.

It can be seen that the areas with greatest visibility of the proposed wind farm tend to be located within 5km of the site, and beyond this distance on the higher elevated ground. Visibility drops off quickly with distance from the site and there are extensive parts of the study area with no visibility, especially to the south and west.

The proposed Clashindarroch Wind Farm is located approximately 7km from Drummuir Wind Farm. There is no visibility of the Drummuir turbines from the Clashindarroch site, however the Clashindarroch turbines will be visible from Hill of Towie and Knockan within the Drummuir site. Between the two sites, areas of cumulative visibility are relatively limited, scattered either side of the A920, but these areas offer closest visibility of the two sites. Wider areas of cumulative visibility are distributed over the elevated ground within 5 – 15km of both sites, such as The Scalp, Meikle Conval, Ben Rinnes, Lairds Seat, Carn Chrom, Clashmach Hill, Muckle Long Hill, The Bin and Meikle Balloch Hill.

Within a 10km radius around Clashindarroch there is also cumulative visibility of Glens of Foudland, as the next closest cumulative site at approximately 8km to the east. There is a very limited amount of cumulative visibility of Cairn Uish and Pauls Hill at distances of approximately 30km.